The purpose of IMPACT II is to spread excellent teaching ideas throughout Ventura County.

IMPACT II does this by partnering with local businesses and organizations to provide $500 individual and $750 team grants to educators for unique, original and innovative curriculum that has been classroom tested.

IMPACT II enables excellent teaching ideas to reach all teachers in the county, and raises community awareness of exemplary classroom practices. IMPACT II boosts teacher morale by recognizing innovative teaching through both grants and an annual awards dinner where we celebrate the true heroes and heroines in our communities.

Over the years Ventura County IMPACT II has matured into the program that we envisioned at its inception in 1993. Business leaders, teachers, and administrators are becoming aware of the program and are participating in unprecedented numbers.

The Ventura County IMPACT II program is a partnership between the Ventura County Office of Education, the Ventura County Star, and several Community Sponsors.

IMPACT II puts cutting edge classroom projects into the mainstream, turning students on to learning.

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InfoVisual Literacy: Science and the Common Core

Introduction
Across disciplines, there is a growing trend toward sophisticated, visual displays of information. With various types of personal and academic data available in our everyday lives, infographics and other modes of infovisual communication offer new perspectives and possibilities for reading and writing with and about informational texts. In this unit, students learned to read, evaluate, and compose scientific infographics.

Common Core Standards

CCSS.ELA-Literacy.W.9-10.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology’s capacity to link to other information and to display information flexibly and dynamically.

Objectives:
1) Students will know conventions of digitally produced and consumed info-visual texts so that they will be able to read/comprehend, analyze, evaluate, and create infographics.
2) Students will be able to use technology to produce, publish, and update digital writing projects.

CCSS.ELA-Literacy.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Objectives:
1) Students will use mentor texts to understand “what counts” as data for their infographics as well as where to locate information.
2) Students will evaluate sources and synthesize information into an info-visual text that communicates a coherent message or stance.

Curriculum

Content Area
The content area curriculum included chapters from our course textbook. These chapters included overviews and information about important environmental issues, like population growth, water supply & consumption, etc. Additional instruction included lessons on where to find credible information about these topics online.

Literacy & Genre
Because the performance task involved presenting information in a particular way, students needed to learn the conventions of infographic composition, including genre (text, media, etc.) and rhetorical moves (e.g. stance, using images to communicate, etc.). Troy Hicks’, Crafting Digital Writing, offered the notion of
“studying [author’s] craft with lenses” (pp. 14-23), which is why students interacted with several examples with the idea that they were reading like writers, even in a science class. Literacy instruction also included assistance on where to find openly-sourced images to avoid common (intentional/unintentional) copyright violations.

**Technical Knowledge**

This unit included two class periods in a computer lab, where students experienced a workshop model of technical instruction on elements they would use in their infographics. Such mini-lessons included how to change the canvas size in PowerPoint, how to layer images, how to create graphs and charts, how to save presentations or Prezis into images (e.g. JPEGs), and how to use Pixlr to edit images. Because the students worked in groups, they were able to account for varied familiarity with technical programs and choose the software with which they felt they could best complete this project.

**Design**

We used tips from Williams’ (2008) *Non-Designer’s Design Book* to teach students about four principles of design (Contrast, Repetition, Alignment, & Proximity) that enhance the aesthetic and readability of an infographics. Once they defined the principles and how to spot them in images, they deliberately tried to incorporate those principles into their drafts, and gave useful, specific feedback on other groups’ drafts.

**Lessons & Activities**

1. Complete content area unit (environmental issues: population growth, deforestation, etc.)
2. Read/comprehend/evaluate professional examples of infographics in order to understand the features of this genre (*read like a writer: What is an infographic?*).
3. “Issues Selection”: Assemble into groups by preference/interest in particular environmental issue. Learn where to find credible information and what “counts” as data.
4. Research an environmental issue, including causes/effects/implications.
5. Read/analyze student examples of infographics (*read like a writer: What did the writer do here? How is information represented?*)
6. Workshop: technical instruction in computer applications and design techniques (e.g. how to make graphs in MS Excel & MS PowerPoint; adjust canvas; layer images, etc.).
7. Storyboard infographic (using previous models as mentor texts) and evaluate needs (technical, data, design)
8. Explore Williams’ principles of design and use those principles as a lens for reading more infographic examples and constructing their own.
9. Complete a “submission draft” and publish to class web site. Give a brief overview of the image.
10. Conduct peer-review of published drafts by entering comments in the text fields below the image.
11. Use peer feedback to make revisions.
12. Publish revised infographics (and reflective annotations) to class web site.
Assessment

Formative assessments:

- Student responses to genre features of infographic examples (oral/written)
- Student responses to aesthetic choices the writers made in infographic examples (oral/written)
- Data collection/interpretation (written/group work)
- Drafts of in-progress infographics (online)
- Peer feedback (written, online)

Summative assessment:

- Submission draft of revised infographics. Submissions were assessed using a scoring guide, which considered environmental science-content criteria, information-visualization criteria, and the role of peer feedback for revision.

Effect on student learning & achievement

Students had agency to choose their topic, work with others who had similar interests, and to use technical applications with which they felt most comfortable or excited to try. In their reflections, students described the challenging nature of this assignment, but they appreciated learning to communicate much information in a succinct, visual way. They considered the role of their audience feedback for revision of their drafts. This project came toward summer, so it was a fun, rigorous way to explore content and real-world issues along-side “real-world” skills that can transfer to other contexts, like college/career. In fact, some were so inspired by their infographic that they actually extended the project to create infovideos.

Adaptations

The lesson sequence can be adapted in consideration of other grades, content-areas, and administrative calendars. Also, the unit is widely adaptable to other grade and content areas because it involves content and infovisual literacy. For example, students may collect personal data about themselves (e.g. hours spent on various tasks, money spent on certain items, etc.) to present a “personal” infographic early in the year. My collaborator used this model in
a class where student teachers were asked to create digital humanities infographics, etc. We hope that other teachers consider this project.
Figure 1. A snapshot of our class flickr.com group page, where all drafts were “published.”
Figure 2. The role of mentor texts (professional model) as examples for students to work from. The student example was a product from this unit.
Example of student feedback: Yeah I agree it is a bunch of writing. It looks more like a pamphlet and less like a graphic. Maybe it can be shortened by making smaller bullet points. For example, just by keeping mainly the bolded words in and the other more detailed words out. Or by representing some of the bullet points in graphics like you did for water uses in your "causes" section. But I did like that it was very thorough!

SUBMISSION DRAFT
Based on feedback from peers, this group revised their graphic to convey a message about implications of global warming.

Figure 3. This is an example of the role of peer feedback in revision. Peers noticed that the early draft discussed water shortage, but the image conveys plenty. The revised image sends a message of scarcity.
District: Ventura Charter School
School: Ventura Charter School
Participant(s): Shelly Ballmer

Lesson Plan Title: Making the Cut
Lesson Plan Grade Levels: 7, 8, 10, 12, 5, 11, 9, 6
Lesson Plan Subject Areas: Language Arts/Reading (SAGE Category), History/Social Science
A major motion picture producer, Mr. Hasalotta Cash, is making a movie on the Renaissance. He needs a cast of characters and a plot line so he can start production on this new blockbuster. He has hired your team to do his pre-production research.

In groups of five, students will form production companies, research a pitch as to the five most influential people and/or events of the Renaissance, and pitch their proposal to Mr. Hasalotta Cash. (I had our principal dress up as Mr. Hasalotta Cash. The class loved it!)

This innovative project involves extensive research, higher order thinking skills, technology, oral presentation, persuasive writing, and reflection. The students are highly engaged in their learning due to the relevant topic, lively competition, and creative activities.

The best practice of student-centered learning is embedded in the open-ended aspect of the assignment. Group work enables students to learn important interpersonal skills as well as content. The presentation gives students a possibility to develop important speech skills. Strong technology integration helps students develop important skills for both educational and career purposes. Lastly, the light-hearted fun of having an impersonator actually come as Mr. Hasalotta Cash engenders a fun and positive class culture where children enjoy learning.

Introduction:

A major motion picture producer, Mr. Hasalotta Cash, is making a movie on the Renaissance, called *The Big Shift*. He needs a cast of characters and a plot line (made up of influential events) so he can start production on this new blockbuster. He has hired your team to do his pre-production research! As a group, it is your job to put together a presentation to present to Mr. Cash, pitching your five most influential people or events. (Half of the groups will present on the five most influential people, and half of the groups will present on the five most influential events.)

Step One: Initial Research

Begin by familiarizing yourself with the Renaissance by visiting these sites.

- [Mr. Dowling's History](#)  [Renaissance Personalities](#)
- [Kids Past](#)  [Renaissance Interactives](#)
- [Renaissance Science](#)

Step Two: Begin Brainstorming

1. Read over the brainstorming guide. [What is brainstorming?](#)

2. Create a padlet account for each member. [http://padlet.com/](#)

3. One member creates a wall. Choose a background, picture, etc. Your wall MUST be named "Making the Cut" Brainstorming Group #_ (insert your group number). You may choose your own subtitle.
4. In the preferences box, while choosing the url, choose (insert an acronym for your school name) Choose "everyone" for both posting and viewing. Do not check the box for approving every post.

5. Each member, while logged in under their own padlet account, adds sticky notes by double clicking. Your note should say the name or event and the "because" statement. Add the url. Make sure the http:// is not there twice. Also, make sure you do not add a name or event that has already been posted. Read over every post.

6. Now that your padlet is VERY full, sit and look at it together as a group. Organize your thoughts on the worksheet Making the Cut Worksheet.

**Step Three: Glogster Posters**

Using Glogster.com create five posters, one for each event or person. Consider the following possibilities for content. **We need to see a connection between the criteria you used for determining influence and the poster. In other words, the poster proves the criteria table.**

**Step Four:  Create a Google Doc**

1. Title it: "Making the Grade" Final Links Group # ___. Also include: All student names, Group number. List Links in order: padlet wall, Google Doc "Choosing the Five Worksheet", and the five Glogster posters. Be sure you share it with me.

2. Feel free to make this document appealing with images, font, color, etc. Mr. Cash will see this documents as well as the links when you present. Make it appealing and polished!

**Step Five: Prepare and Present**

1. Mr. Cash will be coming on ______________ to hear your presentations. Practice as a group. Each member should share their Glogster poster. There should also be an introduction and a recap. Make sure your presentation is persuasive.

**Assessment**

The project is assessed in a detailed rubric. See attachment. Additional content assessment could be conducted on historical content. Self-assessment and teacher-assessment on group work is also gathered. See attachments.

**Adaptations**
Teachers can easily adapt this project idea to any history content they cover. Technology components can be adapted to accommodate students as young as fifth grade (Most Influential American Figure) to twelfth grade (Most Influential Piece of Legislature).

Standards

- **CCSS.ELA-Literacy.RH.6-8.7** Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

- **CCSS.ELA-Literacy.RH.6-8.10** By the end of grade 8, read and comprehend history/social studies texts in the grades 6–8 text complexity band independently and proficiently.

- **CCSS.ELA-Literacy.RH.6-8.2** Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.

- **CCSS.ELA-Literacy.RH.11-12.7** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

- **CCSS.ELA-Literacy.WHST.9-10.1a** Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

- **CCSS.ELA-Literacy.WHST.9-10.1b** Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience’s knowledge level and concerns.

- **CCSS.ELA-Literacy.SL.6.2** Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

- **CCSS.ELA-Literacy.SL.6.1a** Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
Additional Content Standards (According to Former California Content Standards for History-Social Studies)

1. Students analyze the origins, accomplishments, and geographic diffusion of the Renaissance.

2. Describe the way in which the revival of classical learning and the arts fostered a new interest in humanism (i.e., a balance between intellect and religious faith).

3. Explain the importance of Florence in the early stages of the Renaissance and the growth of independent trading cities (e.g., Venice), with emphasis on the cities’ importance in the spread of Renaissance ideas.

4. Understand the effects of the reopening of the ancient “Silk Road” between Europe and China, including Marco Polo’s travels and the location of his routes.

5. Describe the growth and effects of new ways of disseminating information (e.g., the ability to manufacture paper, translation of the Bible into the vernacular, printing).

6. Detail advances made in literature, the arts, science, mathematics, cartography, engineering, and the understanding of human anatomy and astronomy (e.g., by Dante Alighieri, Leonardo da Vinci, Michelangelo di Buonarroti Simoni, Johann Gutenberg, William Shakespeare).
Glogster Topics

Your group will be assigned to identify either the Most Influential People or the Most Influential Events

1. Birth/death

2. Training/Schooling

3. Significant achievements/contributions

4. Significant connections

5. Influence in his/her field

6. Major shifts in thinking or technology

7. Signs of his/her contribution today

8. What if? Statements

For events, you should include:

1. When and where

2. Who was involved

3. The forces at work

4. The cause of the event

5. The immediate effect of the event

6. The long-lasting effect of the event

7. Does this event show any new developments in thinking or technology?

8. Any other interesting facts, etc.
“Making the Cut” Choosing the Five Worksheet

1. What major themes or big ideas did you find in your initial investigations of the Renaissance? What came up a lot? What pictures did you see a lot?

2. What reasons did the group members put as to why they thought an event/person was influential?

3. Choose your definition. Split it up in as many parts as needed, ie. how many parts are there to your definition? Create a rating scale (numbers with statements, with 5 being the highest - most influential) for judging how influential someone is. There is no right or wrong answer here. This is your group’s judgment on what makes someone influential. What is important is that you can explain your reasoning. Insert a table below and fill in the top row with the ratings and the first column with the criteria.
4. Looking back at your wall, come to a consensus on the top 10. List them below. Using the table, list their scores on the five criteria and their total. Use this table to choose your top five.

Ex. Isaac Newton: 5 5 5 5 5 = 25.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

5. Put a colored asterisk next to the top five.
Reflection Questions

1. In what ways did this project match your learning style? Comment on group work, online research, online art, and presentation.

2. When and during what step of the process did you do your best work?

3. On what aspect of this project do you need the most improvement?

4. Give advice to yourself for the next time you do a project like this. Be specific. For example, do not 'work harder' or 'stay on task.' How are these things to be accomplished?
Extension Ideas

1. Design a movie poster

2. List the present day actors you would cast, and a description as to why they were chosen for that part.

3. Create a storyboard for the movie, or just one section of the movie.
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<td>Google Doc Final</td>
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<td>Some attempt</td>
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<td>to follow</td>
<td>organized and</td>
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<td>Needed to</td>
<td>appealing. There</td>
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<td>are little to</td>
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<td>time.</td>
<td>know errors, and</td>
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<td>images, etc.</td>
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<td>in proper order.</td>
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<td>Presentation</td>
<td>Presenters did</td>
<td>Portions of</td>
<td>Presenter mode:</td>
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<td>Outstanding</td>
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<td>not seem</td>
<td>the presentation</td>
<td>eye contact, clear</td>
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<td>presentation</td>
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<td>prepared. Not</td>
<td>were in</td>
<td>and audible voice,</td>
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<td>due to</td>
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<td>all members knew</td>
<td>'presenter mode'</td>
<td>animated,</td>
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<td>theatrics,</td>
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<td>the material.  Did</td>
<td>and displayed</td>
<td>engaged, and</td>
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<td></td>
<td>not present in</td>
<td>adequately</td>
<td>informed.</td>
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<td>or some other</td>
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<td>'presenter mode.'</td>
<td>prepared.</td>
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<td>innovative addition.</td>
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<tr>
<td>Rubric and Reflection</td>
<td>Incomplete or</td>
<td>Done hastily: Does not display a deep reflection</td>
<td>Complete and honest</td>
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<tr>
<td></td>
<td>missing.</td>
<td>- Does not display a deep reflection of the process. Some errors may be present.</td>
<td>of the process. No errors.</td>
<td></td>
<td>reflection and self-assessment. Well-crafted with no errors.</td>
</tr>
</tbody>
</table>
The Bubonic Plague was caused by a bacterium called Yersinia pestis, which belongs to the family Enterobacteriaceae. Fleas, lice, and squirrels carry the bacteria. The bacteria is usually spread through the bite of a fleas and can be transmitted to humans. The bacteria can also get inside you through a cut if you are handling one of the possibly infected animals.

Effects
The first signs of the Bubonic Plague were vomiting, giddiness, headaches, shivering, pale tongue, and sensitivity to light. Later symptoms were joint pain, broken blood vessels, and your skin turning black as a result of internal bleeding. You also developed large, painful boils near your sweat glands. The Black Death wiped out entire families and towns, killing around 25 million.
Johannes Gutenberg
And the Printing Press

Birth-Death

Birth
Most likely born in 1400.
Actual date is unknown.

Death
February 3, 1468

Personal Achievements
In 1445, China originally created movable clay type which sparked Gutenberg's interest to make his own invention. He borrowed money to create his invention that would someday change the printing world. He invented the printing press with replaceable and movable wooden or metal letters in 1456. This invention helped evolve science, art, and religion through text. Gutenberg was the first to print his own book called the Gutenberg Bible. New printing technology was developed over the centuries. This invention forever changed medieval towns in Europe. Johannes worked on the Catholicon of Johannes de Janua, which was a giant encyclopedia with many detailed pages.

Major Shifts in Technology
Before the printing press, books were written by hand and copied. Back in the medieval times, books were very expensive and only the wealthy people could afford them. The printing press produced so many books in such little time. Prices were lowered and the books became cheaper. This invention improved science, art, and religion through text. This new invention changed the way people

Gutenberg vs The Church
So, if Gutenberg's invention was so great, why did the church revolt against him? The Catholic Church was very old fashioned. They had beliefs that they believed should never be changed or improved. So, when Gutenberg invented this new age design, they thought that people would start to form their own beliefs and ideas based on
Leonardo da Vinci is a major influence on modern day science. He developed hundreds of inventions, few of which were actually finished and built. He had hundreds of pages of notes and sketches on each of his fields of interest.

Leonardo was incredibly intelligent - many of his ideas and inventions were centuries ahead of his time. For example, he sketched the first flying devices long before the Wright brothers developed the airplane with influence from Da Vinci's design.

In 1519, Da Vinci had a stroke and was left partially paralyzed and very ill. He died on May 2 of that year.
## Lesson Plan Details

**District:** Ventura Unified School District  
**School:** Foothill Technology High School  
**Participant(s):** Constance Carr, Kristen Pelfrey, Jennifer Kindred  

<table>
<thead>
<tr>
<th>Lesson Plan Title</th>
<th>America Eats</th>
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<tbody>
<tr>
<td>Lesson Plan Grade Levels</td>
<td>8, 10, 12, 11, 9</td>
</tr>
<tr>
<td>Lesson Plan Subject Areas</td>
<td>Language Arts/Reading (SAGE Category), History/Social Science, Science (AMGEN Category), Health</td>
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</table>
“America Eats” holds a spotlight to questions of nutrition, the American diet, the science and politics of farming, animal and worker treatment, organics, genetically modified foods, and the impacts of the industrialized food complex in the United States. "America Eats" ties together the nutrition, fitness, body systems, media literacy, research and speaking curriculums from health, PE, biology, English and our freshman technology survey course. Students focus on critical thinking, collaboration, discussion and debate, and are provided dynamic and interactive communication opportunities during the research, development and delivery phases of the project.

Students work in teams with peer coaches to prepare for a debate on value-based issues regarding the science and politics affecting the American diet. Through video, readings, research, discussion, and debate, students prepare arguments on student-generated resolutions. In culmination, students debate as a 12-person student congress. Debates are moderated by peers from the speech and debate team. Student participation is evaluated by staff members.

Each subject area sponsors debates and Socratic seminars during the months preceding the debate event. The benefits of the practice discussions include: familiarization with debate process; setting behavioral norms; coming to know each other in variety of class settings; and providing scaffolding and practice integrated into routine class activities.

Students work both independently and collaboratively on each phase of research; providing source material for one another via a moderated blog. Research resources address various facets of each issue to facilitate the development of multiple perspectives. Students craft, develop, and consolidate Congressional-style resolutions for the debate with guidance from instructors and peers from the speech and debate team. Assigned a key issue, students develop both a "pro" and "con" argument. Students participate in blogs and small group discussions on topics to gain additional perspectives. Students generate challenge questions for the final debate. Students write formal, 3 minute speeches for each argument. Speeches include elements of each "facet" or perspective.

Students attend seminars with volunteer peer coaches from the speech and debate team. The coaches are trained by our speech team advisor(s). Seminar topics include: writing resolutions; identifying claims, evidence and impacts; developing pro and con arguments; developing follow up questions; and appropriately and effectively challenging the opposition. Students view sample speeches, discuss proper attire and etiquette, and receive pointers for presentation style and skills. Two weeks prior to the debate, students are assigned either the pro or con side of their selected topic. With assistance from peers, the mentors from the speech and debate team, their advisory group leaders and their course instructors, students fine tune and practice their arguments in the days leading up to the culminating event.

On presentation day, students are assigned to rooms based on their topic. They hold a student congress under the moderation of an upperclassman peer coach. Students play the roles of Congressional committees. Resolutions are debated through a series of three-minute speeches, alternating between affirmation and opposition to a given bill or resolution. Speeches are designed to capture the attention of the audience and convince them to vote a certain way on the resolution. Assessors evaluate each speaker using a rubric during their 3 minute turn "on the floor", ranking speakers on their logic, organization, and eloquence. Students take notes throughout as they strategize their rebuttals to the opposition.

Following the debate, students undergo debriefing via an online survey. Students follow up with an outreach activity including, but not limited to, 1) writing to a government representative about their position on an issue, 2) contacting a political action committee or national organization that deals with their issue and seeing how they can "make a difference", 3) creating a poster (digital, then in print) for their position on a topic and posting on campus or in classroom, or 4) suggesting their topic to the PAAC club for an all-campus student debate.

“America Eats” is the annual integrated-project for each incoming freshman class, including (250+) freshman students, (21+) older student coaches, (12+) core instructors from (4-6) integrated curricular areas, in addition to administrators, counselors, faculty and community members who participate during the final debate event.

Standards from each subject are intertwined, taught, and reinforced throughout the project process. Those standards include, but are not limited to: 1) research and information fluency where students gather, evaluate, and use information; 2) critical thinking,
problem solving, and decision making where students plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources; 3) social interaction where students discuss the changing psychological and sociological needs of a diverse society in relation to physical activity; 4) students know how basic genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products; 5) students know a vital part of an ecosystem is the stability of its producers and decomposers; 6) students delineate and evaluate an argument and specific claims, assessing whether the reasoning is valid and the evidence is relevant and sufficient; 7) students cite strong and thorough evidence to support analysis, write arguments to support, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience’s knowledge level and concerns; and 8) construct viable arguments and critique the reasoning of others.

Every student becomes more aware as a consumer. “America Eats” promotes a "can do" culture where students have the common bond of doing a rigorous, college-preparatory level project. This bond carries throughout each student's high school years, where successive projects build a culture of student success. The integrated nature of this project shows the real-life connectedness and applications of a wide variety of disciplines, which promotes transfer of knowledge and skills in the future. Other indications of success of this curriculum is the interest demonstrated by the students as they watch and discuss the videos and topics, the increase in the amount of writing the students complete as their reflection deepens and they get more involved with the topics, and the enthusiasm the students show as they debate in front of an authentic audience from the community.
America Eats 2013 – Past Year

Calendars

Student Assignments Timeline

FIRE Support Dates

Presentation Day Schedule and Information – March 25th | The Debate Process | Speech Rubric

Student Lists

Topic Listing – Assigned by Student (Posted on Monday, February 4)

Pro or Con Speech – Assigned by Student (Posted on Friday, March 8)

WIKI

America Eats Debate Resolutions with Meeting Rooms, Coaches & FIRE Support Leaders (below)

| Topic 1 - Fast Food to All Food | Topic 2 - A Cornucopia of Choices |
| Topic 3 - Unintended Consequences | Topic 4 - The Dollar Menu |
| Topic 5 - In The Grass | Topic 6 - Hidden Costs |
| Topic 7 - From Seed to the Supermarket | Topic 8 - The Veil |

Blog

America Eats – Food Inc. Discussion @ blogspot.com

Videos

Food Inc.

Weight of the Nation

Hand-outs

DO: Topic Survey Form

DO: Food Inc. Study Guides & Socratic Discussions with Deepening Questions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

DO: DVD Review Worksheet

RESOURCE: DVD Review Discussion Notes
DO: Article Analysis Worksheet

ABOUT: What is a Resolution? (see page 1 of handout)

RESOURCE: NJFL Resource – Drafting Legislation

RESOURCE: NJFL Resource – Pro/Con Argument Brainstorm Worksheet

DO: Finding Research Articles for Final Speech Worksheet

DO: Documenting Your Research – Back It Up

DO: Student Congress Speech Directions | Suggested Guidelines from English Instructors

RESOURCE: NJFL Resource – Generating Your Arguments

ABOUT: What is Student Congress? Our Vision - The Student Congress Debate Process

RESOURCE: Sample Student Congress Video

DO: Attacking a Resolution (see page 2 of handout)

DO: Writing Challenge Questions (see page 2 of handout)

ABOUT: Information to Collect for Citations

DO: Citation Collection Worksheet (to be posted)

RESOURCE: Speech Rubric

Articles

How to Win Arguments

Websites

Always Win an Argument

Rhetorical Fallacies

Purdue Online Writing Lab – MLA Style Guide

Presentations

Rhetorical Fallacies – The Antithesis of Sound Reasoning
<table>
<thead>
<tr>
<th>Content: Organization, Evidence &amp; Language</th>
<th>D quality</th>
<th>C quality</th>
<th>B quality</th>
<th>A quality</th>
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<tbody>
<tr>
<td>Initial 3 Minute Speech</td>
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<tr>
<td>Lack clear thesis</td>
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<td>Lacks organizational structure</td>
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<td>No real evidence, claims are only asserted with generalizations</td>
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<td>Language use is unclear or ineffective</td>
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<td>18.0 – 20.9 Write in score_______________</td>
<td>21.0 – 23.9 Write in score_______________</td>
<td>24.0 – 26.9 Write in score_______________</td>
<td>27.0 – 30.0 Write in score_______________</td>
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<tr>
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<tr>
<td>The speaker offers mostly unwarranted assertions</td>
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<td>Simply repeats or rehashes previous arguments instead of adjusting or challenging what has been said</td>
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<td>6.0 – 6.9 Write in score_______________</td>
<td>7.0 – 7.9 Write in score_______________</td>
<td>8.0 – 8.9 Write in score_______________</td>
<td>9.0 – 10.0 Write in score_______________</td>
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<tr>
<td>Little to no eye contact</td>
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<td>Lack of natural gestures and/or movement</td>
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<td>Vocal presentation is inarticulate due to soft volume or lack of enunciation.</td>
<td>3.0</td>
<td>4.0</td>
<td>4.5</td>
<td>5.0</td>
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<th>Dress</th>
<th>D quality</th>
<th>C quality</th>
<th>B quality</th>
<th>A quality</th>
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<td>Inappropriate attire, lack of effort</td>
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| Purpose is present                           |           |           |           |           |
| Lack of logical organization and/or developed ideas |           |           |           |           |
| Analysis of evidence fails to connect its relevance to the speaker's claims |           |           |           |           |
| Use of language is weak                      |           |           |           |           |
| 18.0 – 20.9 Write in score_______________  | 21.0 – 23.9 Write in score_______________ | 24.0 – 26.9 Write in score_______________ | 27.0 – 30.0 Write in score_______________ |

| New ideas presented                          |           |           |           |           |
| Responds to previous arguments, but in an unbalanced manner (too much refutation or too many new arguments) |           |           |           |           |
| Questions are answered adequately            |           |           |           |           |
| 6.0 – 6.9 Write in score_______________      | 7.0 – 7.9 Write in score_______________ | 8.0 – 8.9 Write in score_______________ | 9.0 – 10.0 Write in score_______________ |

| Appropriate eye contact                      |           |           |           |           |
| Physical presence awkward at times           |           |           |           |           |
| Contains a few mistakes, including problems with pronunciation and enunciation |           |           |           |           |
| The speech may be partially read with satisfactory fluency |           |           |           |           |
| 3.0                                           | 4.0 | 4.5 | 5.0 |       |

| Presentation is excellent                    |           |           |           |           |
| Eye contact is effective and consistent      |           |           |           |           |
| The speaker’s physical poise is polished, deliberate, crisp and confident |           |           |           |           |
| Vocal control is polished and delivery is extemporaneous with few errors in pronunciation |           |           |           |           |
| 3.0                                           | 4.0 | 4.5 | 5.0 |       |

**Student Name_____________________________________________________        Topic #_______ Stance PRO CON Room #________________________**
# 2014 Ventura County Impact II Grant

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<th>District:</th>
<th>Ventura Unified School District</th>
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<tbody>
<tr>
<td>School:</td>
<td>Foothill Technology High School</td>
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<tr>
<td>Participant(s):</td>
<td>Steven Perfect</td>
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| Lesson Plan Title: | How in the World Do We Respond to Violence? |
| Lesson Plan Grade Levels: | 10, 12, 11, 9 |
| Lesson Plan Subject Areas: | Foreign Language |
How in the World Do We Respond to Violence?

Si viéramos realmente el Universo, tal vez lo entenderíamos.

Jorge Luis Borges

If we were to truly see the Universe, then perhaps we would understand it.

Jorge Luis Borges

The all too common response to violence is violence. In 2003, Spanish troops invaded Iraq, and in 2004, Islamic terrorists bombed Spanish commuter trains killing nearly 200 people. In this high school AP Spanish Language and Culture unit, students unknowingly enter into this conversation about violence. They begin the unit innocently only to find themselves confronted with up-close and personal accounts of the tragedy. “How to Respond to Violence” is a 3-week project based unit in which students engage with music, poetry, and non-fiction texts as they acquire Spanish language. The unit culminates in a performance task, which requires students to think critically and utilize the Spanish language they have acquired.

Looking from a Limited Perspective

To begin the unit students read the song “Jueves” by the Spanish musical group La Oreja de Van Gogh.

We read the song together and students acquired new vocabulary as they pieced together a superficial narrative of the story told in the song. To reinforce the vocabulary, students watch a fan-made video of the song on Youtube. To many of the students these first hearings of “Jueves” sound like a cheesy, pop love song. While a few students like the song instantly, most find it outside of their usual musical tastes. After a few listens to the song, students are asked to write their true thoughts about the song.

In the next part of the lesson, students engage with a poem that is mentioned within the song. “Volverán las oscuras golantrinas” is a famous poem by the Spanish poet Gustavo Adolfo Becquer. This poem is about an intense love that cannot be duplicated by another. Students read the piece and dissected the work for meaning as they gained vocabulary. Next, they analyzed the traditional 19th century Spanish rhyme scheme. Then the students performed a jigsawed-choral recital of the poem. In groups of 6, students memorized a stanza from the Becquer poem, and then the class performed the piece. In this process, students were engaged in reading, writing, speaking, and listening in Spanish. They revisited their stanzas again and again as they worked to recite in unison, giving attention to pronunciation, intonation, cadence, and tempo. The resulting performances were videotaped and shared with other Spanish classes.

Broadening Our Horizons – Seeing more of the Universe

At this point in the unit, students watch the official video for the song “Jueves.” This black and white video shows 30 different people singing the song “Jueves.” It ends with the typed words, “In memorium, 11/3/04.” No students knew, and thus we began fleshing out the story of the Madrid train bombing. First, we looked at a short 30 second surveillance video of people calmly leaving the Atocha Train Station after a first bomb goes off and then subsequent bomb blasts causing chaos and confusion. We then went through online animated graphic representations from Spain’s most prestigious news source, El Pais, which show the events from the time when the bombers board each of the four trains to the aftermath left by each explosion. Next, students were given a handout with 8 sections that have spaces for name, age, nationality, profession, personality, and interesting facts. Together as a class we visited a site, “Vidas Rotas,” that honors the victims of the bombings. We clicked on a black ribbon that represents one of the fallen in order to learn more about him/her. We saw a photo of the person and read a deeply personal account of his/her life as recounted by a family member or close friend. Students filled in the handout as they read. Next they chose seven other people to investigate. This was a very emotional experience for most students.

Now that students knew what happened on March 11, we revisited the song. Students now understood the background of the piece and were able to analyze the song both in terms of lyrics and musical techniques. The students recognized now that the song begins and ends with a church-like solemnity. They were able to identify the crash of cymbals in the middle of the song, which represents the bomb blasts. In addition, they now understood that
they song is much more than a cheesy love song. It is a love song to victims of the tragedy, and in a bigger sense, it is a response to violence.

**Traveling Beyond the Story - Expanding Our Universe**

In the next lessons, students visit an online photo essay from El Pais. They learn about how Spaniards chose to respond to the bombings. The day after the bombing was a rainy day, and it became known as La Tarde de Paraguas. In Barcelona alone, 1.3 million people were in the streets saying no to violence and terrorism. The Spanish people’s message was clear, “¡Con las víctimas, con la constitución, y para la derrota del terrorismo!” The Spaniards sent the message that they wanted no more violence. On the day after the bombing, Spain scheduled a 15-minute shut down of the country as citizens took to the streets signaling their desire to end violence.

The culminating experiences for students included revisiting their original opinions about the song, “Jueves.” Now that they could truly see the song’s significance, students used targeted vocabulary, wrote more informed opinions, and discussed how their worldviews had changed. Next, they completed a performance task aligned with common core standards and AP themes. One of the themes in the AP curriculum is Global Challenges. In order to explore this World Language theme, students wrote an expository essay in which they explored Spain’s response to terrorism and violence. Many students made connections with other songs and concluded that art itself is a proper response to violence.
Jueves

Si yo hubiera sabido la historia detrás de la canción “Jueves” yo habría tenido una opinión diferente. Cuando escuché esta canción por primera vez pensé que se trataba sobre una muchacha que se subía al tren todas las mañanas para ir a trabajar y veía a un muchacho que le gustaba. Ya no pienso que te canció sea romántica. Todavía pienso que es una canción muy repetitiva pero ahora entiendo porque era tan lenta. Respecto al dicho de Borges, “Si vieramos realmente el Universo, tal vez lo entenderíamos” se aplica en el caso 11-M. Por ejemplo si los terroristas hubieran visto a las personas inocentes que estaban en el tren y como vivían ellos con sus familias, tal vez hubieran entendido que la respuesta no era matar a las personas en el tren.
Jueves

Cuando escuchamos la canción, si yo hubieras sabido la historia detrás de la canción "jueves" yo habría tenido feo, y tienes respeto por la artista. Antes de saber la historia detrás de la canción yo pensaba que la canción era muy fantasiosa y casi estúpida. No me gustaba que estuviera muy lenta y dramática, la canción me dio la impresión que al final de la canción se murió la muchacha, por el amor del chico. No me gusta como el canción decía que Se hacia pequeña cuando estaba junto del chico. Ahora ya no pienso que sea tan tonta la canción. Pero todavía creo que la canción se siente muy feo para ser un canción de gente que está muerto.

Respecto al dicho de Borges "Si vieramos realmente el universo, tal vez lo entenderíamos" se aplica en el caso H-M, por ejemplo la gente en Madrid estaba protestando contra la violencia con paz en vez de más violencia. Pero también pienso que alguien no es capaz de entender el universo, no es posible porque el universo está muy complicado para la mente de un ser humano, solo Dios lo puede entender.
"Jueves"
La oreja de Van Gogh

Si fuera más guapa y un poco más lista
Si fuera especial, si fuera de revista
Tendría el valor de cruzar el vagón
Y preguntarte quién eres.

Te sientas en frente y ni te imaginas
Que llevo por ti mi falta más bonita.
Y al verte lanzar un bostezo al cristal
Se inundan mis pupilas.

De pronto me miras, te miro y suspiras
Yo ciervo los ojos, tú apartas la vista
Apenas respiro me hago pequeña
Y me pongo a temblar

Y así pasan los días, de lunes a viernes
Como las golondrinas del poema de Bécquer
De estación a estación enfrente tú y yo
Va y viene el silencio.

De pronto me miras, te miro y suspiras
Yo ciervo los ojos, tú apartas la vista
Apenas respiro, me hago pequeña
Y me pongo a temblar.

Y entonces ocurre, despiertan mis labios
Pronuncian tu nombre tartamudeando.
Supongo que piensas que chica más tonta
Y me quiero morir.
Gustavo Adolfo Bécquer
Volverán las oscuras golondrinas

Volverán las oscuras golondrinas
en tu balcón sus nidos a colgar,
y otra vez con el ala a sus cristales
jugando llamarán;

pero aquéllas que el vuelo refrenaban
tu hermosura y mi dicha a contemplar,
aquellas que aprendieron nuestros
nombres...
esas... ¡no volverán!

Volverán las tupidas madreselvas
de tu jardín las tapias a escalar,
y otra vez a la tarde, aun más hermosas,
sus flores se abrirán;

pero aquellas cuajadas de rocío,
cuyas gotas mirábamos temblar
y caer, como lágrimas de día...
esas... ¡no volverán!

Volverán de amor en tus oídos
las palabras ardientes a sonar;
tu corazón, de su profundo sueño
tal vez despertará;

pero mudo y absorto y de rodillas,
como se adora a Dios ante su altar,
como yo te he querido... desengáñate:
¡sí no te querrán!
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## Rúbrica para el ensayo de Jueves

<table>
<thead>
<tr>
<th>CATEGORÍA</th>
<th>A - aceptable o mejor</th>
<th>B - aceptable</th>
<th>C - mínimo</th>
<th>Inaceptable</th>
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<tbody>
<tr>
<td><strong>Organización y pensamiento</strong></td>
<td>Los detalles están puestos en orden lógico y la presentación sostiene el interés del lector.</td>
<td>La escritura sufre un poco de la mala presentación de algunas detalles, aunque estén en orden lógico.</td>
<td>Hay detalles fuera de su orden lógico, de modo que la lectura resulta confusa o distraiga al lector.</td>
<td>La escritura está mal pensada o mal organizada.</td>
</tr>
<tr>
<td><strong>Detalles en apoyo</strong></td>
<td>Hay citas o detalles apropiados que apoyan las declaraciones del autor.</td>
<td>Hay detalles en apoyo, pero hacen falta en una parte de la discusión.</td>
<td>En más que una parte de la discusión, los detalles en apoyo o no están claros, no tienen relación evidente, o simplemente no hay.</td>
<td>Apenas si hay detalles en apoyo, o los que hay son vagos, inaplicables, o faltan de claridad.</td>
</tr>
<tr>
<td><strong>Uso de vocabulario y estructuras claves</strong></td>
<td>Usa bien todas las estructuras claves y todo el vocabulario esencial.</td>
<td>Usa bien muchas de las estructuras claves y mucho del vocabulario esencial.</td>
<td>Usa pocas de las estructuras claves y poco del vocabulario esencial.</td>
<td>No usa ni las estructuras claves ni el vocabulario esencial.</td>
</tr>
<tr>
<td><strong>Amplitud de oraciones</strong></td>
<td>En cada párrafo, hay oraciones que varían apropiadamente de largo.</td>
<td>Algunos párrafos tienen oraciones largas y bien pensadas.</td>
<td>Hay algunas oraciones de largo más que el mínimo.</td>
<td>Hay solamente oraciones chiquitas, o que consisten simplemente de una serie de chiquitonas juntas (&quot;run-on sentence&quot;)</td>
</tr>
<tr>
<td><strong>Ortografía</strong></td>
<td>No hay errores en ortografía, inclusive de poner acentos.</td>
<td>Hay nomás tres errores en ortografía y éstas no distraen o confunden al lector.</td>
<td>Hay hasta tres errores en ortografía que sí distraen o confunden al lector.</td>
<td>Hay más que tres errores ortográficos que distraen al lector del asunto o confunden el sentido.</td>
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<tr>
<td>Participant(s):</td>
<td>Kim Michaud, Kristi Durley, Carrie Watterson, Nicole Clark</td>
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<tr>
<th>Lesson Plan Title:</th>
<th>Exploring the Four Regions of California</th>
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<tr>
<td>Lesson Plan Grade Levels:</td>
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<td>Lesson Plan Subject Areas:</td>
<td>Language Arts/Reading (SAGE Category), History/Social Science, Science (AMGEN Category), Health, Visual Arts, Mathematics (AMGEN Category), Foreign Language</td>
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Exploring the Four Regions of California

The social studies standards of third grade focus on the state of California and California’s regions (coast, desert, valley, and mountain), as well as the individual communities within those regions. Since the student social studies book only contains one lesson covering all four regions, our team of third-grade teachers concluded that this single lesson provided a superficial learning experience for this topic of study. To address this issue, our team collaborated to design additional lessons that incorporated language arts, technology, and art standards. Our goal was to provide a cross-curricular, in-depth learning experience to create an understanding and awareness of each region’s importance and the role each plays in the economy of California.

Before embarking on the exploration of each region, students shared what they knew about the state of California and our specific region with a table partner. Our team found that the opportunity to share one-on-one provided our English learners an opportunity to develop/practice their speaking skills in a setting with a low affective filter. Each teacher then facilitated a whole-group discussion to create a KWL chart on poster paper (K=Know, W=Want to Know, and L=Learned) for each region. These posters served to guide our exploration of each region, were referenced often as anchor charts, and were updated weekly as students learned new information. Students activated their prior knowledge and shared personal experiences of the coast region. Some of our students shared information about their previous desert and mountain experiences, but the majority of our students were limited to only having prior personal experiences with the coast region.

Students researched the four regions using a variety of text (adopted textbooks, internet resources, personal interviews, and various non-fiction texts from the school and local libraries) to learn each region’s location, key landforms, vital resources and recreational activities. They took notes on pertinent information for each region and proceeded to organize their information on a graphic organizer. A key language arts standard in third grade involves paragraph writing and the graphic organizer supports students in developing a cohesive paragraph with a topic sentence, three supporting details, and a conclusion. Teachers provided different levels of scaffolded organizers to align to our students’ writing proficiency levels. We supported our English learners and students who are not yet proficient in writing by including sentence frames in the graphic organizers. This allowed students to focus more on the content of their writing. From their graphic organizers, the students were then able to independently write a rough draft paragraph for each region. Once students completed their rough drafts, they conferenced individually with their teacher to edit and revise their work. This practice reinforced the importance of the writing
process. With the writing process completed, students then typed each paragraph in Microsoft Word to practice and enhance their typing and computer literacy skills.

Next, students created three-dimensional pages to represent each region. Using a variety of artistic mediums (crayons, colored pencils, watercolors, markers, and colored construction paper) they creatively transformed a white piece of construction paper into a backdrop of each region. Then students used colored construction paper to design pop ups of items commonly found in each region (For example, a dolphin in the ocean for the coast region). They printed and glued their typed paragraphs onto the corresponding region pages. Students designed a cover page for their books with a hand-drawn, color-coded map of California, including a key that identified each region. Finally, they compiled their pages into a Four Regions pop-up book.

One of our classrooms is part of a 1-to-1 device pilot. This means that each student in that class has their own iPad to work with during school hours. We wanted to make sure we capitalized on this experience so we modified this assignment for that classroom. Those students had the opportunity to type their paragraphs in the Educreations application with an embedded picture of each region from web-based searches as a background. The Educreations application turned their iPads into recordable whiteboards. The students chose the backdrop picture for each region, typed their paragraph below the picture, and then used the recording device to record themselves reading their paragraphs. Use of this application served as a powerful reading support for our students, in particular those who are struggling readers. We observed these students shine with this format. Since they were reading their own writing, they were confident and enthusiastic while recording themselves. This application provided students with another outlet of individual expression and creativity. It also incorporated a technology component and taught students to be responsible digital citizens.

The four regions of California paragraphs, flipbooks, and Educreations projects were all vital components of our cross-curricular project that incorporated social studies, language arts, arts, and technology standards. These learning experiences fostered personal creativity, student individuality and addressed various learning styles. No two final products were the same and the students enjoyed sharing their learning with each other. This project served as a jumping off point for our study of California throughout the year. We've observed that as we continue with our study of California, our students constantly refer back to the information they learned while researching California's four regions and creating their flip books and Educreations projects.
Our teaching team has been working with this unit of study for four years. Each year we are able to change the way we do things to make the lessons more exciting and relevant for our students. We enjoy working together and we believe our collaboration is a powerful strategy allowing us to reflect together after each component to see what has been successful and what we might need to change in the future. This project format is easily adaptable across grade levels and content areas. For example, the focus of the project could be the planets in our solar system, the thirteen original colonies, different types of figurative language, or geometric shapes. The content of the paragraphs and the art topics would vary, but the structure of the lessons would be the same. In the next few years, we hope to further adapt this project to be predominately technologically based to make sure our students have the 21st century skills they need to be successful as they continue in education and eventually enter into the workforce.
California has a desert region. The land in the desert is very hot and dry. The main city in the desert is Death Valley.

Mountain region. It has large forests, many lakes and waterfalls. Here we get our drinking water. The main city is San Francisco.

Coast region. It has sandy beaches, mountains, and cliffs. This is where most of the people live. The main resources are fish, oranges, and pineapples.

California’s Regions:
- Coast
- Desert
- Mountain
- Valley
California has a coast region. It has cliffs that are on the Pacific Ocean. The rain and strawberries like him in Camarillo.

Desert
The land is flat and too summers. The main resources are oranges and... in California, is on the desert.

California Regions
- Coast
- Desert
- Mountains
- Valley

Dale
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<td>Participant(s):</td>
<td>Karen Mercer, Shelly Ballmer</td>
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<tr>
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<td>Lesson Plan Grade Levels:</td>
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<tr>
<td>Lesson Plan Subject Areas:</td>
<td>Language Arts/Reading (SAGE Category), History/Social Science</td>
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</table>
“Hey, kids! Next we are going to work on informational texts, specifically citing sources, evaluating arguments, and assessing the relevancy of evidence. Then we will write our own argument essays, citing our own claims and supporting evidence, all the while acknowledging opposing claims. Finally, we will show our learning through oral debates and various forms of electronic media. “ Zzzzzzzz….huh?

Not a big hit? This announcement did not make them lean forward in their seats, awaiting what happens next? Try this announcement about a social studies and literacy simulation based on the hit reality show Survivor Island instead:

(Survivor music plays in the background.) “Welcome to Discoverer Island. You (and your group) are insert discoverer’s name here and YOU are the true discoverer of America, but now you have to prove it! The winner of Discoverer Island will be determined by points earned from fun individual and group projects like videos, posters, maps, and debates that “slam” your opponent’s arguments as well as confessional-style videos like the ones you’ve seen on Survivor. (Show video clips of Survivor confessional here.) Take a look at your opponents. At the end of this simulation, only one of you will be… the True Discoverer of America.” Then you give each group their first challenge: make their hat and a torch (a la Survivor) in five minutes with limited materials and NO tape or staples. The hat must look true to the historical character!

Lessons and Activities (See attachment for supporting educational materials)

Launch Panel Activity: Impromptu Panel that introduces the seven explorers in a To Tell the Truth format- Christopher Columbus, Brendan the Bold, Bjarni Herjulfsson, Leif Ericsson, Prince Madoc of Wales, Chief Howling Wind, and Hoei-Shin.

Flag: Artistic representation of the discoverer’s flag, complete with symbolic representation of his country, his voyage, and his mission. Flag to be hung up in the room and used later during the culminating activity.

Map: Artistically representing a map of the discoverer’s route, including mathematically correct scale and annotations about the voyage.

Annotated Poster: Artistic poster of the technology (boat, sextant, hunting tools, etc.) that proves the voyage was possible.

Evidence Notes (includes instruction in and differentiation of primary and secondary resources): Initial research.

Video #1: Defending Your Claim- argument essay in the form of video script. Actual video uploaded to classroom non-public YouTube Channel.

Video #2: Refuting the Opposition- argument essay in the form of video script. Actual video uploaded to classroom non-public YouTube Channel.

Video #3: Citing Weaknesses of Your Own Argument- argument essay in the form of video script. Actual video uploaded to classroom non-public YouTube Channel.

Tribal Councils- debate circles made of one representative from each group on both preannounced and spontaneous topics. Transition made from collaborative (with notes and collaboration of team) to individual impromptu argumentation.

Optional P.E. Challenges- Games such as “Travel the Seven Seas” and “Ship to Shore.”

Culminating Activity: The Final Challenge- fun-filled afternoon with light-hearted physical and team challenges on the field. Winner crowned at the end.

So…Who is the True Discoverer, Anyway? Video and discussion exploring the ongoing controversy over such things as the validity of the Ericsson Map, computerized tide mapping disqualifying the claims of Madoc, and new archeological conclusions regarding the supposed Chinese anchors of Hoei-Shin.

Best Practices

ELA Common Core Standards are embedded within the social studies classroom.

Technology such as student-made YouTube videos demonstrate student learning.

Relatable context of reality television show engenders student engagement and active participation in the learning process.

21st Century Learning Skill of Collaboration emphasized due to extensive group work, group reflections, and social-emotional instruction about effective group work.

Activity-based learning with students at the center of the learning process.

Variety of modalities represented across the unit (visual, musical, verbal, artistic, inter/intrapersonal).

Assessment of Student Achievement and Success of the Curriculum (See attachment)

Each activity that is meant to display student learning is assessed by a rubric. Students were assessed by the teacher for each assignment with a rubric (map, technology, 3 videos). Rubrics included categories of completion/following directions, presentation, argumentation, costume/characterization, and quality of writing. For each group challenge activity (including Tribal Council), points were earned toward a running tally for the competition. Students were assessed on participation and group work, both by their teacher and as a self-evaluation.

Common Core Standards Addressed:

The project spanned 4 grade levels (5-8) and addressed many Common Core Standards in each grade level, all of which are also College and Career Readiness Anchor Standards.

ELA
Reading Informational Text
Integration of Knowledge and Ideas
Standard 8
Writing
Text Types and Purposes
Standard 1: Write arguments to support claims with clear reasons and relevant evidence
Research to Build and Present Knowledge
Standards 7-9
Speaking and Listening
  Comprehension and Collaboration
  Standards 1-3
  Presentation of Knowledge and Ideas
  Standards 4-6

**Reading Standards for Literacy in History/Social Studies**
Standard RH.6-8.2 Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.
RH.6-8.8 Distinguish among fact, opinion, and reasoned judgment in a text.

**Technology Opportunities**

Tweets and memes
online research
Google Drive- shared documents
Edmodo
YouTube-posting videos to private classroom channel

**Adapatability**

While this unit explores who is the true discoverer of America, it could easily be adapted to other social studies curriculum, i.e. the most influential of the following: Renaissance character, Founding Father, ancient river civilization, ancient American civilization, or civil rights development. The assignments sheets provided could be easily changed to reflect any history content.

This unit could also be adapted to the science classroom for most influential scientist or scientific discovery.

Lastly, this unit could be adapted to the ELA classroom by exploring the most influential American writer, English poet, even the best genre or rhetorical device.
Launching the Project

For the “launch” of the project, have all students divided into their discoverer groups and seated at their tables/desks. Have one volunteer from each group come forward. Hand them the envelope with the four statements. Each person takes a turn reading the statements, like the show “to tell the truth.” At the end, each steps forward and introduces himself as the “true” discoverer of America. The teacher can then go on to describe the project and begin with the Discoverer Island activities and lessons.

Hoei-Shin

I am a Buddhist monk from China.

My account of the people and customs I encountered in America were strikingly accurate.

I brought back the fusang plant to my native land, China.

My name is Hoei-Shin, and I discovered America.

Brendan the Bold

I am a devout Irish monk.

Many Irish sagas have told the story of my adventures to America.

I came to the New World in search of Paradise.

My name is Brendan the Bold, and I discovered America.

Bjarni Herjulfsson

I am a Norse trader from Iceland.

My journey began when, upon returning home to Iceland, I found my father had moved to Greenland without me.

I sailed due west, and after enduring a storm, I spotted a land that was flat and wooded, and definitely not Greenland.

My name is Bjarni Herjulfsson, and I discovered America.
Leif Ericsson

I am the eldest son of the violent murderous Viking leader, Eric the Red.

King Olaf of Sweden convinced me to help him spread the Christian religion.

I explored the land, as per Viking tradition, and set foot on the land, plundering as I went.

My name is Leif Ericsson, and I discovered America.

Prince Madoc of Wales

My father was the King of North Wales.

I sailed west to escape a bloody civil war in Wales, a war started by my three brothers.

I explored because I was just looking for some peace and quiet.

My name is Prince Madoc of Wales, and I discovered America.

Christopher Columbus

I was born in Genoa, Italy. I always felt like I had a mission in life.

I sailed with a small three-ship fleet.

I placated my mutinous crew with promises of gold.

My name is Christopher Columbus, and I discovered America.

Chief Howling Wind

My ancestors were Paleolithic-Mongoloid hunters.

I am part of the Cree nation.

My people walked to America all the way from Siberia.

My name is Chief Howling Wind, and my people discovered America.
Welcome to Discoverer Island!

You know you are the true discoverer of America. You are pitted against six others who are laying claim to this title. It is your mission to survive and be recognized by everyone as the true discoverer. You and your team will accomplish this by completing the following tasks.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Due date</th>
<th>Possible Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map Activity</td>
<td></td>
<td>5- presentation (neatness, conventions, artistic)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-following directions (elements present)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-accuracy</td>
</tr>
<tr>
<td>Resource and Evidence Notes</td>
<td></td>
<td>5- completeness of #1-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15- 3 arguments for with evidence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10- 2 arguments against</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*10- 2 arguments against opposition</td>
</tr>
<tr>
<td>Technology Proof</td>
<td></td>
<td>5- presentation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-completeness</td>
</tr>
<tr>
<td>Video Script #1</td>
<td></td>
<td>10- argument and evidence (delineate which kind of evidence)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-total</td>
</tr>
<tr>
<td>Video #1</td>
<td></td>
<td>5- costume</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-characterization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-delivery</td>
</tr>
<tr>
<td>Video Script #2</td>
<td></td>
<td>10- argument and evidence (delineate which kind of evidence)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-total</td>
</tr>
<tr>
<td>Video #2</td>
<td></td>
<td>5- costume</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-characterization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5-delivery</td>
</tr>
<tr>
<td>Video Script #3</td>
<td></td>
<td>10- argument and evidence (delineate which kind of evidence)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence</td>
<td>30 - total</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>Video #3</td>
<td>5 - costume</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 - characterization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 - delivery</td>
<td></td>
</tr>
<tr>
<td>Armband and Flag</td>
<td>10 - completion</td>
<td></td>
</tr>
<tr>
<td>Team Challenges</td>
<td>4 worth 10 each</td>
<td></td>
</tr>
<tr>
<td>Culminating Team Challenges</td>
<td>4 challenges, varying in points, 5 to 15</td>
<td></td>
</tr>
<tr>
<td>Extra Credit (optional- max 3) Tweets</td>
<td>1 to 5, depending on quality</td>
<td></td>
</tr>
<tr>
<td>Tweets</td>
<td>Meme</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sea Shanty Song</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diary Entry or Ship’s Log</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpretive Dance set to Music</td>
<td></td>
</tr>
</tbody>
</table>
Discoverer Island Resources

Directions:
Today you will begin collecting evidence for your videos. You need to cite both primary and secondary resources.

Do numbers 1 through 4 independently.
1. Carefully study this prezí on primary and secondary resources.
2. Answer the questions on the second to last slide.
http://prezi.com/ytgns_rservu/primary-resources/#

3. What primary sources might you find on your explorer?
   Journal or diary of the voyage
   letter describing their journey and/or time in America
   Map drawn in the year of discovery- or map used by explorer
   portrait of person
   artifact from ship

4. What secondary sources might you find on your topic?
   Wikipedia
   books/articles/biographies
   Google-internet articles
   re-enactments, plays, movies
   presentations
   songs
   legend/myth
   poems

Begin work.
5. Working together with your group on a Google Doc, compare your answers to numbers 2 through 4. Change anything on your document you want to change.

6. Create a Google Doc entitled as your explorer and each member's name.

7. Collect your resources. Use links, books, articles, videos, etc. Do a search for primary resources as well.

8. Begin taking notes on relevant information. What is relevant? Your research has three objectives. Add notes to the following headings. You should include where you found the
information. If on the web, simply copy the url. If in print, write down the name of the book and page number. You may need to find it later. Do not copy and paste massive amounts of text. The link will suffice. Put the information into your own words.

Discoverer Island Evidence Notes

A. Information that supports your claim as the first discoverer of America.

B. Information that contradicts your claim as the first discoverer of America.

C. Evidence that strongly refutes the claim of others.

D. Good stuff that you are not sure where it fits. (Include here general comments and statements.)
Explorer: __________________________

Team Members: __________________________

Date: __________

Evidence: Map

As any good explorer knows, a map is excellent evidence of discovery. Those who explore are those who create the maps of new lands. Therefore, you will create an accurate, annotated map of your journey to America.

**Step 1: Research**
What year do you claim to have arrived in America? Your map should reflect what was known about the globe in this time period. Look at maps from this time period and re-create yours to match maps from the time period as closely as possible.

**Step 2: Create Map**
Include a compass rose, legend, and scale. Label continents, oceans, and any other important landmarks.

**Step 3: Show your route**
Create a dotted line to show where you traveled. Be prepared to talk about where/when you started, any places you stopped along the way, and where/when you landed.

**Step 4: Annotate it!**
You must include descriptions of your journey. Choose three spots on your map to “annotate.” This means you will write a brief description of an important event or discovery onto the map in the place where it happened. If possible, include an illustration to go with your annotation.

*Remember, this map is a key piece of evidence for your argument! Take your time, make it look great, and be prepared to discuss/defend it in front of the class!*
Map Rubric
5 points possible in each category

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Map is neat, with correct spelling and grammar. It is pleasing to look at.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion</td>
<td>Map includes all required elements: legend, compass rose, 3 annotated points, route, labels for countries and bodies of water. Map was turned in on time.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Explorer's route is marked with detail and attention to historical accuracy. Annotations are complete, thorough and reflect details of explorer's route.</td>
</tr>
</tbody>
</table>

Total: ______ / 15

Comments:
Each explorer will be expected to tell us how he arrived in America. What type of ship did you use? How did you navigate the seas? How did you fund the trip? Each team will create a detailed drawing of the ship that they used to arrive in America, including who funded the trip (paid for it).

**Step 1: Research**
Find out what type of ship was used by your explorer. Find pictures and descriptions online.

**Step 2: Draw**
You can print out a picture of the ship, but you will need to create a larger illustration based on the picture you find. Label the drawing. For example: What were the sails made from? What type of material made the body of the ship? How was it all held together? How did the explorer know what way to go?

**Step 3: Add Detail**
Make your drawing and description as detailed as possible. Make sure you understand how your ship made it all the way across the ocean to America. Find out how you paid for your trip. Include a paragraph detailing the capabilities of your ship and how you paid for the trip.

**Chief Howling Wind of the Cree Nation: Neo-Paleo Hunter-Gatherers**
*OR describing in detail the science behind the land bridge.*
Because you do not claim to have sailed to America, but instead arrived on the continent via the land bridge, you will need to create something different. Your map already details the land bridge route, so instead, you will need to find descriptions of your own people's technology that you used in America. For example, what types of tools did you use? Did your people have boats? What archeological evidence exists that your people are descended from those who crossed the land bridge? Create your own drawing of three pieces of “technology” (tools) used by the Cree people. This is evidence of your continued and long-lasting existence in America.
Rubric:
5 points possible for each category

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Drawing is neat, with correct spelling and grammar. It is pleasing to look at.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Following Directions</td>
<td>Drawing includes all required elements: detailed picture with labels and a paragraph describing how the ship crossed the ocean and how the trip was funded.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Ship reflects time period it is from. It accurately shows the technology/materials available at the time.</td>
</tr>
</tbody>
</table>

Total: ___________/15

Comments:
Tribal Council

Circle Debate #1 One representative from each group sits in the circle as that explorer. Notes are allowed, and the topic and question has been announced ahead of time:

Topic: Be prepared to introduce yourself and state a strong argument defending your claim. (1-10 points)
Challenge: After hearing each explorer's argument, you may challenge any explorer you wish. Be prepared to counter his rebuttal. You may instigate a challenge but end of losing! (1-5 points)

Circle Debate #2 One representative from each group sits in the circle as that explorer. Notes are not allowed, but the topic and question has been announced ahead of time.

Topic: Be prepared to speak on your particular "slant" as to your claim as the true explorer. (For example, were you first? Were you the bravest, or did the most with the least? Were your motives more pure? (1-10 points)
Challenge: After hearing the slants of other explorers, be prepared to argue against the importance of another's slant, or how their evidence does not support their slant. (1-10 points)

Circle Debate #3 A name will be drawn at random from each group to represent in the circle. There will be an open crossfire against the relevance of sources. Are there primary sources? Are the sources refuted? Come prepared to attack other's sources and defend their own. (1-10 points)

Circle Debate #4 Choose a representative for the circle. This person will draw a random name and must attack the weaknesses of their argument. Come prepared to both attack and defend. (1-10 points)

Final Tribal Council Come prepared to speak on a mystery topic. The team with the most points in this point of the game can choose their delegate. The second place team can put two names in the hat, third place three, etc. Surprise Question: Acknowledge your weaknesses, but explain why they are not as detrimental to your argument than two other explorer's weaknesses that you view as a contender. (1-20 points)
Video #1 Instructions- Defending Your Claim
aka “The Defense”

Using the “Survivor” video clips for inspiration, you will complete the following:

1. Write a script for the explorer in which he defends his claim as the first discoverer of America. This script should mainly be the evidence you found during your research. Avoid general statements, repetitions, and assertions that cite no evidence. Instead, your short script should be mainly evidence, analysis, and argumentation.

Example:

This script is about who discovered the light bulb, as a similar controversy exists between Hiram Maxim, Joseph Swan, and Thomas Edison. (Your script should be a bit longer, perhaps four paragraphs long):

Joseph Swan: If you ask any American school child who invented the light bulb, you will most likely hear “Thomas Edison.” But those Americans are all barmy. I invented the first incandescent light bulb, demonstrating it on December 18, 1878 at a lecture in Newcastle. My home in Gateshead, England was the first in the world to be lit by a light bulb. Blimey, the historical society even agrees, as this is a picture of the plaque now mounted on my home. (show picture) I had begun working on it years before, as can be proved by this excerpt from a letter written in 1867:

'I have been seeing Joseph Swan's carbon process, and I never was more interested in my life! It is enough for a lifetime, or even for a generation of men, to produce such results with so many difficulties overcome. It takes my breath away, as one of the wonderful things of the world.'

My light bulb was patented in 1880. I even still know the patent numbers: 18, 250, 4933, 5004, and 5014. These patents are registered at Newcastle. Now you’ve been genned up!

2. Record your video. You need to keep doing run-throughs until you get a clip that is error-free, as we will not be editing. Consider making large notes cards that the actor can refer to, without being seen, of course.

3. Upload the video to
<table>
<thead>
<tr>
<th>Basics</th>
<th>Explorer introduces self, states that he is the true discoverer of America.</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arguments in Defense of Discovery</td>
<td>Video has at least two clearly stated arguments for discovery.</td>
<td>10</td>
</tr>
<tr>
<td>Primary/Secondary Sources</td>
<td>Video sites at least one source for every argument made.</td>
<td>10</td>
</tr>
<tr>
<td>Creativity/Characterization</td>
<td>Script includes &quot;characterization&quot; - sayings and wording that he may have spoken</td>
<td>5</td>
</tr>
<tr>
<td>Mechanics</td>
<td>Script has been proofread and is properly punctuated, with few to no spelling errors.</td>
<td>5</td>
</tr>
</tbody>
</table>
Video #2 Instructions - Refuting the Opposition
aka “Smack Talk”

Using the “Survivor” video clips for inspiration, you will complete the following:

1. Write a script in which you directly refute the claims of other explorers. This differs from Video #1, in which you were trying to prove you DID discover it first. Now you are trying to prove that the other DID NOT. This script should mainly be the evidence you found during your research. Avoid general statements, repetitions, and assertions that cite no evidence. Instead, your short script should be mainly evidence, analysis, and argumentation.

Example:

Continuing with the light bulb example, here is a sample script from the point of view of Thomas Edison. Rather than try to prove he DID, he is simply stating why they DID NOT invent the first light bulb. Again, yours will be longer than what you see here, perhaps at least four paragraphs.

_Thomas Edison: I am the fourth most prolific inventor in history. Is it no wonder that others try to stake a claim to my inventions? In regards to who invented the light bulb, the list of these usurpers is long: Alessandro Volta, Henry Woodward, Mathew Evans, Humphrey Davy, James Lindsay, Moses Farmer, And William Sawyer. These fellows Joseph Swan and Hiram Maxim are just like them. Sure, they were in the race, but I crossed the finish line first._

_Take Joseph Swan’s design, for example. Sure it lit, but was it practical? Could it light a home? Was it able to be mass-produced? No! Even when he first lit the Savoy Theater, he was not able to light the whole building, and still had gas lights on the stage. Ha!_

_And this Hiram fellow, some people refer to him as a “true inventor” since he did not bother with patent law, but was just taken up with the process of inventing. Well, isn’t that convenient to say now. If you check the patent office you will see that his patent was not approved. Why not, I wonder?_
### Video Script #2 Rubric

<table>
<thead>
<tr>
<th>Basics</th>
<th>Explorer introduces self, where he is from, and that he is the true discoverer of America.</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arguments against another discoverer's claim</td>
<td>Script has clearly stated arguments against 2 or 3 other explorers' claims of discovery.</td>
<td>10</td>
</tr>
<tr>
<td>Primary/Secondary Sources</td>
<td>Script sites sources or lack of sources for every argument made.</td>
<td>10</td>
</tr>
<tr>
<td>Creativity/Characterization</td>
<td>Script includes at least 3 &quot;characterization&quot; - sayings and wording that he may have spoken.</td>
<td>5</td>
</tr>
<tr>
<td>Mechanics</td>
<td>Script has been proofread and is properly punctuated, with few to no spelling errors.</td>
<td>5</td>
</tr>
</tbody>
</table>
Video #3 Instructions - Citing Weaknesses of Your Own Argument
aka “The Confessional”

Using the “Survivor” video clips for inspiration, you will complete the following:

1. Write a script in which you confess the weaknesses of your own argument. Is there a lack of primary resources? Are there conflicting accounts? Do not make up weaknesses, or infer that something is not true unless there is a resource that specifically says it is not true. Rather, you are raising important questions, questions that have no answer (that you could find) and that weaken your claim.

Example: Here we see Thomas Edison cite a few of the weaknesses to the argument that he was the first to invent the light bulb. Again, your script should be about four paragraphs long.

Thomas Edison: Well, just between you and me, I have a pretty hard case to prove as the first inventor of the light bulb. There were so many working on it at the same time! We were all hearing what the others were doing, and although we lived on different continents, our discoveries were being published. It all does get a bit foggy. “Was it my idea? Or did I read about it and expand on it? Where does inspiration end and plagiarism begin?” It’s true, I did get the first American patent, but Hiram Maxim’s was registered before mine... and I did have the backing of some pretty wealthy and influential people... and his patent was stuck in red tape and did not go through. I am known as someone who was interested in making money, as I am quoted as saying, “Anything that won’t sell, I don’t want to invent. Its sale is proof of utility, and utility is success.” That doesn’t look too good, does it?

Was it greed? Or competition? I am a complex fellow, as is seen in an interview with the New York Tribune in 1878 wherein I announced my intentions to work on an incandescent light bulb. When asked about the financial rewards of being the first man to make such a product, I replied: “I don’t so much care for fortune as I do for getting ahead of the other fellow.” Makes me sound like I would do anything to be the first to get the patent, doesn’t it?

Later, it would seem I kind of gave in to Joseph Swan, creating the Ediswan Company. Why would I give in and create a company with him if he did not have a claim to its invention?
### Video Script #3 Rubric

<table>
<thead>
<tr>
<th>Basics</th>
<th>Explorer introduces self, where he is from, and that he is the true discoverer of America. Except...</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaknesses for claim to Discovery</td>
<td>Script has at least 3 clearly stated weaknesses for his claim. New information is given- no repeats from video 1.</td>
<td>15</td>
</tr>
<tr>
<td>Creativity/Characterization</td>
<td>Script includes 3 “characterization” - sayings and wording that he may have spoken</td>
<td>5</td>
</tr>
<tr>
<td>Mechanics</td>
<td>Script has been proofread and is properly punctuated, with few to no spelling errors.</td>
<td>5</td>
</tr>
</tbody>
</table>
Discoverer Island Finale!

Parent Volunteers/Assignments:
- Please stay with your group and help them to participate honestly and fairly in each activity.
- Make sure you are not giving answers/help, just keep them focused, listening to directions, following rules, etc.
- Please let a teacher know immediately if you are having trouble with any individuals.

Schedule:

1:00- Set up cones outside/scoreboard/megaphone
1:10 - Students and parents meet at designated cones

Opening - assemble flags

1:20 - Challenge 1: Drill Team- Outside, all together

1:45- Challenge 2: Chant- Outside, all together

2:00- Challenge 3: Relay Race* - Outside, all together

*parents! We need your support here! Please listen carefully to the directions and help monitor for fairness.

2:15- Challenge 4: Pictionary-

*Also a place for you to be “on” Make sure the kids are playing by the rules!

As soon as they complete the pictionary challenge, they will need to put their puzzle together, solve it, and run it out to Grayson on the field.

As groups “finish” we need a few parents to set up refreshments on the snack tables outside the rooms (12, 13, 17). We have frozen “island bars” and juice. Please also stay and help to serve the snacks. There is one frozen treat per student.

The kids will eat outside as the teachers tally the scores. Please disperse yourselves among them. We will all meet out at the original cone area around 2:50 to announce the “true discoverers of America”
Culminating Challenge Activities:

* Teachers set up seven cones with flag at each cone before kids arrive.

1:10 Meet at your flag and tape your second flag. Pass out armbands.

**Drill Team Challenge:** Everybody can win. 5 points.

"The true go marching one by one
Hurrah Hurrah
The true go marching one by one
Hurrah Hurrah
The true go marching one by one
No other explorer has gotten it done
So ________________ will always be known as the true and go down in history"

Sing twice
Marching
4 synchronized moves
2 formations
5-10 minutes to create drill. Each team performs and earns up to 5 points, at discretion of judges.

**Chant challenge:** Everybody can win. 5 points.

Create a chant that...
States explorer's name three times
Three different sentences
At least one closing move
5 minutes to create chant. All take turns performing and earn up to 5 points, at discretion of judges.

**Relay Race Challenge:** There will be a 1st, 2nd, 3rd place, all else tie for 4th. (10, 8, 6, 5)

You must use tape and paper bags to create a boat. Rules: It must encircle your body.
You must be able to step into it, Hold it around your waist, and run. If it rips so that it no longer encircles your body, you must stop, drop the boat, run to shore, grab the repair materials, run back and repair boat. Adults will check before you pass. If it is ripped you are disqualified.
**Pictionary Challenge:** You will be given 14 words. Your task is to take turns (everybody must draw once) drawing clues to get your team to guess the word. You will not be getting points for this challenge, but you will be earning your puzzle pieces, so some may be getting those pieces before others if they are the fastest.

Once you have your puzzle piece, you are to put the puzzle together, find the words, and run to the field to hand it to the judge—puzzle is a word search.

14 words for Pictionary
ship
flag
explorer
North America
primary resource
secondary resource
claim
debate
history
map
tribal counsel
costumes
videos
acting
So... Who is the True Discoverer of America?

1. According to the video "CBC Land Bridge Theory," the hunters were not aware that they were on a different continent. They even mentioned, ironically, that they "followed the food!" Does this disqualify them as the true discoverer? Why or why not?

2. In your opinion, can they be the first inhabitants of America without being the true discoverers of America? Why or why not?

3. While it does seem clear that the Chinese were excellent sea voyagers, the evidence of the 'sea anchors' seems unclear. What is the controversy regarding the anchors? Have they been proven to be Hoie Shin's?
4. According to the video “Who Really Discovered America?” Bjarni’s account is merely mentioned in the sagas that depict Leif’s journeys. In your opinion, is this lack of evidence enough to say that it is definitely not Bjarni? Why or why not?

5. Columbus seems to be out of the running entirely. Do you agree? Why, or why not?

6. We heard that the Madoc legend surfaced at the same time that Queen Elizabeth was trying to prove that the British made it to America before the Spanish. Why does this fact cast doubt on the Madoc story?

7. How did modern computer mapping of tides, etc. further debunk the Madoc claim?
8. Brendan’s mention of sheep and volcanoes don’t seem to be enough for historians to consider his claim. Do you agree? Why or why not?

9. We heard from one Irish historian that Christopher Columbus’ visit to Ireland was handed down in Ireland’s oral history. Why do all historian’s seem unaffected by this account? Wouldn’t the fact that Columbus visited Ireland seem to validate Brendan’s claim? Why do non-Irish historians not buy this?

***************************************SP OILER ALERT*****************************************

10. For years, up until the 1950s, most Americans were taught that Christopher Columbus was the discoverer of America. Then, upon the discovery of the Vinland Map, most historians believed that Leif Ericsson was the discoverer. Now, according to the video “The Viking Deception” the map is a forgery! So... are we back to Columbus? Some would think so, but the map is not the only evidence we have. We found Viking iron nails, bone needles, and spindles in Canada dating back to the year 1000, almost 500 years before Columbus.

So.... what do you think? Leif Ericsson? Or........

Tell me who you think truly deserves credit for the discovery of America and why you believe his claim to be the most valid.
Group Work Reflection

What are you like as a group worker?

What do you like about working in a group?

What do you dislike about working in a group?

What would you want to do differently next time?

How well did you voice your concerns, make a request, or get support when needed?

What strategies can you use to foster cooperation and success?
Resources

“Who Really Discovered America?” https://www.youtube.com/watch?v=QJlc36DvQrw

CBC Land Bridge Theory https://www.youtube.com/watch?v=c_jaMyd3cNYQ

List of seven characters gleaned from Who Discovered America? (Interact)

Prezi on primary vs. secondary resources http://prezi.com/ytgns_rservu/primary-resources/
Sample Work and Screen Shots From Discoverer Island

Screen shot from a video asserting Christopher Columbus is the true discoverer of America.

These students are ready to attest on film that Hoei Shin is the true explorer.
Prince Madoc’s team even learned how to use a green screen!

A student argues his point in tribal counsel.
The triumphal entry of the explorers with their five minute challenge hats and torches.

Student map displaying the voyage of Prince Madoc.
Student map displaying the voyages of Christopher Columbus.

One group’s flag representing Chief Howling Wind.
Group flag for Leif Ericsson group.

Team doing one of the challenges (team chant) during the Final Challenge Day
Technology Proof

This is a small open vessel made of a wooden frame covered by ox hide and was water-proofed by the only seafaring technology available to the Irish during Breandán’s time.

Steering Paddle Long board

Technology Proof
The Junk Ship

Junk Ships were developed during the Han Dynasty (206 BC, 220 AD).

Junk Ships were able to buy a ship because Li was a trader and a merchant so he had a lot of money.

The Junk Ship was hand-painted by Giovanni, Hannah, and Alberto.
<table>
<thead>
<tr>
<th>District:</th>
<th>Conejo Valley Unified School District</th>
</tr>
</thead>
<tbody>
<tr>
<td>School:</td>
<td>Colina Middle School</td>
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<tr>
<td>Participant(s):</td>
<td>Kari White, Christa Lamb</td>
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<th>Standing Up and Speaking Out</th>
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<td>Lesson Plan Grade Levels:</td>
<td>7, 8, 11, 9, 10, 12</td>
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<tr>
<td>Lesson Plan Subject Areas:</td>
<td>Language Arts/Reading (SAGE Category), History/Social Science</td>
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Lesson Plan Narrative:

Socratic seminar, various nonfiction and fiction documents, engaging topical video clips, case studies, article endorsements, collaborative groups, artistic representations, speeches, and debates are all part of Standing Up and Speaking Out, a four-week, grade six and above unit targeting Common Core Reading Standards for Informational Text. During the unit the students engage in evaluating aspects of courage and injustice, thereby giving them a sense of empowerment.

Guiding Questions
What choices must people face when confronted with injustice?
What lasting impact will our choices have on ourselves, family and society?
Why do some people stand by while others stand up?

The Unit
Stage 1
In order to instill a desire to dig into the challenge of the high level documents in this unit, the unit begins with engaging students in the subject matter through a secret word activity. Students cycle through ten stations where they investigate the characteristics and definition of the vocabulary words involved in the unit. Students collect their information using a word map and then must analyze each word as to whether it applies to an action or description of a bully, the bullied or a bystander.

The unit continues to draw in the students through emotional videos presenting different perspectives of bullying, including a former bully. By analyzing the vocabulary, video clips, two informational texts on bullying (“Understanding Bullying” at www.cdc.gov/violenceprevention and an excerpt from Bully, Bullied, Bystander by Barbara Coloroso), students discuss the criteria for a bully, the bullied and a bystander and create a poster with their definitions and characteristics. Once students have created the criteria, students read case studies where they must make judgments as to whether individuals meet the traits of a bully, the bullied or a bystander and then present and argue their findings in a Socratic Seminar.

Stage 2
After analyzing case studies, students now apply their criteria of bullying characteristics to real-world situations by jigsawing excerpts from the novel I Am Malala and three articles about Malala Yousafazi, a young Pakistani girl who stands up to the Taliban for the right to be educated. Students interact with the documents through close reading activities, ultimately writing a summary answering the following questions, “What choices does Malala make? What impact do these choices have on her own life, her world and on others?”
This stage concludes with groups creating a symbolic representation of Malala and her courageous fight for justice. As each group presents its project to the class, the group must support its choices with evidence from the documents.

Stage 3
Now that students have analyzed bullying in videos and real-life situations, students will apply that same knowledge to fictional characters. As classes read “Teacher Tamer” by Avi and “Smallest Dragonboy” by Anne McCaffrey, students evaluate the actions of the characters. Do their actions meet the criteria of courage? How has their perspectives changed as the plot develops? Students will compare and contrast how the characters deal with what they perceive as injustice through written activities and a Socratic Seminar.

Stage 4
Next, students search for an article online or in print which shows an individual who has confronted an injustice and displays courageous qualities. While students present the articles to their groups, students determine if the individual meets the criteria of a person of courage. After the presentations, students are assessed with an in-class essay where they must argue which individual best meets the criteria of someone with courage. Students must support their claim with evidence from the articles presented.

The unit concludes with a debate on the following topic: Bystanders should be held responsible for failing to speak up or out about bullying.

Achievement and Assessment
The unit promotes self-expression and the use of higher order thinking skills as students are identifying, defining, analyzing and interpreting various types of documents like newspaper articles, excerpts from novels, short stories, videos, and pamphlets. The unit addresses the needs of all learners by tapping into creative thinking as well as objective analysis of information. We are able to measure the success of the unit via discussion, tests, completed projects, and essays.

All in all, this unit is instructional, relevant, student-centered, and one we will continue to use. Standing Up and Speaking Out inspires and empowers our students in finding their own voice as they pay particular attention to the choices people make and the possible consequences. We feel an overwhelming need to do this unit since our students are at an age where they are discovering who they are- their values, their dreams, their aspirations.

Connections to Curriculum
In addition to the focus on Common Core Reading Standards for Informational Text, the unit also includes the following standards:
Reading Standards for Literature 1, 2, 4, 6
Writing Standards 1a-e, 2a-e, 4, 5, 6, 8&9
Speaking and Listening Standards 1a-d, 2, 3, 4 & 5
Language Standards 1, 2, 3, & 4
Reading Standards for Literacy in History/Social Science 2, 4
Standing Up and Speaking Out
Malala Symbolic Jigsaw
Group Work

Directions: Your group will present the central idea of your assigned article. As a group you must complete the following tasks with the information collected during the previous day's activities.

- Write a paragraph revealing the Central Idea of your article
  - Use strong vocabulary
  - Vary your sentence structure: simple, compound, complex and compound-complex
  - Strong commentary starting with a subordinating conjunction
  - TS, CD, CD, CM, CD, CD, CM, CS
- Create a Symbolic Representation of your Central Idea (should be 11x14 and the group must explain its relevance and connection to the Central Idea)
- Prepare an oral presentation for the class to present your findings (approximately 2-4 minutes)

Please make sure to note the correct title, author and source for your article.

Symbolic Representation

<table>
<thead>
<tr>
<th>Contributions</th>
<th>Beginning</th>
<th>Developing</th>
<th>Accomplished</th>
<th>Exemplary</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation</td>
<td>Does not prepare with group</td>
<td>Prepares a little with group</td>
<td>Group preparation satisfactory.</td>
<td>Outstanding group preparation.</td>
<td></td>
</tr>
<tr>
<td>Group's Symbol</td>
<td>Central idea doesn't relate to article</td>
<td>Weak examination of central idea</td>
<td>Strong examination of central idea</td>
<td>Thoughtful examination of central idea</td>
<td></td>
</tr>
<tr>
<td>Central Idea</td>
<td>No facts or examples are used to support group's idea.</td>
<td>Some evidence with weak commentary.</td>
<td>Good use of evidence and commentary.</td>
<td>Unique and balanced evidence and commentary.</td>
<td></td>
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<tr>
<td>Paragraph</td>
<td>Weak vocab; no variety in sentence structure; many mistakes.</td>
<td>Good vocab, some variety in sentence structure; many mistakes.</td>
<td>Strong vocab, sentence structure; a few mistakes.</td>
<td>Thoughtful vocab, sentence structure; no mistakes.</td>
<td></td>
</tr>
<tr>
<td>Written Expression</td>
<td>No attempt made to connect symbol.</td>
<td>Weak connection to the central idea.</td>
<td>Good connection to the central idea.</td>
<td>Symbol clearly relates to the central idea</td>
<td></td>
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<td>Symbolic Representation</td>
<td>No creativity</td>
<td>Weak creativity</td>
<td>Strong creativity</td>
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<td>Creativity</td>
<td>No creativity</td>
<td>Weak creativity</td>
<td>Strong creativity</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td></td>
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86
Read, Think, Explain

Identifying Nonfiction Elements

Use this activity sheet with “The Fighter Malala Yousafzai,” an excerpt from Time.

Before Reading: Text Features

1. Look at the image on page 97. What are some words that describe Malala’s expression or the mood of the photograph? What is she holding? What image was the artist trying to portray?

2. Examine the other photos and documents in the article (p. 98, 100, 102, 104 and 107). What is the mood of these images? What kind of story do they convey?

3. Look back at the documents on p. 102. What do you learn about Malala as a student?

4. Read the subtitles and margin notes throughout the article and look at any text features you have not yet examined. Based on your preview of the article, write three sentences predicting what you think the article is about.
Close-Reading Questions
“The Fighter Malala Yousafzai”

1. Why do you think the author begins the article with the story of Ayesha Mir? (text structure)

2. On page 98, what details help you understand the meaning of empowerment in the phrase “the key to raising living standards throughout the developing world is the empowerment of women and girls?” (context clues)

3. Based on the information about Malala’s family, what can you infer about the support she has received? (inference)

4. Why does Malala request to only be photographed with a book and her injuries covered? What does the book symbolize and what do the scars represent? (figurative language)

5. Malala’s friend Moniba inscribed “This is Malala’s desk” on the only empty desk in the classroom. Even if Malala herself never returns, why does the author of the article suggest there are “400 Malala’s prepared to take her place?” (inference)
Malala’s Big Ideas

A central idea is a main point that the author is making. It can always be supported with details from the text. In this activity, you will identify central ideas and text evidence in “The Fighter Malala Yousafzai.”

1. Find a central idea

Read the text evidence below. Decide what central idea it supports, and write it in the space provided.

CENTRAL IDEA: ____________________________________________________________________________

TEXT EVIDENCE:

1. “In trying and failing, to kill Malala, the Taliban appear to have made a crucial mistake. They wanted to silence her. Instead they amplified her voice” p. 98.
2. “Former British Prime Minister Gordon Brown declared November 10 Malala Day in honor her and girls around the world” p. 98.
3. “Malala has many powerful supporters and she created the Malala Fund to support organizations in education. Pakistani president Asif Ali Zardari has established a 10 million dollar education fund in Malala’s name” p. 107.

2. Find text evidence

Find three pieces of text evidence for the central idea below. Use section 1 as a model for how to quote text evidence. Be sure to include page numbers for the text evidence.

CENTRAL IDEA: Malala is a crusader for the right of all children everywhere to go to school.

TEXT EVIDENCE:

1. ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

2. ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
4. Find a central idea and text evidence.

Identify another central idea in the article. Then write three pieces of text evidence for it. Remember to include page numbers.

CENTRAL IDEA:

TEXT EVIDENCE:

1.  

2.  

3.  


Bystander
"I don't want to stand up!"

Don't know what to do

Peer Pressure
<table>
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<tr>
<th><strong>District:</strong></th>
<th>Pleasant Valley Unified School District</th>
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<td><strong>Participant(s):</strong></td>
<td>Peggy Celic, Corinne New, Susie Mier, Linda Wallace, Kathy Wadley</td>
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<td><strong>Lesson Plan Subject Areas:</strong></td>
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Kindergarteners “Bloom” with Jan Brett Stories!

Kindergarteners love the engaging stories and beautiful illustrations in Jan Brett’s popular books. For many years our students have been delighted by the surprise ending in *The Gingerbread Baby*, the quest of a lonely Gingerbread Baby searching for a friend in *Gingerbread Friends*, the silly antics of the animals in *The Hat*, and the laughable ending in *The Mitten*. Jan Brett’s rich literature has been a springboard for many engaging activities for our young learners. This year, our kindergarten team’s goal was to inspire our students to use their higher thinking skills in response to a wide variety of literature based activities.

Our student-centered lessons are highly motivating and are aligned with many Common Core Standards listed below in kid friendly language:

**Literature:**
- Answer questions about key details in a text
- Retell familiar stories
- Identify characters, setting and major events
- Name author and illustrator and define roles in telling the story
- Compare and contrast the experiences of characters in familiar stories
- When speaking, use frequently occurring nouns and verbs
- Understand and use question words
- Produce and expand complete sentences in shared language activities
- Spell simple words phonetically
- Identify real-life connections between words and their use
- Respond to text using words acquired through reading

**Writing**
- Use drawings, dictation, and/or writing to compose opinions and preferences for books
- Use drawings, dictation, and/or writing to tell the events in the order they occurred

**Speaking and Listening**
- Participate in collaborative conversations with peers in large and small groups
- Ask and answer questions in order to get information or clarification
- Describe familiar people, places, and events
- Add drawings to provide additional details
- Speak audibly and express thoughts and ideas clearly
- Ask and answer questions in order to get information or clarify something

**Math**
- Graph information and interpret data

Our teaching team worked together to broaden the lessons that our students have enjoyed so much in the past. We provided the children with many opportunities to access their higher level thinking skills, while keeping in mind the wide range of abilities within our classes. We used Bloom’s Revised Taxonomy as a foundation for broadening our lessons and challenging all students. Teacher observations and authentic assessments were used to monitor student success. Modifications to our lessons did provide all students opportunities to think more deeply and creatively.
Bloom’s Revised Taxonomy for Higher Order Thinking Skills

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering
Remembering

Remembering story events may be regarded as a basic and low level thinking skill, yet it is a critical comprehension skill for beginning readers. Our students had multiple opportunities to sequence the main events of The Mitten. They reenacted the plot with puppets as they listened to a tape recording of the story. This experience prepared them to retell the main events of the story for their third grade Big Buddy, then once again for each other, and finally at home for their families. Repeated practice ensured that all were proficient at remembering and sequencing the events of this story.
Understanding

In Gingerbread Friends, children related to the Gingerbread Baby as he went out in search of a friend. After discussing the point of view of the Gingerbread Baby, we listed things he could do to make a new friend. The children easily remembered how they felt at the beginning of kindergarten while they began to make new friends at school. The kindergarteners created and named a friend for the Gingerbread Baby. Later, they dictated what it means to be a friend and how to treat a friend to their third grade Big Buddy. A class book was made and shared. This activity proved to be something relevant to all of our kindergarteners… and Big Buddies too!
Applying

Children love the surprise ending when the Gingerbread Baby narrowly escapes being chased by a crowd by hiding in the gingerbread house Jamie created for him. Would our kindergarteners be able to apply their knowledge of story elements to create new and different story endings? Indeed they did! This lesson was built on previous discussions of other story endings. They were able to apply this knowledge so they could come up with novel endings for the Gingerbread Baby. After the children illustrated their story ending, they either wrote or dictated to the teacher what happened. Every child was successful in completing a twist at the end of the story... and was proud to share their version with the class.
Analyzing

Our students had experience using Venn diagrams to compare and contrast in previous science lessons. After hearing both The Hat and The Mitten, they were given time to think, pair, share with a partner about the similarities and differences between the stories. All students participated eagerly in discussing the stories. Children placed pictures from both stories accurately on a Venn diagram. As a follow-up, each student recorded one detail from The Hat, one from The Mitten as well as something that was found in both stories. Children were able to record their information using a combination of pictures and words based on their individual ability. This authentic assessment showed that all students were successful and confident as they analyzed the two stories!
Evaluating

After reading three of Jan Brett’s well loved stories, children were asked to evaluate which one was their favorite and why. After children illustrated their favorite story, they orally shared why it was their favorite. Next, we graphed the results. The children used their math skills to evaluate data from the graph. Many were excited to see that The Gingerbread Baby was ranked as #1 favorite of the class!
Creating

Kindergarteners were paired with a second grade Big Buddy to discuss the animal characters in The Hat. Next, they decided what kind of hat would appeal to their character. They set to work designing and creating a unique hat for the animal. This proved to be much more than an ordinary art project... imaginations soared while creating distinctive headgear! One hat had double padding to fit comfortably around pointy pig ears...another was made with extra lining so it would be extra cozy for the hen...
All our kindergarten students “bloomed” during our study of Jan Brett’s literature. In addition to promoting a love of learning, all students were given many opportunities to use higher level thinking skills. Students showed us time after time how capable they were of analyzing, evaluating, and creating. We learned how important it is to encourage our youngest learners to think more deeply and creatively on an ongoing basis. This spring, we will encourage our emerging readers to continue to “bloom” as we delve into our author study of Eric Carle. As a result of this project, we are committed to continue challenging our kindergarteners to develop the thinking skills that are so necessary for our 21st century students!
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<td>Participant(s):</td>
<td>Danna Lomax</td>
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<td>Lesson Plan Title:</td>
<td>Finding Our Voices as We Prepare for High School</td>
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<td>Lesson Plan Grade Levels:</td>
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Finding Our Voices as We Prepare for High School

Speak is a four to six week project-based unit during which students took on challenging and diverse topics such as date rape, gender equality, art history, and high school preparedness. The essential questions for the unit were: How can I speak truth to power? and How can I survive and thrive in high school? The unit contained a variety of educational experiences that integrated Language Arts, Technology, Art, Film, and Women’s Studies and culminated with two performance tasks.

Pre-reading - A Critical Framework
In order to prepare students to understand the issue of gender equality, the unit began with an analysis of women in media. Students were asked to make a list of their favorite movies, tv shows, and novels. Next, they watched a youtube video on the Bechdel Test. This test was created to assess women’s representation in films and to note female presence in media. To pass the test, a work must meet three basic criteria: 1. The work must have at least 2 or more women. 2. The two women must have names. 3. The two women must talk to each other about something other than a man. Next, students analyzed the movies, books, and tv shows to see if those they listed pass the Bechdel Test. This analysis sparked a lively discussion and helped students develop a critical framework for gender equality in media. It also showed students the need for such a framework.

Reading – Learning to Speak
Speak is a high interest novel in which the author, Laurie Halse Anderson, takes on extremely difficult, yet relevant, subjects. The novel is about a high school student, Melinda, who is an outcast during much of her freshman year. In the summer between 8th and 9th grade, Melinda attends a party and calls the police. As a result, students alienate Melinda. What her classmates don’t know is that Melinda was raped that night. The novel takes students on a journey through pain, process, friendship, and healing. In the end, the story is about finding one’s voice and overcoming adversity.

During this phase of the unit, students focused on understanding the text. Each day for two weeks, students engaged in language activities that prepared them for the day’s reading. In addition, students began some classes by making virtual field trips to art galleries and/or creating their own art. Next, students read a portion of the text. Finally, the students demonstrated daily their reading comprehension by taking a quiz, storyboarding the events in the day’s reading, or creating non-linguistic representations of characters, themes, or events.

As a final assessment of students’ understanding of the novel, the eighth graders engaged in a Socratic Seminar. The students chose a seminar buddy and then sat in inner and outer circles. Using discussion sentence frames, those in the inner circle discussed a variety of questions while those in the outer circle took notes and graded their seminar buddies. Then the students in the two circles exchanged places. The students graded their buddies on number of contributions to the discussion, ability to cite specific examples from the text, ability to speak clearly and stay focused, and ability to actively listen and use sentence starters.
Post-reading – Moving Beyond the Text

In the next phase of the unit, students explored themes within the book by completing a webquest. The webquest focused on age appropriate explorations of date rape, women’s history, famous artists, and tips for surviving and thriving in high school. Guided by a teacher created research link (http://sqworl.com/n6anza) and accompanying handout, students visited dozens of websites and answered questions that helped them think more deeply about the novel and apply what they learned to their own lives. Students reported especially enjoying the tweets from seniors to freshmen regarding survival tips for high school.

The unit culminated with a guest speaker and two different performance tasks. Our superintendent gave students advice for succeeding in high school. The first performance task incorporated art. Art plays an important role in the novel Speak. Not only is the art teacher an ally for Melinda, but the artistic process also offers Melinda a mode of expression when she is unable to use her voice. Art allows Melinda’s unconscious to work through her experience and finally begin to heal. Since art is an unmistakably important part of the novel, we incorporated art into the unit and connected it to the essential question: How can I survive and thrive in high school? To answer this question, students created plaster masks that represent the positive traits they will employ as they transition to high school. Working in teams, students laid strips of plaster gauze on each other’s faces until the gauze hardened and left an impression of the students’ faces. Next, students encoded words (courage, love, flexibility, intelligence, beauty, responsibility, etc.) into the masks by writing the words on strips of paper and covering them with gauze. Next, they painted the masks. These masks serve to remind students of the skills and values they will need to survive and thrive in high school.

Finally, in the second performance task students wrote an argumentative essay in which they made a claim regarding women’s equality in the United States. Students read four sources (2 which say women have achieved gender equality and 2 which say they have not). Following the format of the new Smarter Balanced Assessment, the students cited evidence from the sources, considered counterarguments, and wrote and edited an argumentative essay. The essays were graded using the district’s rubric for argumentative essay.

Creating this unit was a bit risky. Although the novel is highly acclaimed and board approved, it was unclear how students and parents would react to a novel about rape. Because the topic is handled so delicately and because students are ready and able to have meaningful discussions about what really matters, this unit was a resounding success for all involved.

Common Core Standards Addressed:
The Bechdel Test

Part I – Your media history.

List 5 of your favorite movies:  
1. ____________________________  
2. ____________________________  
3. ____________________________  
4. ____________________________  
5. ____________________________  

List 5 of your favorite TV shows:  
1. ____________________________  
2. ____________________________  
3. ____________________________  
4. ____________________________  
5. ____________________________  

List 5 of your favorite novels:  
1. ____________________________  
2. ____________________________  
3. ____________________________  
4. ____________________________  
5. ____________________________  

Part II – The Bechdel Test (Watch the clip at: http://www.youtube.com/watch?v=rZn_IJoN6Pl)

What is the purpose of the Bechdel Test?

________________________________________________________________________

________________________________________________________________________

What are the 3 criteria necessary for a movie to pass the test?

1. ____________________________  
2. ____________________________  
3. ____________________________  

Part III – Analyze one of the novels, shows, or movies from your list. Does this text pass the Bechdel test? Explain your reasoning.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Quiz 1, *Speak* (1-9)

Fill in the blanks.

1. The protagonist is in the _______ grade.

2. She makes a list of “The First Ten _________ They Tell You in High School.”

3. Because she is not sure what to do, the main character decides to __________ her lunch on the first day.

4. The main character gets hit with ________________ in the cafeteria.

5. The art teacher’s name is ____________________________.

Why is “Our Teachers are the Best” a sarcastic statement?

__________________________________________

__________________________________________

__________________________________________

Name__________________________

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5. The art teacher’s name is ____________________________.

Why is “Our Teachers are the Best” a sarcastic statement?

__________________________________________

__________________________________________

__________________________________________

Name__________________________
Quiz 2, Speak (p. 10-29)

Fill in the blanks.

1. What object does the protagonist pull from the globe? ____________________________

2. The main character’s first name is ____________________________.

3. The main character often communicates with her parents by ____________________________.

4. Who is Rachel/Rachelle? ____________________________

5. What did the main character do that has made so many people mad? ____________________________

6. Where does the main character find a hiding place? ____________________________
Quiz 3, Speak (29-46)

Fill in the blanks.

1. The protagonist’s lab partner belongs to the ______ clan.

2. The protagonist and her clan dressed up as ______ last Halloween.

3. The new school mascot is the______.

Why is the sobriquet Me-no-linda funny? What does linda mean?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What does the protagonist’s comment “the possibility that Rachel would slit my throat on her new carpet foreshadow?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

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________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What does the protagonist’s comment “the possibility that Rachel would slit my throat on her new carpet foreshadow?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Quiz 4, Speak (49-70)

Fill in the blanks.

1. David bases his argument against Mr. Neck on possibly the most important historical document in US History: “The __________ does not recognize different classes of citizenship based on time spent in the country. I am a citizen, with the same rights as your son, or you.”

2. The protagonist and her family had __________, instead of turkey, for Thanksgiving.

3. The protagonist discovers ______________ growing out of an apple seed in an apple.

4. Why do David Petrakis and Mr. Neck not get along?

5. Following the vote for a new school mascot, the protagonist comments that “Democracy is a wonderful institution.” How is this sarcastic?
Quiz 5, *Speak* (70-92)

Fill in the blanks.

1. Why did the protagonist’s parents give her a sketch pad and charcoal pencils for Christmas?

2. What causes IT’s face to pop up in the protagonist’s mind?

3. What does the protagonist fear will require brain surgery to remove? Who does she consider having perform the brain surgery?

4. How does the protagonist know that Heather is losing standing with the Marthas?
Quiz 6, *Speak* (95-116)

Fill in the blanks.

1. Why does the protagonist want to be in fifth grade again?

2. The “tree” from art class symbolizes Melinda’s emotional or psychological state. What is another example of *symbolism* in the novel?

3. What reasons does Heather cite for dissolving her relationship with the protagonist?
Quiz 7, Speak (116-137)  Fill in the blanks.

1. Why does Andy Evans have Merryweather In-School Suspension (MISS)?

2. Mr. Freeman gives Melinda a book about which artist? (Thinking point: Why is Cubism including in this chapter?)

3. What is Melinda studying in biology? (Thinking point: Why did the author include this section?)

4. About what are the two Melindas in Melinda’s brain arguing?

5. Why does Melinda call the police at the summer party?
Quiz 8, Speak (141-163)  Fill in the blanks.

1. With whom does Rachel/Rachelle go to the movies?

2. What does Melinda decide to do to help Rachel/Rachelle?

3. What does the process of drawing a tree symbolize in this novel?

4. Why do you think the author included Mr. Freeman’s following comments: “Scar it, give it a twisted branch – perfect trees don’t exist. Nothing is perfect. Flaws are interesting. Be the tree.”?

5. What is a suffragette? Why do you think the author included the information about the suffragettes?
**Quiz 10, Speak (184-198)**

Dad: He’s not chopping it down. He’s saving it. Those branches were long dead from disease. All plants are like that. By cutting off the damage, you make it possible for the tree to grow again. You watch—by the end of summer, this tree will be the strongest on the block.

<table>
<thead>
<tr>
<th>Damaged Tree</th>
<th>Tree after Pruning</th>
<th>Healthy Tree</th>
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</table>

Look through the book. Find at least 3 references to nature and write below. What do you think they represent? Why did the author choose to include them?

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<tr>
<th>Page #</th>
<th>Sentence + Reference to Nature</th>
<th>Meaning</th>
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</table>
Mr. Neck: “Where do you think you’re going?”

Me:

“It is easier not to say anything. Shut your trap, button your lip, can it. All that crap you hear on TV about communication and expressing feelings is a lie. Nobody really wants to hear what you have to say.” (p. 9)

1. Is Melinda right?

________________________________________________________________________

2. Melinda speaks early in the novel, then she decides to stop speaking. When in the novel does Melinda start to speak up?

________________________________________________________________________

________________________________________________________________________

Dad: “he’s not chopping it down. He’s saving it. Those branches were long dead from disease. All plants are like that. By cutting off the damage, you make it possible for the tree to grow again. You watch-by the end of summer, this tree will be the strongest on the block.” (p. 187)

3. What do trees symbolize in the novel?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

4. The adults in this novel are very disappointing. Do you agree or disagree? Why?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
“Welcome to the only class that will teach you how to survive,” he says. “Welcome to Art.” …

Mr. Freeman turns off the wheel and grabs a piece of chalk without washing his hands. “SOUL,” he writes on the board. The clay streaks the word like dried blood. “This is where you can find your soul, if you dare. Where you can touch that part of you that you’ve never dared look at before. Do not come here and ask me to show you how to draw a face. Ask me to help you find the wind.”

5. What is the role of Art in this novel? (Consider: Why is the teacher named Mr. Freeman?)

6. What are some of the recurring images in the novel? What does the author want you to see, taste, touch, smell, and/or hear?

7. What are some of the recurring images of nature in the novel?

8. Why does Melinda refer to Andy Evans as “It?”

9. Throughout the novel does Melinda exhibit self-care? Why or why not?

10. Did you like this novel? (Was it worth your time to read it?) Why or why not?
Socratic Seminar
Discussion Partner Evaluation

Name of person you are observing ________________________________

Your name ________________________________ Date ____________

Seminar Topic ________________________________ Date ____________

1) Record a check for each time your partner contributed in a meaningful way: ____________

2) On a scale of 1-5, with 5 being the highest, how well did your partner do at the following?

Analysis and Reasoning
Did your partner...
- Cite reasons and evidence for his/her statements with support from the text?
- Demonstrate that they had given thoughtful consideration to the topic?
- Provide relevant and insightful comments?
- Demonstrate organized thinking?
- Move the discussion to a deeper level?

Notes/Comments:

Discussion Skills
Did your partner...
- Speak loudly and clearly?
- Stay on topic?
- Talk directly to other students rather than the teacher?
- Stay focused on the discussion?
- Invite other people into the discussion?
- Share air time equally with others (don't talk more than was fair to others)?

Notes/Comments:

Civility
Did your partner...
- Listen to others respectfully?
- Enter the discussion in a polite manner?
- Avoid inappropriate language (slang, swearing)?
- Avoid hostile exchanges?
- Question others in a civil manner?

Notes/Comments:

Use of appropriate sentence starter/language strategy

110
Language Strategies for Active Classroom Participation

Expressing an Opinion
I think/believe that...
It seems to me that...
In my opinion...

Asking for Clarification
What do you mean?
Will you explain that again?
I have a question about that.

Soliciting a Response
What do you think?
We haven't heard from you yet.
Do you agree?
What answer did you get?

Individual Reporting
I discovered from ____ that...
I found out from ____ that...
____ pointed out to me that...
____ shared with me that...

Disagreeing
I don't agree with you because...
I got a different answer than you.
I see it another way.

Affirming
That's an interesting idea.
I hadn't thought of that.
I see what you mean.

Predicting
I guess/predict/imagine that...
Based on ..., I infer that...
I hypothesize that...

Paraphrasing
So you are saying that...
In other words, you think...
What I hear you saying is...

Acknowledging Ideas
My idea is similar to/related to ____'s idea.
I agree with (a person) that...
My idea builds upon ____'s idea.

Partner and Group Reporting
We decided/agreed that...
We concluded that...
Our group sees it differently.
We had a different approach.

Offering a Suggestion
Maybe we could...
What if we...
Here's something we might try.

Holding the Floor
As I was saying...
If I could finish my thought...
What I was trying to say was...
<table>
<thead>
<tr>
<th>Page</th>
<th>Quote</th>
<th>Significance</th>
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Performance Task
adapted from Smarter Balanced Assessment Consortium: Grade 8 Performance Task

Part I – Finding support.

1. Provide three arguments from the sources you just read that support the position that women have not yet achieved gender equality with men. Be sure to include the title or the number of the source for each argument you provide.

2. Provide three arguments from the sources you just read that support the position that women have achieved gender equality with men. Be sure to include the title or the number of the source for each argument you provide.
3. There is some disagreement in society regarding gender equality. Some people believe that women have achieved equal status in society as men whereas others argue that women have not. The four sources treat this question of gender equality differently.

Part A

Identify one piece of support and the source for the following view: Women do not make earn the same wage as men for the same work.

Part B

Identify one piece of support and the source for the following view: Women do make earn the same wage as men for the same work.
Part II – Student directions for Part 2

You will now review your sources, take notes, and plan, draft, revise, and edit your essay. You may use your notes and refer to the sources. Now read your assignment and the information about how your argumentative essay will be scored; then begin your work.

Your assignment:

Now that you have read the sources, you will take a position and present your findings in your school’s newspaper. You will write an argumentative piece in which you analyze the arguments and make a claim as to whether or not women have achieved gender equality in our society. Make sure you address potential counterarguments in your essay and support your claim with information from the sources you have examined.

Argumentative scoring:

Your arguments will be scored using the following:

1. **Statement of claim and organization:** How well did you state your claim, address opposing claims, and maintain your claim with a logical progression of ideas from beginning to end? How well did your ideas thoughtfully flow from beginning to end using effective transitions? How effective was your introduction and your conclusion?

2. **Elaboration/evidence:** How well did you integrate relevant and specific information from the sources? How well did you elaborate your ideas? How well did you clearly state ideas using precise language that is appropriate for your purpose and audience?

3. **Conventions:** How well did you follow the rules of grammar usage, punctuation, capitalization, and spelling?

Now begin work on your argumentative essay. Manage your time carefully so that you can

1. plan your essay
2. write your essay
3. revise and edit the final draft of your essay

For Part 2, you are being asked to write a multi-paragraph essay, so please be as thorough as possible. Write your response in the space provided, or use your own paper. Remember to check your notes and your prewriting/planning as you write and then revise and edit your essay.
## VUSD Grade 8 Argument Writing Rubric

<table>
<thead>
<tr>
<th>Score of 4 (Above Grade Level)</th>
<th>Score of 3 (At grade level)</th>
<th>Score of 2 (Approaching Grade Level)</th>
<th>Score of 1 (Below Grade Level)</th>
</tr>
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<tbody>
<tr>
<td><strong>Ideas &amp; Content</strong></td>
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</tr>
<tr>
<td>addresses all parts of the writing task with a tightly focused response</td>
<td>addresses the writing task with a focused response</td>
<td>addresses the writing task with an inconsistent focus</td>
<td>attempts to address the writing task but lacks focus</td>
</tr>
<tr>
<td>establishes the precise claim(s)</td>
<td>establishes plausible claim(s)</td>
<td>attempts to establish plausible claim(s)</td>
<td>attempts to establish claim(s)</td>
</tr>
<tr>
<td>effectively acknowledges and distinguishes the claim(s) from alternate or opposing claims</td>
<td>acknowledges and distinguishes the claim(s) from alternate or opposing claims</td>
<td>attempts to acknowledge and distinguish the claim(s) from alternate or opposing claims</td>
<td>does not acknowledge and distinguish the claim(s) from alternate or opposing claims</td>
</tr>
<tr>
<td>skillfully supports claim(s) with logical reasoning and relevant evidence to demonstrate an understanding of the topic or text</td>
<td>supports claim(s) with logical reasoning and relevant evidence to demonstrate an understanding of the topic or text</td>
<td>inconsistently supports claim(s) with logical reasoning relevant evidence to demonstrate an understanding of the topic or text</td>
<td>supports claim(s) using evidence that is irrelevant and/or insufficient that interferes with an understanding of the topic or text</td>
</tr>
<tr>
<td>uses accurate and credible resources*</td>
<td>uses accurate and credible resources*</td>
<td>inconsistently uses accurate and credible resources*</td>
<td>attempts to use accurate and credible resources*</td>
</tr>
<tr>
<td><strong>Organization</strong></td>
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<tr>
<td>effectively introduces the claim(s)</td>
<td>introduces the claim(s)</td>
<td>introduces the claim(s); however, may fail to distinguish the claim(s)</td>
<td>identifies the claim(s)</td>
</tr>
<tr>
<td>organizes reasons and evidence logically in a manner that supports the writing task</td>
<td>organizes reasons and evidence logically</td>
<td>organizes reasons and evidence in a manner that may lack cohesion (ideas may be rambling and/or repetitive)</td>
<td>has little or no evidence or purposeful organization</td>
</tr>
<tr>
<td>efficiently uses words, phrases, and/or clauses to create cohesion and clarify relationships among claim(s), counterclaims, reasons, and evidence</td>
<td>uses words, phrases, and/or clauses to create cohesion and clarify relationships among claim(s), counterclaims, reasons, and evidence</td>
<td>inconsistently uses words, phrases, and/or clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence</td>
<td>inconsistently uses words, phrases, and/or clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence</td>
</tr>
<tr>
<td>provides an effective concluding statement or section that follows from and skillfully supports the argument presented</td>
<td>provides a concluding statement or section that follows from and supports the argument presented</td>
<td>provides a sense of closure</td>
<td>provides a sense of closure</td>
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<tr>
<td><strong>Language/Conventions</strong></td>
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<tr>
<td>demonstrates an exemplary use of conventions (grammar, punctuation, capitalization, and spelling) to enhance meaning</td>
<td>demonstrates use of conventions (grammar, punctuation, capitalization, and spelling); errors do not interfere with understanding</td>
<td>demonstrates a limited and/or inconsistent use of conventions (grammar, punctuation, capitalization, and spelling); errors may interfere with understanding</td>
<td>demonstrates a weak understanding of grade level appropriate conventions (grammar, punctuation, capitalization, and spelling); errors interfere with understanding</td>
</tr>
<tr>
<td>skillfully employs language, domain-specific vocabulary, and tone appropriate to audience and purpose</td>
<td>employs language, domain-specific vocabulary, and tone appropriate to audience and purpose</td>
<td>inconsistently employs language, domain-specific vocabulary, and tone inappropriate to audience and purpose</td>
<td>employs language, domain-specific vocabulary, and tone that are inappropriate to audience and purpose</td>
</tr>
<tr>
<td>has sentences that are expertly constructed with appropriate variety in length and structure</td>
<td>has sentences that are generally complete with sufficient variety in length and structure</td>
<td>has some sentence formation errors and/or lack of sentence variety</td>
<td>has frequent and severe sentence formation errors and/or a lack of sentence variety</td>
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<tr>
<td>follows standard format for citation with few errors*</td>
<td>follows standard format for citation with few errors*</td>
<td>follows standard format for citation with several errors*</td>
<td>follows standard format for citation with major errors*</td>
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</table>

* if applicable

Ventura Unified School District 5-9-12
District: Conejo Valley Unified School District
School: Colina Middle School
Participant(s): Monica Beck

Lesson Plan Title: Common to the Core
Lesson Plan Grade Levels: 7, 8, 9
Lesson Plan Subject Areas: Language Arts/Reading (SAGE Category), History/Social Science
Common to the Core

Incorporating English Language Arts, technology, art, and the new common core state standards (CCSS), this unit heightens students’ awareness of what unites us rather than what separates and differentiates us.

The unit begins with a discussion of what the word story means to them. We focus on the character, plot, and settings of stories along with why stories exist (to entertain, teach, and persuade). We quickly proceed to a TED talk titled “The Danger of the Single Story.” Before viewing I pose the question: What is the danger of a single story? Students point out that it is bias if only one side is presented. The speaker in the video, Chimamanda Adichie, a Nigerian novelist, warns that if we hear only a single story about another person or culture, we risk a misunderstanding; consequently, it “robs people of their dignity.” She explains how this trap can be avoided if we listen to more than one story. After students summarize and answer questions about the video, I tell them we will revisit this concept when we analyze propaganda in the WW 2 part of the unit.

The unit continues with the idea of story when students interview a parent or grandparent using David Isay’s Storycorps Project, a program focusing on ordinary Americans with extraordinary stories. Students ask their family members about anything from the first time they fell in love to their career choice. With the answers, students create a biographical essay. The class sees that if we take the time to listen, we’ll find not only stories, but wisdom, wonder, and poetry in the lives of people all around us. Parents often email and express gratitude for having their family stories documented for future generations (and I get to feel like a million bucks).

Next, students put the concept of story in its many forms to further analysis through the literature and projects in the Holocaust portion of the unit. Using the collaboration, critical thinking and communication components of the new CCSS, students work in groups to research propaganda used during WW II and present a power point to the class. This further underscores the concept of how a single story can lead to stereotypes and diminish the dignity of the person being judged. The rubric requires one primary and one secondary source, graphics, and proper MLA citation. From there I assign the class to one of four groups: A Hitler youth, an American, a Jew, and a political activist with Jewish sympathies. I then show a Hitler speech and have them write about their reactions based on their assigned point of view. This helps them see that not only is it valuable to hear more than one side of a story but also the importance of understanding another’s perspective. By not knowing the full extent, people generalize and assume; we become blind to the whole story. Once we realize this and open up to all stories and everyone’s culture, we become humanized and complete.

From there we read Night, Anne Frank, and “Camp Harmony.” Students again see the historical event from different perspectives: a concentration camp survivor, Jews in hiding and their ultimate demise, and Japanese families interned on American soil. To further drive home the concept of “Common to the Core” I have students work on a Holocaust photo comparison assignment. The project requires students to compare a photo of their family engaged in an activity to a photo of a Jewish family from the archives in the United States Holocaust Memorial Museum before the war broke out. They put both photos on a word document and respond to a series of questions. With their analysis, they write an essay, drawing parallels between their life today and the life of one of the Holocaust victims before the war. Prior to the assignment, WW II remains somewhat nebulous to the class; after the photo comparison assignment, they not only have a better understanding, but are profoundly moved.

I then show a contemporary three minute clip by TrueMove titled “Giving is the Best Communication” which compellingly portrays the connection of how story plays a role across cultures, further solidifying what is common among us and capitalizing on the social media part of the CCSS. In the video a man lends help to a boy who is stealing medicine for his sick mom by paying for it himself and even supplying the boy with soup. Years later that same man is sick and his daughter cannot afford the medical bills. While the daughter is mourning she suddenly notices the bill paid in full. The boy, now a grown man and who it turns out is now the man’s doctor, has paid for the bill. With a partner students create a Venn diagram comparing and contrasting the theme of the video to Miep’s heroism in Anne Frank. This segues into the closing of the unit as I change the question we
opened with: Instead of “What is the danger of a single story?” I ask them what would happen if we changed the word “danger.” Could one word change our whole thought process? What if we put in the word “beauty”? How does it apply to this video? They come to the realization that one story, one single story, could not only move us, but even forever alter the way we live our lives. With that thought, I have them work on our culmination project, “Flipped Forward.”

For this, students create a list of the people studied in the unit, along with their positive character traits. I then present a list of people from the school who have retired and explain that, although they have not met all of them, share many of the same positive traits. I further explain that just like Adichie mentioned in her TedTalk, we are impressionable as children and our first encounter with something is so vital to our future understanding of that thing that it becomes our foundation, our stepping stone. Fittingly, we will create stepping stones to commemorate those who were instrumental in helping provide that solid foundation for us -- the teachers and staff who have retired from the school. This part I call “Flipped Forward” for two reasons. Students create stepping stones in the form of a flip flop to honor the retirees and the retirees’ character traits still resound, or flip forward, in our students. The students carry the torch passed on to them...the torch of respect, kindness, perseverance, and learning. The flip flop symbolizes the retirees’ eternal impact; their footprint, literal and metaphorical, remains and “flips forward” as their indelible impression continues on in the futures of the students.

The unit is one I will continue to use, including the stepping stones (as others retire). It not only is in alignment with the new CCSS, it also deepens students’ understanding of the importance and value of perspective, all perspectives. I feel an overwhelming need to do this unit since students are at an age where they are discovering who they are – their character, their values, their dreams. The process of seeing in stories and in history that we are more common than different, helps students create their own life story, both beautiful and rich.

**Materials used:**
Ted Talk “The Danger of the Single Story”
*Anne Frank*
*Night*
“Camp Harmony”
Hitler speech clip from u-tube
True Move “Giving is the Best Communication”
Stepping stone mold, paint, gloves, paint brushes, and buckets

**Standards covered:**
*Integrate multimedia to clarify information and strengthen claims and evidence.*
*Analyze the purpose of information in diverse media and formats and evaluate the motives behind it.*
*Gather information from multiple digital sources, assess the credibility and accuracy, and quote the data while avoiding plagiarism and following standards for citation.*
*Write narratives using effective technique, details, and structured sequence.*
*Evaluate the advantages and disadvantages of different mediums.*
*Analyze how a text makes connections among individuals, ideas, or events.*
*Determine and analyze author’s point of view.*
*Analyze the impact of specific word choices on meaning and tone.*
The Outcome

By June 6, 1944, with the beachheads firmly secured more than 325,000 troops had crossed with more than 180,000 tons of military equipment. Paris was liberated on August 25, and Germany surrendered on May 8, 1945.
<table>
<thead>
<tr>
<th>District:</th>
<th>Santa Paula Unified School District</th>
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<tr>
<td>School:</td>
<td>Isbell Middle School</td>
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<tr>
<td>Participant(s):</td>
<td>Jennifer Dobbie</td>
</tr>
<tr>
<td>Lesson Plan Title:</td>
<td>Video Games and History: A Perfect Combination</td>
</tr>
<tr>
<td>Lesson Plan Grade Levels:</td>
<td>7, 5, 6, 8, 10, 12, 9, 11</td>
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<tr>
<td>Lesson Plan Subject Areas:</td>
<td>Language Arts/Reading (SAGE Category) , History/Social Science , Science (AMGEN Category)</td>
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</table>
“Meet your students where they’re at,” is the mantra we all heard in our credentialing programs, but over the years have forgotten with the implementation of standards and assessments and expectations. But when you’re teaching seventh grade students with second and third grade reading levels, interrupted formal education and second language learners, you quickly realize all the “stuff” they want you to do is an enormous undertaking. This was my mountain to climb when creating this unit; how can I meet the students where they are and at the same time teach them about the civilizations of Central and South America?? I knew of one activity that captures the attention of ALL adolescents: video games. Let’s face it, the video gaming industry has been doing something right, they’ve managed to capture the attention of virtually every adolescent (and many adults) worldwide who have access to technology, and they make billions of dollars doing it. I must admit, at first I did this out of desperation, a sort of teaching Russian roulette. I decided to bring the video games to the classroom.

Seventh grade history covers a variety of civilizations starting with the fall of the Roman Empire and ending at the Renaissance. We had recently completed a rather hum drum study of West Africa and were now onto the civilizations of the Americas, (the Incas, the Aztecs, and the Mayas). I began by breaking the students into groups and explained that they would be creating a video game based on the three civilizations. Each group was assigned a particular city (Tenochtitlan, Cuzco, Chichen Itza, Tikal, and Machu Picchu), and instructed to research that city and create a portion of a video game that would become part of an epic game. You would have thought I told them we were all going to Disneyland. Yes, they were that excited! I had boys who hadn’t been engaged all year, begin to ask questions and groups begin planning before I was even finished giving the overview. There were questions like “Can we do multi-player and single player?” “Can we incorporate zombies?” “Will we be able to present to other people about our portion of the game?” “Can we have an assembly to show everyone what we did?” (That last one blew me away!)

I then gave a brief introduction on each of the civilizations, a sort of “teaser,” making certain that I gave them just enough to get them interested (that was not difficult!). For instance, I hinted at the importance of human sacrifice and ritual killing. From there the students were given an assignment sheet (Fig.1) that explained they had just started a job at a gaming company and their duty was to develop a game based on the civilizations of the Americas. They were then given rubrics for the project (Fig. 2, 3, 4)- which is how I assessed the students, and verbal reminders about collaborative work and to have a plan each day to work towards their goals. I also required them to filled out a group and self-evaluation (Fig. 5, 6) after each due date to keep them focused, and this gave me an insight as to which groups maybe needed a little more hand holding and/or supervision. I was shocked to see how much they kept each other on task and when someone was absent they picked up the slack or made sure that person had something to work on at home.

Since we have begun to require students to justify every response they give with textual evidence as per the new Common Core State Standards (CCSS), I required my students to provide me with textual evidence of understanding through the game play of their portion of the video game. This included who the characters were and what tasks they must perform in order to successfully complete their portion of the game; this can be seen in the rubric for the final project (Fig. 2, 3, 4).

Students were given access to books containing information about their city and were allowed to use computers outside of class to do further research. Our school has only one computer lab and not enough computers for all the students in this large class so the use of computers during school time was not possible. I wanted the students to have the opportunity to use books as research tools and not to become dependent on Google for all their research needs. I was pleased to see the students enjoyed having the access to books and could quickly turn from one topic
to another and bookmark the pages with sticky notes so as to access pages on proceeding days. They also learned valuable researching skills and discovered that books, in fact, were great tools for their needs.

As the days went on you could see how engaged the students were, it was like a fire had been lit inside them for learning and creating. It was great to see how they really depended on one another’s strengths. Students that had strong artistic skills were in charge of drawing and creating models, students that had strong reading and research skills worked on finding information, students that had strong organizational skills put everything together. I really enjoyed seeing how each of them felt important and validated in their collaborative groups. I talked briefly one day about future careers in game development and was delighted to have quite a few students inquire about what course of study they would take in order to be able to do that.

The next phase of the project was to create a 3-D model of their city on a giant board. I had the students use salt dough (I was shocked that 98% of the students had never used salt dough before!), and was pleased with the results. They were creative and worked well together on the task, being quite creative with finding items around our school to use.

The final phase was to present, and this is when my mouth dropped open. Each and every group came up and explained how their portion of the game worked, how it related to their civilization’s religion, culture, and history, AND they did it with NO NOTES! These students really learned about these places. They were confident in their delivery and answered questions like experts. I feel they really improved their confidence in their public speaking skills. I posted on Facebook later that day that I had died and gone to teacher heaven. It was remarkable. My underachieving, forgotten, back of the pack kids demonstrated knowledge well above the requirements and far ahead of their honors student counterparts. Meeting my students where they were at was the key to opening the door to learning for them.

One great discovery I made about this project is that it can be used for a variety of topics and subjects; my students will be doing this project again when we study the Renaissance. This could be used for a class reading a novel (especially a non-fiction novel such as Anne Frank), every time period in history, science (imagine a video game based on the wetlands or the water cycle). Teachers of all grade levels could have their students create video games and make the requirements and complexity based on the grade level and subject matter. And who knows... maybe one day one of these games will be played on gaming consoles around the world!

**Common Core Standards Covered:**

Reading History: 6-8.1, 6-8.2, 6-8.3, 6-8.4, 6-8.5, 6-8.7, 6-8.9

Writing History: 6-8.2, 6-8.4, 6-8.7, 6-8.8, 6-8.9

Language Arts Speaking and Listening: 7.1, 7.4, 7.5, 7.6
Rate yourself as a group participant according to your performance on the task. Use the following indicators:

<table>
<thead>
<tr>
<th>VG = Very Good</th>
<th>I = Improving</th>
<th>SNW = Still Needs Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______ I come prepared for the group activity.</td>
<td>_______ I make sure I know what the task is.</td>
<td></td>
</tr>
<tr>
<td>_______ I listen carefully and respectfully.</td>
<td>_______ I can be depended on to do accurate work for the group.</td>
<td></td>
</tr>
<tr>
<td>_______ I respond clearly and honestly.</td>
<td>_______ I can participate without bothering others.</td>
<td></td>
</tr>
<tr>
<td>_______ I respond clearly and honestly.</td>
<td>_______ I get down to the task quickly.</td>
<td></td>
</tr>
<tr>
<td>_______ I attempt answers.</td>
<td>_______ I give help to others when asked.</td>
<td></td>
</tr>
<tr>
<td>_______ I make suggestions.</td>
<td>_______ I complete what is expected or assigned.</td>
<td></td>
</tr>
<tr>
<td>_______ I encourage and invite others to contribute.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
You have recently been hired at a leading video game development company in Los Angeles. The company, Video Game Masters, needs to develop a new game to compete with the many successful games that have recently hit the market; Grand Theft Auto 5, God of War, Ghosts. Gamers are anxiously awaiting an epic game that can be used on the latest gaming consoles, PS4 and Xbox. Your job, along with your team is to develop this game. The head of the company wants a game that takes place in the ancient civilizations of the Incas, Mayas and Aztecs. The head of the company wants the following parameters followed:

1. The game must take place in the ancient civilizations of the Incas, Mayas and Aztecs.
2. Game play must end at Machu Picchu.
3. Players need to be able to play single and multi-player.
4. There must be clear instructions as to how to play and win the game.
5. All aspects of the game must be related to Incan, Mayan and Aztec civilization.

Groups need to work together by finding out each person’s strengths and assigning certain tasks to each individual so the work load is evenly distributed. The teacher will be coming around to check on progress and participation. Here is your timeline:

**Friday, December 13, 2013:** Rough sketch of your town or road system

*Group/Self Evaluation Due

**Wednesday, December 18, 2013:** Rough draft of game play. You need to know how players will proceed through your town and what happens there. Remember you need single and multi-player scenarios.

*Group/Self Evaluation Due

**Friday, December 20, 2013:** Final draft of your town. This should be absolutely perfect and will serve as a model for your 3-D representation that will be completed when you return from the winter break.

*Group/Self Evaluation Due

**Tuesday, January 7, 2014:** Construction of 3-D models begin

*Group/Self Evaluation Due

**Tuesday, January 14, 2013:** Final project due. This includes final rules of gameplay and all 3-D models. Presentations begin today and continue tomorrow.

*Final Evaluations due!
Engaged Students!
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>Exemplary</th>
<th>Proficient</th>
<th>Partially Proficient</th>
<th>Unsatisfactory</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on the Task and Participation</td>
<td>Consistently stays focused on the task and what needs to be done. Very self-directed.</td>
<td>Focuses on the task and what needs to be done most of the time. Other group members must count on this person.</td>
<td>Rarely focuses on the task and what needs to be done. Lets others do the work.</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>A true team member who contributes a lot of effort, and encourages and supports the efforts of others in the group.</td>
<td>A strong group member who tries hard!</td>
<td>Sometimes a satisfactory group member who does what is required</td>
<td>Sometimes chooses not to participate and does not complete assigned tasks.</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>Dependability and Shared Responsibility</td>
<td>Consistently punctual for group meetings, turns in all work on time.</td>
<td>Usually punctual for group meetings, turns in most work on time.</td>
<td>Sometimes late for group meetings, frequently turns in work after the deadline.</td>
<td>Late for all or most group meetings, misses all deadlines for turning in work.</td>
<td>3/3</td>
</tr>
<tr>
<td>Follows through on assigned tasks and does not depend on others to do the work, responsibility for tasks is shared evenly.</td>
<td>Follows through on most assigned tasks.</td>
<td>Does not follow through on most assigned tasks and sometimes depends on others to do the work.</td>
<td>Seldom or never follows through on assigned tasks. Depends on others to do all of the work.</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>Listening, Questioning and Discussing</td>
<td>Respectfully listens, interacts, discusses and poses questions to all members of the team during discussions and helps direct the group in reaching consensus.</td>
<td>Respectfully listens, interacts, discusses and poses questions to others during discussions.</td>
<td>Has some difficulty respectfully listening and discussing, and tends to dominate discussions.</td>
<td>Has great difficulty listening, argues with teammates, and is unwilling to consider other opinions. Impedes group from reaching consensus.</td>
<td>3/3</td>
</tr>
<tr>
<td>Research and Information Sharing</td>
<td>Routinely gathers research and shares useful ideas when participating in the group discussion. Defends/ rethinks ideas relating to the group's project goals.</td>
<td>Usually provides useful research and ideas when participating in the group discussion.</td>
<td>Sometimes provides useful research and ideas when participating in the group discussion.</td>
<td>Rarely provides useful research or ideas when participating in the group discussion.</td>
<td>3/3</td>
</tr>
<tr>
<td>Problem-Solving</td>
<td>Actively looks for and suggests solutions to problems.</td>
<td>Refines solutions suggested by others.</td>
<td>Does not suggest or refine solutions, but is willing to try out solutions suggested by others.</td>
<td>Does not try to solve problems or help others solve problems.</td>
<td>3/3</td>
</tr>
<tr>
<td>Group/Partner Teamwork</td>
<td>Consistently makes necessary compromises to accomplish a common goal.</td>
<td>Usually makes necessary compromises to accomplish a common goal.</td>
<td>Occasionally makes compromises to accomplish a common goal, and sometimes helps keep the group working well together.</td>
<td>Rarely makes compromises to accomplish a common goal and has difficulty getting along with other group members.</td>
<td>3/3</td>
</tr>
<tr>
<td>Always has a positive attitude about the task(s) and the work of others.</td>
<td>Usually has a positive attitude about the task(s) and the work of others.</td>
<td>Occasionally is publicly critical of the task(s) or the work of other members of the group.</td>
<td>Is often negative and publicly critical of the task(s) or the work of other members of the group.</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>All team members contributed equally to the finished project.</td>
<td>Assisted group/partner in the finished project.</td>
<td>Finished individual task but did not assist group/partner during the project.</td>
<td>Contributed little to the group effort during the project.</td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>Performed all duties of assigned team role and contributed knowledge, opinions, and skills to share with the team. Always did the assigned work.</td>
<td>Performed nearly all duties of assigned team role and contributed knowledge, opinions, and skills to share with the team. Completed most of the assigned work.</td>
<td>Performed a few duties of assigned team role and contributed a small amount of knowledge, opinions, and skills to share with the team. Completed some of the assigned work.</td>
<td>Did not perform any duties of assigned team role and did not contribute knowledge, opinions or skills to share with the team. Relied on others to do the work.</td>
<td></td>
<td>3/3</td>
</tr>
</tbody>
</table>
**Rating Collaborative Work**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 3 2 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Most of the time</th>
<th>Seldom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most of the members</td>
<td>Only 1 or 2 members</td>
</tr>
<tr>
<td>Highly evident</td>
<td>Hardly Evident</td>
</tr>
<tr>
<td>Excellent</td>
<td>Weak</td>
</tr>
</tbody>
</table>

- During brainstorming, all students participated by listening, contributing, encouraging.
- The group was careful to divide up the work fairly and evenly.
- The members completed their work within the time they set for themselves as a group.
- The members discussed and helped one another with problems and challenges.
- The group shared decision-making about the important parts of the work.
- The group worked in an orderly and purposeful way.

If you circled a 1 or 2 on any of the above items, please explain why, giving specifics and names of group members you felt were not working collaboratively.

_________________________________________________________________________________________________________
_________________________________________________________________________________________________________

**Final Grade:**

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**Rating Collaborative Work**

<table>
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<tr>
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<tr>
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- The members discussed and helped one another with problems and challenges.
- The group shared decision-making about the important parts of the work.
- The group worked in an orderly and purposeful way.

If you circled a 1 or 2 on any of the above items, please explain why, giving specifics and names of group members you felt were not working collaboratively.

_________________________________________________________________________________________________________
_________________________________________________________________________________________________________

**Final Grade:**
Sample excerpts from student gameplay:

“Single Player. You are an Aztec Warrior an explosion from the Jaguar God, Eagle God and Serpent. Since they were controlled by the Demon of the Shadows your journey is to find the Aztec Sorcerer’s dagger and defeat all the gods.”

“Single Player. You begin with 25 gems and you must do the following to complete your mission: build your own hut, gather slaves, create an army...”

“Inca Game play. This game is about the ancient Incas and you are going through the city of Cuzco. This game can be played on an Xbox 360, Xbox One, PS4, and PS3. You must press A to run, B to jump, X to duck and Y to fight. The first mission you will have to accomplish will be to get a diamond. While you are taking the diamond to the destination you will have to climb mountains and while you are climbing you will find gems, coins, and weapons. The weapons will help you kill the many animals you will encounter and cut the plants that are in your way. You can use the coins to buy more weapons, clothes and Jeep. You will come to a river and you will have to build a boat with sticks and rope and then you will fish in the river. When you reach the end you will find the temple in the middle of the forest, but before you get there you will face criminals and many wild animals like Jaguars and lions. At the temple you will be asked to get a code and then you will go back to get the code in one of the houses. Once you find the code you give it to the soldiers and you will pass the level and move to the next city.”

“Game Play. Pass 3 missions to get a key and unlock hidden treasure and get a weapon. Open temple and use key to open treasure. Play drums to fully unlock treasure. Eat food to gain a life. There will be a maze with fog and there are going to be animals you have to fight. In the treasure box you are going to find a map to lead you through the forest. Volcano erupts and lava falls then you can’t let it touch you or else you lose and life and die. Kill animals and use the skin to keep you warm.”

“Mayan Game Play. This part of the game tells how the world is going to end in 3013. The avatar has many insane dreams with many people dying, and then those people tell the player how to play the game. Gods will die and an ugly monster will try to kill you at the end. Many enemies will try to attack and destroy your village. Drought and floods will happen while in story mode and you’ll find ways to stop it. You must help in ritual sacrifices...”
<table>
<thead>
<tr>
<th>CATEGORY</th>
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<th>Un satisfactory</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on the Task and Participation</td>
<td>3 points</td>
<td>2 points</td>
<td>1 point</td>
<td>0 points</td>
<td>3</td>
</tr>
<tr>
<td>Consistently stays focused on the task and what needs to be done. Very self-directed.</td>
<td></td>
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<td>A true team member who contributes a lot of effort, and encourages and supports the efforts of others in the group.</td>
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<tr>
<td>Dependability and Shared Responsibility</td>
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<td>2 points</td>
<td>1 point</td>
<td>0 points</td>
<td>3</td>
</tr>
<tr>
<td>Consistently punctual for group meetings, turns in all work on time.</td>
<td></td>
<td></td>
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<td>Follows through on assigned tasks and does not depend on others to do the work, responsibility for tasks is shared evenly.</td>
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</tr>
<tr>
<td>Listening, Questioning and Discussing</td>
<td>3 points</td>
<td>2 points</td>
<td>1 point</td>
<td>0 points</td>
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</tr>
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<td>Respectfully listens, interacts, discusses and poses questions to all members of the team during discussions and helps direct the group in reaching consensus.</td>
<td></td>
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<td>Research and Information Sharing</td>
<td>3 points</td>
<td>2 points</td>
<td>1 point</td>
<td>0 points</td>
<td>3</td>
</tr>
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<td></td>
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<td>Problem-Solving</td>
<td>3 points</td>
<td>2 points</td>
<td>1 point</td>
<td>0 points</td>
<td>3</td>
</tr>
<tr>
<td>Actively looks for and suggests solutions to problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group/Partner Teamwork</td>
<td>3 points</td>
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<td>1 point</td>
<td>0 points</td>
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</tr>
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<td>Consistently makes necessary compromises to accomplish a common goal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always has a positive attitude about the task(s) and the work of others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>All team members contributed equally to the finished project.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performed all duties of assigned team role and contributed knowledge, opinions, and skills to share with the team. Always did the assigned work.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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147

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# Video Game Rubric

## Maps- Paper and 3-D

<table>
<thead>
<tr>
<th></th>
<th>25 pts.</th>
<th>20 pts.</th>
<th>15 pts.</th>
<th>5 pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper Map</strong></td>
<td><strong>Content</strong></td>
<td><strong>Map is accurate representation of city. Everything is clearly labeled.</strong></td>
<td><strong>Map is mostly accurate representation of city. Most items are labeled.</strong></td>
<td><strong>Map is somewhat accurate representation of city. Some items are labeled.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>25 pts.</strong></td>
<td><strong>20 pts.</strong></td>
<td><strong>15 pts.</strong></td>
<td><strong>5 pts.</strong></td>
</tr>
<tr>
<td><strong>Neatness and Effort</strong></td>
<td><strong>25 pts.</strong></td>
<td><strong>Obvious attention to detail is made.</strong></td>
<td><strong>Attention has been made to detail, but a few eraser ghosts exist and/or items are crossed out. Most items are clearly labeled.</strong></td>
<td><strong>Work is messy and obviously done last minute. Little or no attention to details. Some items are labeled.</strong></td>
</tr>
<tr>
<td><strong>3-D Map</strong></td>
<td><strong>Content</strong></td>
<td><strong>Map is accurate representation of paper map. It is obvious what city is represented.</strong></td>
<td><strong>Map is a somewhat accurate representation of the paper map. It is obvious what city is represented.</strong></td>
<td><strong>Map is partially similar to paper map, some items are missing.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>25 pts.</strong></td>
<td><strong>20 pts.</strong></td>
<td><strong>15 pts.</strong></td>
<td><strong>5 pts.</strong></td>
</tr>
<tr>
<td><strong>Neatness and Effort</strong></td>
<td><strong>25 pts.</strong></td>
<td><strong>Obvious attention to detail is made. Buildings are perfect models.</strong></td>
<td><strong>Map is clean and detailed, but some items are not good models.</strong></td>
<td><strong>Map is not clean and detailed, many items are not good models.</strong></td>
</tr>
</tbody>
</table>
# Video Game Rubric

## Presentation

<table>
<thead>
<tr>
<th>Component</th>
<th>25 pts.</th>
<th>20 pts.</th>
<th>15 pts.</th>
<th>5 pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voice</strong></td>
<td>Voice is clear and loud enough for students in the back of the room to hear.</td>
<td>Voice is clear, but not loud enough for students in the back of the room to hear.</td>
<td>Voice is clear most of the time, some mumbling, and not loud enough for many students to hear.</td>
<td>Voice is muffled and/or mumbling, no one can hear.</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Presentation gave full overview of game play and related it to religion, culture and time period of the city.</td>
<td>Presentation gave full overview of game play and mostly related it to religion, culture and time period of the city.</td>
<td>Presentation gave overview of game play and somewhat related it to religion, culture and time period of the city.</td>
<td>Presentation gave little information as to how game was to be played and was not related to religion, culture and time period of the city.</td>
</tr>
<tr>
<td><strong>Questioning</strong></td>
<td>Able to answer all questions clearly and accurately sounding much like an expert.</td>
<td>Able to answer most of the questions clearly and seems to have some expert knowledge.</td>
<td>Able to answer some of the questions but does not seem to have much expertise.</td>
<td>Unable to answer questions.</td>
</tr>
<tr>
<td><strong>Participation</strong></td>
<td>Participated in presentation equally with group presenting an equal portion.</td>
<td>Participated in the presentation, but portion was not as much as others.</td>
<td>Barely participated in presentation, group members have to encourage or remind.</td>
<td>Did not participate in group presentation.</td>
</tr>
</tbody>
</table>
## Video Game Rubric

### Game Play

<table>
<thead>
<tr>
<th>Instructions</th>
<th>25 pts.</th>
<th>20 pts.</th>
<th>15 pts.</th>
<th>5 pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 pts.</td>
<td>Instructions are clear and easy to follow. Instructions for both single and multi-player, with online component.</td>
<td>Instructions are somewhat clear, some clarification is needed. Instructions for both single and multi-player, with online component.</td>
<td>Instructions are a bit confusing, need lots of clarification. No or confusion between single and multi-player.</td>
<td>Instructions are confusing and/or incomplete. No distinction between single and multi-player.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characters</th>
<th>25 pts.</th>
<th>20 pts.</th>
<th>15 pts.</th>
<th>5 pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 pts.</td>
<td>Characters are specific to particular city and weapons are relevant to that city and time period.</td>
<td>Most characters are specific to particular city and most weapons are relevant to that time period.</td>
<td>Some characters relate to particular city and some weapons relate to the time period.</td>
<td>Characters have nothing to do with particular city and weapons do not relate to time period.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tasks</th>
<th>25 pts.</th>
<th>20 pts.</th>
<th>15 pts.</th>
<th>5 pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 pts.</td>
<td>All tasks demonstrate understanding of culture, religion and are time period specific.</td>
<td>Most tasks demonstrate understanding of culture, religion and are time period specific.</td>
<td>Some tasks demonstrate understanding of culture, religion and are time period specific.</td>
<td>Few tasks demonstrate understanding of culture, religion and are time period specific.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neatness and Effort</th>
<th>25 pts.</th>
<th>20 pts.</th>
<th>15 pts.</th>
<th>5 pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 pts.</td>
<td>Obvious attention to detail is made. There are no stray eraser ghosts, or crossed out items. (or has been typed and no errors)</td>
<td>Attention has been made to detail, but a few eraser ghosts exist and/or items are crossed out. (or has been typed and some errors)</td>
<td>Work is messy and obviously done last minute. Little or no attention to details. (or has been typed and many errors)</td>
<td>Work is illegible, done last minute, messy. (or is incomplete)</td>
</tr>
<tr>
<td>District:</td>
<td>Ventura Charter School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School:</td>
<td>Ventura Charter School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant(s):</td>
<td>Terri Hooson</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Lesson Plan Title:    | Open-Mic Night |
| Lesson Plan Grade Levels: | 7, 8, 2, 9, 3, 10, 12, 5, 6, K, 11, 4, 1 |
| Lesson Plan Subject Areas: | Language Arts/Reading (SAGE Category), History/Social Science, Theater |
**Open-Mic Night**

**A Celebration of Authors: Integrating Social-Emotional-Learning**

“I’ve grown as a writer - we all have; we’re real authors now! I have lots of strategies for writing essays. And ‘cuz we wrote “This I Believe” essays, I know more about me.”

~Reflection from Student After Open-Mic Night

Listening to an essay shared on NPR’s *This I Believe*, I was inspired to create a project that integrated Social-Emotional-Leaning (SEL.) During this student-centered project my students and I integrated SEL and writing, culminating in a celebration, Open-Mic Night, an entertaining presentation of writing performed in the evening at a local coffee-house.

**The Project**

The first time I played an essay from NPR’s *This I Believe*, my students were captivated by the child’s story. *This I Believe* essays are centered on Core Values, fundamental beliefs. We began by discussing the concept of Core Values and how these basic beliefs affect our behaviors, attitudes, and daily decisions. I invited the kids to take part in a SEL Survey that helped them learn their most important Core Values, such as connection or accomplishment. We integrated math by analyzing this data in a table. Throughout this project, I read aloud books teaching SEL concepts and taught lessons to reach multiple-learning styles on understanding and managing emotions through role plays, games, book reviews, daily conflict-resolution-circle, and grand discussions. Next, we began journaling about our lives and our values.

I brought in personal journals, sharing my own writing. I gifted each student a Writers Notebook and pen – writer’s tools. Students began to jot down things they noticed and wondered, memories and ideas, thoughts and responses. These became the seeds of which our Core Value essays grew in Writers Workshop.

In Writers Workshop each child is seen as a working author – they select their own topics, write daily, and manage the development of each writing piece. Writers Workshop is not text-book driven; it consists of a daily teacher-led mini-lesson, based on writers’ needs and Common Core standards. It explicitly teaches writing strategies, craft, and techniques. Writers learned how to craft thesis statements, improve mechanics, and strategies for organization. They studied hooks and sentence structure, wrote mini-stories angled towards illustrating their Core Values, “story telling” to flesh out ideas. Students were organized into heterogeneous partnerships, and learned to peer-conference. We listened to podcasts and read multiple *This I Believe* essays, learning writing techniques. Students used mentor texts, studying how authors wrote, not just what they wrote.
We invited a published author to class and interviewed her. We went on a “‘Writeabout” Field Trip. During our “Writeabout” we visited a scenic vista and wrote our feelings; at the beach we recorded observations; at the coffee-shop writers sipped herbal-tea and quietly wrote. If people asked what we were doing, the kids answered, “We’re writing, because that’s what writers do!” Writing was becoming a lifestyle.

Children sought critique on drafts by presenting their work on the doc-cam to a Critical Friends Group (CFG,) a tuning protocol for revision. In a CFG, one writer shared his/her work with a support group of students, who provided critical feedback in the form of appreciations, observations, and suggestions.

As my students began to view themselves as writers, writing became more than a school activity, but a lifestyle. When they began self-assigning their own writing homework and organizing recess “Writing Clubs,” I knew that the culture in my class had changed.

**Assessment**
Periodically writers were formatively-assessed with “on-demand” essays, which supported lesson-planning, small-group-work, and 1:1 conferences. Students self-assessed with rubrics to determine growth, creating new goals and revising current writing. Both teacher and student edited final drafts. Writing templates were provided for students needing extra support throughout the project.

**Culmination**
As we worked through final revisions towards publishing, we began to plan our big event, Open-Mic Night, which was to be held at a local coffee-house. To prepare for Open-Mic Night, students created committees. Emcees quizzed the class on important topics to teach our audience-to-be about their writing process, essay strategies, and Core Values. The kids organized greeter s, stage-hands, custodians, and event advertisers.

The principal sent out a press release.

The evening of Open Mic Night was magical! Copies of writers’ essays were placed around the coffee-house, with feedback forms for comments. I sat in the audience, as the kids ran the show. Dressed in their “Sunday-Best,” standing at two microphones on stage, they introduced their writing partner with an “About the Author” paragraph (created through interviews) read their essays, and soaked up the applause from an audience of 80-plus people!

**Adaptability**
Hosting an Open-Mic Night can be easily modified for different grade-levels (K-12.) It can be a celebration or a fund-raiser. Writing genres such as fiction, information, or response-to-literature can be taught – next I am excited to try a Poetry-Open Mic! Younger students can co-author and older students
might submit essays to NPR’s *This I Believe*. Teachers can support their genre choice with similar read-alouds.

**Impact**

I rejoiced when many students began to see writing as lifework, not schoolwork. At the end of the project students completed self-assessments, analyzing their growth as writers, orators, and social-emotionally. My students have moved on in grade-level, but the project impact remains clear; past students continue to send me their writing, often visit my classroom to read current students’ work, and inquire about invitations to future Open-Mic Nights. One student summed up the project, commenting, “*We write to understand ourselves,*” … and this I believe!
## Essay Rubric

### Scoring

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Independently meets expectations</td>
</tr>
<tr>
<td>3</td>
<td>Meets expectations with support</td>
</tr>
<tr>
<td>2</td>
<td>Below expectations</td>
</tr>
<tr>
<td>1</td>
<td>Far below expectations</td>
</tr>
</tbody>
</table>

### Content

Student generates ideas/thoughts from his/her life to explore in essay. Generates entries without teacher support. The writer has multiple strategies for generating ideas.

| PP#1 - Intro | Writer has a hook, topic sentence, 2-3 reasons, and a thesis statement. |
| PP#2 -Reason 1 | Writer has a topic sentence stating their reason and thoroughly supports their reason in 3-4 sentences. The writer uses prompts to push their thinking (IE: For example, this makes me think, this shows…*) |
| PP#3-Reason 2 | Writer has a topic sentence stating their reason and thoroughly supports their reason in 3-4 sentences. The writer uses prompts to push their thinking (IE: For example, this makes me think, this shows…*) |
| PP#4-Conclusion | Writer restates their thesis statement and elaborates on why their thesis is important. |

### Writing Process

The writer proceeds through the writing process, producing an essay at the end, having generated ideas, expanded on ideas, created an outline, drafting and finally revising by conferencing and creating a star page. The writer understands that revision and changes are a part of the work a writer does to produce quality writing and enters into this process and willingly works with guidance to make changes to his/her paper.

### Strategies

The writer incorporates essay writing strategies introduced in class. The writer develops a strong thesis. S/he uses topic sentences in each paragraph, uses prompts to push thinking, uses transition words between thoughts, sites at least one examples, concludes paragraphs. The writer concludes the essay effectively.

### Mechanics

During editing, the writer uses sentence-ending punctuation and correct spelling of high-frequency words in drafting.

### Work Ethic and Effort

The writer produces at least 1 page of writing on a daily basis. The writer spends time thinking, writing, and/or conferencing, each day striving to make his/her work reflect his/her best effort. The writer uses strategies taught in class.

### Comments:

---

*For example, this makes me think, this shows…*
**PROJECT SELF-REFLECTION ON LEARNING**

Spend a few minutes to analyze your performance during the project.

<table>
<thead>
<tr>
<th>Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Name:</td>
<td></td>
</tr>
</tbody>
</table>

**Describe the project in a sentence or two:**

**What big idea(s) did this project help you understand?**

**What are the Ingredients for a Good Essay?**

**What do you wish you had done differently:**

**What part of the project did you do your best work on:**

**How could your teacher(s) change this project to make it better next time:**
### My Work Ethic Rubric

<table>
<thead>
<tr>
<th></th>
<th>3 Almost Always</th>
<th>2 Sometimes</th>
<th>1 Almost Never</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I used resources to find information I needed.</strong> (Little teacher help)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I stayed on task.</strong> (Began work right away and conversations were about the task/concept)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>My behavior helped the group.</strong> (Positive attitude, listen and respond, appropriate use of humor, stayed present)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I had a meaningful contribution.</strong> (I gave and received support. There was shared responsibility)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I did my best work.</strong> (Effort and ability)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: __________________________________________________________________________________________
# Writers Notebook Rubric

<table>
<thead>
<tr>
<th>Writing Element</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity of entries</strong></td>
<td>Writes at least 3 entries at school a week and entries are at least one page long.</td>
<td>Writes less than 3 entries at school a week and entries are NOT at least one page.</td>
<td>Does not add new entries.</td>
</tr>
<tr>
<td><strong>Homework</strong></td>
<td>Completes EVERY assigned writing homework.</td>
<td>Completes some of the assigned writing homework.</td>
<td>Does not attempt to complete writing homework.</td>
</tr>
<tr>
<td><strong>Effort in entries</strong></td>
<td>Writing demonstrates a variety of topics.</td>
<td>Writing does not demonstrate a variety of topics.</td>
<td>Does not add new entries often or does not do homework.</td>
</tr>
<tr>
<td><strong>Applies writing strategies taught in class</strong></td>
<td>Attempts new writing strategies and applies lessons from class.</td>
<td>Does not show an attempt to try new writing strategies from lessons in class.</td>
<td>Does not add new entries often or try new strategies from class.</td>
</tr>
<tr>
<td><strong>Organization and neatness in notebook</strong></td>
<td>Entries are thought and planned. There are titles and dates are used for EVERY page.</td>
<td>Entries are messy and appear to be just thrown together.</td>
<td>Pages are skipped and entries are not coherent.</td>
</tr>
</tbody>
</table>

**My goals to improve my Notebook entries:**

_____________________________________________________________________________

_____________________________________________________________________________
## List of Core Values

<table>
<thead>
<tr>
<th>Assertiveness</th>
<th>Joyfullness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caring</td>
<td>Justice</td>
</tr>
<tr>
<td>Cleanliness</td>
<td>Kindness</td>
</tr>
<tr>
<td>Commitment</td>
<td>Love</td>
</tr>
<tr>
<td>Compassion</td>
<td>Loyalty</td>
</tr>
<tr>
<td>Confidence</td>
<td>Mercy</td>
</tr>
<tr>
<td>Consideration</td>
<td>Obedience</td>
</tr>
<tr>
<td>Courage</td>
<td>Orderliness</td>
</tr>
<tr>
<td>Courtesy</td>
<td>Patience</td>
</tr>
<tr>
<td>Decisiveness</td>
<td>Peacefulness</td>
</tr>
<tr>
<td>Dependability</td>
<td>Punctuality</td>
</tr>
<tr>
<td>Determination</td>
<td>Reliability</td>
</tr>
<tr>
<td>Enthusiasm</td>
<td>Respect</td>
</tr>
<tr>
<td>Fairness</td>
<td>Responsibility</td>
</tr>
<tr>
<td>Fidelity</td>
<td>Self-Discipline</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Self-Reliance</td>
</tr>
<tr>
<td>Forgiveness</td>
<td>Service</td>
</tr>
<tr>
<td>Friendliness</td>
<td>Tact</td>
</tr>
<tr>
<td>Generosity</td>
<td>Thankfulness</td>
</tr>
<tr>
<td>Gentleness</td>
<td>Tolerance</td>
</tr>
<tr>
<td>Helpfulness</td>
<td>Trust</td>
</tr>
<tr>
<td>Honesty</td>
<td>Trustworthiness</td>
</tr>
<tr>
<td>Humility</td>
<td>Truthfulness</td>
</tr>
<tr>
<td>Integrity</td>
<td>Unselfishness</td>
</tr>
</tbody>
</table>
Prompts To Push Our Thinking In Essays

• For example…
• Another example is…
• In addition…
• This makes me realize…
• This is important because…
• This is giving me the idea that…
• The reason for this is…
• Another reason is…
• This connects with…
• On the other hand…
• I partly disagree but…because…
• This is similar to…
• This is different from….
• This might not be true, but could it be that…
• I used to think…but now I realize…
• What I think this says about me is that…
• Many people think…but I think…
Books to Support
Social Emotional Learning and Essay Writing

*Atkins and Petrovicic. How High Can We Climb.

*Beckwith, Kathy. Playing War.


Ludwig, Trudy. Trouble Talk.


Ludwig, Trudy. Trouble Talk.

Ludwig, Trudy. Sorry.

Canfield, Jack. Chicken Soup of the Soul: Stories for a Better World.

Canfield, Jack. Chicken Soup for Children’s Souls.

Atkins, Jan. This I Believe: Remarkable Stories from Men and Women.
<table>
<thead>
<tr>
<th>Photo</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Image" /></td>
<td>Authors and Emcees Sharing About Open-Mic Night, Our Writing Strategies, And Core Values</td>
</tr>
<tr>
<td><img src="image2" alt="Image" /></td>
<td>Authors Reading Their Essays and Introducing Their Writing Partners</td>
</tr>
<tr>
<td><img src="image3" alt="Image" /></td>
<td>An Author Reads His <em>This I Believe</em> Essay</td>
</tr>
<tr>
<td><img src="image4" alt="Image" /></td>
<td>An Author And His Mom Read And Write Comments About Others’ <em>This I Believe</em> Essays</td>
</tr>
<tr>
<td><img src="image5" alt="Image" /></td>
<td>Authors Record Their Observations and Thinking On Our <em>Writeabout</em> Fieldtrip At the Beach</td>
</tr>
</tbody>
</table>
3rd and 4th Gr Common Core Standards Addressed

**Grade 3 Writing**

**Text Types and Purposes**

- CCSS.ELA-Literacy.W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.
  - CCSS.ELA-Literacy.W.3.1a Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.
  - CCSS.ELA-Literacy.W.3.1b Provide reasons that support the opinion.
  - CCSS.ELA-Literacy.W.3.1c Use linking words and phrases (e.g., *because, therefore, since, for example*) to connect opinion and reasons.
  - CCSS.ELA-Literacy.W.3.1d Provide a concluding statement or section.

**Production and Distribution of Writing**

- CCSS.ELA-Literacy.W.3.4 With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.
- CCSS.ELA-Literacy.W.3.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing. (Editing for conventions should demonstrate command of Language standards 1-3 up to and including grade 3 here.)
- CCSS.ELA-Literacy.W.3.6 With guidance and support from adults, use technology to produce and publish writing (using keyboarding skills) as well as to interact and collaborate with others.

**Research to Build and Present Knowledge**

- CCSS.ELA-Literacy.W.3.8 Recall information from experiences and sort evidence into provided categories.

**Range of Writing**

- CCSS.ELA-Literacy.W.3.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

**Grade 3 Listening and Speaking**

**Comprehension and Collaboration**

- CCSS.ELA-Literacy.SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 3 topics and texts*, building on others’ ideas and expressing their own clearly.
  - CCSS.ELA-Literacy.SL.3.1b Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).
  - CCSS.ELA-Literacy.SL.3.1d Explain their own ideas and understanding in light of the discussion.
- CCSS.ELA-Literacy.SL.3.2 Determine the main ideas and supporting details of a text read aloud diverse media and formats, including visually and orally.

**Conventions of Standard English**

- CCSS.ELA-Literacy.L.3 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
  - CCSS.ELA-Literacy.L.3.1f Ensure subject-verb and pronoun-antecedent agreement.*
  - CCSS.ELA-Literacy.L.3.1i Produce simple, compound, and complex sentences.
CCSS.ELA-Literacy.L.3.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

- CCSS.ELA-Literacy.L.3.2a Capitalize appropriate words in titles.
- CCSS.ELA-Literacy.L.3.2e Use conventional spelling for high-frequency and other studied words and for adding suffixes to base words (e.g., sitting, smiled, cries, happiness).

**Knowledge of Language**

- CCSS.ELA-Literacy.L.3.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.
  - CCSS.ELA-Literacy.L.3.3a Choose words and phrases for effect.*

**Grade 3 Mathematics**

*Represent and Interpret Data*

- CCSS.Math.Content.3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.

**Grade 4 Writing**

*Text Types and Purposes*

- CCSS.ELA-Literacy.W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
  - CCSS.ELA-Literacy.W.4.1a Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer’s purpose.
  - CCSS.ELA-Literacy.W.4.1b Provide reasons that are supported by facts and details.
  - CCSS.ELA-Literacy.W.4.1c Link opinion and reasons using words and phrases (e.g., for instance, in order to, in addition).
  - CCSS.ELA-Literacy.W.4.1d Provide a concluding statement or section related to the opinion presented.
  - CCSS.ELA-Literacy.W.4.3c Use a variety of transitional words and phrases to manage the sequence of events.

*Production and Distribution of Writing*

- CCSS.ELA-Literacy.W.4.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
- CCSS.ELA-Literacy.W.4.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing. (Editing for conventions should demonstrate command of Language standards 1-3 up to and including grade 4 here.)
- CCSS.ELA-Literacy.W.4.6 With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of one page in a single sitting.

*Research to Build and Present Knowledge*

- CCSS.ELA-Literacy.W.4.8 Recall relevant information from experiences; take notes and categorize information.
  - CCSS.ELA-Literacy.W.4.9b Apply grade 4 Reading standards to informational texts (e.g., “Explain how an author uses reasons and evidence to support particular points in a text”).

*Range of Writing*

- CCSS.ELA-Literacy.W.4.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Grade 4 Speaking and Listening
Comprehension and Collaboration

- CCSS.ELA-Literacy.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others’ ideas and expressing their own clearly.
  - CCSS.ELA-Literacy.SL.4.1b Follow agreed-upon rules for discussions and carry out assigned roles.
- CCSS.ELA-Literacy.SL.4.2 Paraphrase portions of a text read aloud presented in diverse media and formats, including visually and orally.

Presentation of Knowledge and Ideas

- CCSS.ELA-Literacy.SL.4.4 Report on a topic, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Conventions of Standard English

- CCSS.ELA-Literacy.L.4.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
  - CCSS.ELA-Literacy.L.4.1f Produce complete sentences, recognizing and correcting inappropriate fragments and run-ons.*
- CCSS.ELA-Literacy.L.4.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
  - CCSS.ELA-Literacy.L.4.2a Use correct capitalization.
  - CCSS.ELA-Literacy.L.4.2d Spell grade-appropriate words correctly, consulting references as needed.

Knowledge of Language

- CCSS.ELA-Literacy.L.4.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.

Grade 4 Mathematics
Represent and Interpret Data

- CCSS.Math.Content.4.MD.B.4 Make a line plot to display a data set.
<table>
<thead>
<tr>
<th><strong>District:</strong></th>
<th>Ventura Unified School District</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School:</strong></td>
<td>Anacapa Middle School</td>
</tr>
<tr>
<td><strong>Participant(s):</strong></td>
<td>Laurie Curtis-Abbe</td>
</tr>
</tbody>
</table>

**Lesson Plan Title:** Students Get Their Kicks on Route 66 (or Interstate 5 or the Jersey Turnpike ...)

**Lesson Plan Grade Levels:** 8, 5, 10, 12, 11, 9

**Lesson Plan Subject Areas:** Language Arts/Reading (SAGE Category), History/Social Science
Students Get Their Kicks on Route 66 (or Interstate 5 or the Jersey Turnpike ...)

This interdisciplinary, 4-6 week, project-based unit takes students on an exploration of America's physical and human geography. In "... Route 66" and beyond, students investigate American music, food, festivals, celebrations, dance, clothing types, dialects and colloquialisms, landmarks, and regional history while using technology in creating a presentation about their ideal road trip. This project comes in three steps: 1. Igniting interest by listening to and mapping out geographical musical differences; 2. plotting and labeling key destinations along America's most famous interstate highway; and 3. researching, lesson planning, and presenting their three contiguous state road trip with self-made visual aids and maps. This practical and high-interest project incorporates reading, writing, speaking, artistry, cartography, and geography skills into a creative, cross-grade level, multi-learning style unit!

Ladies and Gentlemen, Start Your Engines - Listening to an American Music Sampler
To engage students with the unit, we begin by listening to a contemporary American music sampler (see American Music attachment). Students learn about regional geography by listening to American musical culture; they become familiar with the musical style of musicians such as Hawaii's Makaha Sons, Southern California's Beach Boys, Louisiana's The Cajun All-Stars, Mississippi's Shirley Caesar & the Caravans (gospel), Florida's Tito Puente (Afro-Cuban rhythms), Appalachia's Osborne Brothers (bluegrass), and New York's "Annie Get Your Gun" Broadway cast. Students develop their musical intelligence and visual/spatial abilities in using physical and political US maps to identify, color, and label geographical regions (see attachment). They are cultivating their sense of cultural (human) and physical geographical awareness.

Hitting the Road - Exploring Route 66
In the Second phase of this project, students deepen their understanding of the U.S. by using Good Sam Club road atlases, film footage, photos, internet images, and the lyrics to Nat King Cole's 1946 hit song, "(Get Your Kicks on) Route 66," (see attachment) to map out the historically famous route from Chicago to Los Angeles. They learn about political and physical geography, historical figures and roadside sites, American history of the 1930s and 40s (westward migration due to the Great Depression and World War II), and population and demographic shifts from the East Coast to the West Coast during the 1930s-1960s. The song is played over and over as students map the route; they later claim that they think they hear the song playing in their heads while they sleep. In addition to the original Cole tune, 14 different cover versions are played during their Route 66 mapping time (see attachment), all offering opportunities to imagine the vast diversity of America's geographical and cultural regions; cover artists include Buckwheat Zydeco (Louisiana Cajun), Asleep at the Wheel (Texas country-western), Manhattan Transfer (New York vocalese), and the Brian Setzer Orchestra (Southern rockabilly).

Travel My Way. Take the Highway That's the Best - Creating "Your Great American Road Trip"
In the final phase of this unit, students complete a performance task by creating and presenting their ideal Great American Road Trip (see attachment). Topographical and climate maps show students where they would be
happiest while touring on their three-state journey. After deciding on their route, they research the geographic region's unique natural (nature-made) and cultural (human-made) attributes such as landforms, water bodies, vegetation, animals, art, clothing, food specialties, architectural style, forms of entertainment, folktales, and aspects which are unique to that region of people because of where they live in the U.S. ("regional diversity"). While researching their future road trip destinations, lodgings, attractions, and activities, students interact with a variety of written and non-written texts and resources. They use various internet sites such as RoadTripUSA.com/routes, AAA.com, and chamber of commerce websites, and they extract information from the Automobile Club of America's (AAA) state Tour Books and maps, take notes from PBS's Globe Trekker DVD series, and conduct interviews with travel agents and other adult travelers who have visited their intended destinations.

Assuming the role of an enthusiastic travel agent, students decide upon a clever way to present their well-researched information within a 5-step lesson plan (see attachment) and with a minimum of two self-created visual and/or aural aids. Samples of visual and aural aids include: playing a song from that region on a musical instrument; cooking and serving food samples; making a landmark sculpture; creating and wearing an indigenous costume; designing and using a power point presentation that contains graphic organizers, images, captions, and maps. A MLA-style bibliography containing at least 5 different types of sources is required to show a variety of research resources. Their 5-step written lesson plan and 3x5 index cards give structure to their 5-10 presentation.

The success of this project is assessed with the help of the Your Great American Road Trip: Speech Evaluation Form (see attachment). Prior to their oral and visual presentation, students are taught how to go beyond the basic speech and to plan and deliver a teaching lesson plan. Scoring is based on their body language delivery, the information presented, their written index cards, the usage/quality of visual aids, and content/appearance of their bibliography.

The outcome of this interdisciplinary research project carries beyond the classroom. Many former students, after high school graduation, have contacted their teacher with news of their completed Great American Road Trip. This project expects students to apply learned classroom reading, writing, listening, and speaking skills to their real world, research and seek out unfamiliar travel destinations, and experience, first-hand, the similarities and differences of regional, US human and physical geography.

Common Core State Standards Addressed: ELA — Literacy. Reading: Informational Text 8.1, 8.2, 8.3, 8.4, 8.7, 8.8, 8.10; ELA — Literacy: Speaking & Listening 8.1a, 8.2, 8.4, 8.5, 8.6; ELA — Literacy: Writing 8.4, 8.5, 8.6, 8.7, 8.8, 8.9b

American Music

Directions: *Listen carefully* to the variety of instruments and vocal types presented. Our country's musical traditions and styles are as wide and varied as is its land mass. *Color and label the states* listed below on your United States map as you listen to the different musical styles. *Explore* the regional variations of American music on your own when you research Your Great American Road Trip.

Overview:
- *This Land is Your Land* by Woody Guthrie 1944

The Pacific States:
- Hawai'i: *Ka Loke* by The Makaha Sons 2001
- California: *California Dreamin'* by The Mamas & The Papas 1965
  *Surfin' USA* by The Beach Boys 1963

The Southwestern States:
- *Bonanza* by David Rose 1960
- *The Good, The Bad, & The Ugly* by Hugh Montenegro 1968
- *Rodeo: Hoedown* by Aaron Copeland 1942

The Southern States:
- Texas: *Cotton-Eyed Joe* by Bob Willis & His Texas Playboys with vocal Tommy Duncan 1946
- The South & Appalachia: *You Are My Sunshine* by The Rice Brothers Gang 1939
- Alabama: *Call Me The Breeze* by Lynyrd Skynyrd 1974
- Mississippi: *One of These Old Days* by Shirley Caesar & The Caravans 1963
- New Orleans, Louisiana:
  *Dead Man Blues* by Jelly Roll Morton’s Red Hot Peppers 1926
  *Cajun Two-Step* by The Cajun All Stars 1999
  *Proud Mary* by Creedence Clearwater Revival (CCR) 1969
- Florida: *Ram-Kan-Kan* by Tito Puente 1949
  *No Llores* by Gloria Estefan 2007

Appalachian States:
- *Rocky Top* by The Osborne Brothers 1977
- *Foggy Mountain Breakdown* by Wynn Osborne 1995
- *Dueling Banjos* by Arthur Smith & Jeff Whittington 1975

Broadway, Manhattan, New York:
- *There's No Business Like Show Business* from *Annie Get Your Gun* by Ethel Merman, Bruce Yarnell, Rufus Smith, & Jeffy Orbach 1966
- *Everything's Coming Up Roses* from *Gypsy* by Angela Lansbury 1973

Overview:
- *The Stars and Stripes Forever* by John Philipp Sousa c.1896
Verse 1:
If you ever plan to motor west,
Travel my way,
Take the highway that's the best.
Get your kicks on Route 66.

Verse 2:
It winds from Chicago [Illinois] to L.A. [Los Angeles, California],
More than 2,000 miles all the way.
Get your kicks on Route 66.

Chorus:
Now you go through Saint Louie [St. Louis, Missouri],
And Joplin, Missouri,
And Oklahoma City [Oklahoma City, Oklahoma] looks mighty pretty.
You'll see Amarillo [Texas],
Gallup, New Mexico,
Flagstaff, Arizona,
Don't forget Winona [Winslow, Arizona] –
Kingman [Arizona], Barstow [California], San Bernardino [California].

Verse 3:
Won't you get hip to this timely tip.
When you make that California trip,
Get your kicks on Route 66.

-- Interlude --

Repeat Verse 2
Historic Route 66 Mapping Activity

Directions:
1. Using your classroom atlas and our United States wall map, locate with a bullet and label the following locations which were once, and continue to be, traveled by Americans and its visitors from Chicago, Illinois to the Pacific Ocean (Santa Monica, CA).
2. Connect the dots of this historic highway.
3. Color the states it runs through with different colors. *(Do not label or color non-Route 66 states.)*
4. This is an in-class assignment.

- Chicago, Illinois (IL)
- Pontiac, Illinois
- Springfield, Illinois
- St. Louis, Missouri (MO)
- Springfield, Missouri
- Joplin, Missouri
- Tulsa, Oklahoma (OK)
- Oklahoma City, Oklahoma
- Amarillo, Texas (TX)
- Santa Fe, New Mexico (NM)
- Albuquerque, New Mexico
- Gallup, New Mexico
- Winslow, Arizona (AZ)
- Flagstaff, Arizona
- Kingman, Arizona
- Needles, California (CA)
- Barstow, California
- San Bernardino, California
- Santa Monica, California
USA Capitals

Legend:
- National boundary
- State boundary
- National capital
- State capital

GIS data and graphics © 1997 MapPac, Inc. All rights reserved.
Your Great American Road Trip Research Project:  
A Study in American Physical & Human Geography

Situation: To better understand America’s geographic diversity and its impact on humans, animals, and vegetation, you have decided to explore a three-state region of the United States and tell about it with the hope of visiting there one day. You also hope to inspire others in your class to travel to these special places. (Be certain they are three states that you have NOT yet explored.) Assume the role of someone like a travel agent from AAA (the Automobile Association of America, a.k.a. “The Auto Club”) who is trying to convince prospective travelers to explore these three physically and culturally rich geographic regions of the United States.

Directions:
1. Locate the physical region and climate maps within your atlas and American history textbook.

2. Select three contiguous states within a particular geographical region for your ideal Great American Road Trip. Special directions will be given for any states bordering the Pacific Ocean, Atlantic Ocean, Gulf of Mexico, and the Great Lakes (i.e., those states which touch large bodies of water and are set up for water taxi, boat, or ship inter-traveling). Road/water trips to Canada, Mexico, Puerto Rico, Guam, Cuba, or others outside of the 50 states are not permitted in this research assignment.

3. Research the geographic region’s unique natural and cultural attributes:
   - landforms, nature-made landmarks, water bodies, climate, vegetation, animals
   - music, language, art, clothing, food, houses, architecture, forms of entertainment, human-made landmarks
   - aspects which are unique to that region of people because of where they live in the United States (“regional diversity”)

4. Decide upon a clever way to present this information (both physical and human geography) like a travel agent would do with AT MINIMUM two self-made visual and/or aural aids. Be certain your visual aids are large enough for your classmates, who are seated at the back of the room, to see ALL of the details. A basic, flat poster paper/board display is NOT permitted for this visual aid requirement. Some suggestions include:
   - flannel or Velcro board map or display
   - LARGE, colorful, and interactive relief map
   - regional costumes made by/pieced together by you
   - food samples made by you
   - playing a song from that region on a musical instrument
   - landmark sculpture
   - painting or mural
   - huge, open-air diorama
   - cardboard cut-outs
   - power point presentation (slide show with graphic organizers, images, captions, maps)
   - advertisement brochure or flyer
   - worksheet or handout for your fellow travelers

List any other visual aid ideas you could use for your Road Trip presentation, instead of a basic poster paper or poster board display?
5. Keep a running bibliography of all the sources you use in researching your topic at the top of your notes. The final bibliography must be typed (black ink), 12 size font, Times New Roman, 1” margins, 12 or 14 size font title, one-sided with 5 different types of sources. After a source type has been used (ex: interview with a travel agent or a book), make certain four other different types of sources are used before using that same source type again. Source ideas and proper format will be discussed in class.

6. Are there any songs, folktales, orchestral recordings, poems, books, famous works of art, photographs, and so on which have been written/composed about your chosen area? Bring in a sample for your audience to hear or see. *This will not take the place of a handmade visual or auditory aid, but it will be enriching to your presentation.*

7. Organize your information on 3”x 5” index cards for your 5-10 minute presentation. Practice several times in front of a non-threatening audience at home or with friends making certain to include your visual aids at the right time when you refer to them (as opposed to an after-thought at the end of your presentation).

Requirements and due dates:
- 3-5 index cards w/an introduction, body, and conclusion (IBC) outline
- 2 self-made visual aids
- 8+ source bibliography
- 5-10 min oral presentation

Partners: It is preferred that you work on your research project without a partner(s). However, you may work with no more than two additional partners (three people total) under the following conditions:

1. You are responsible for and will be “paid” for whatever you submit to your instructor: Index cards, visual aids, bibliography, and oral presentation.
2. *You will not be held responsible for or be paid for your partner’s oral presentation, bibliography, index cards, or visual aids.*
3. Your instructor is not a divorce court judge and will not permit you to complain about your partner. Do not expect your teacher to dissolve your group or force your chosen partner to pull his/her weight. You are stuck with each other until the end of the project, and you will figure out how to solve the problem so that the show will go on and you can be paid in full!
4. Each person is responsible for producing their own 3-5 index cards, their own 2 self-made visual aids, their own 8+ source bibliography, and speaking about their own research for their 5-10 minutes on stage. You may help each other with the project, but not do the work for the other person(s).
5. *If your partner(s) is absent or fails to bring his or her supplies on the day of your Road Trip presentation, you are still held responsible for presenting your part of the oral report. You must use your two handmade visual aids, submit your bibliography, give your part of the oral presentation, and use your index cards on the day that you and your partners signed up to present, whether they are at school or not. Each partner will be paid for whatever they produce and do.*
5-Step Lesson Plan

Topic: ____________________________
Grade level: ____________________________
Time: ____________________________
# of students: ____________________________

Objectives:
- Students will learn about ____________________________.
- Students will (do) ____________________________.

Materials needed:
- Audio-visual: VCR/DVD Player LCD Projector Flashdrive/CD
  Computer Document Camera Whiteboards/pens
- Instructor needs to bring: ____________________________
- Students need to bring: ____________________________

Any corresponding textbook pages? ____________________________

I. Anticipatory Set (Teaser – first 30 sec. to 2 min.):

II. Introduction (mental and physical learning statement addressing the prompt):

III. Guided Practice (order of information taught):
  A.
  B.
  C.
  D.
  E.
  F.
  G.

IV. Closure (closing statement summarizing what was learned/taught during the lesson readdressing the prompt):

V. Independent Practice (an in-class or homework assignment to reinforce learning the topic at hand):
### Your Great American Road Trip Speech Evaluation Form

**Speaker:** ____________________

**Topic:** ____________________

**Date:** ____________________

**Evaluator:** ____________________

4=A 3=B 2=C 1=D 0=F

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**Bibliography Total:**
My Great American Road Trip

Alabama, Georgia, South Carolina

Where to?

AL  GA  SC
First Stop- Alabama ("Heart of Dixie")

- Huntsville Botanical Gardens
- Birmingham:
  - Alabama Theatre
  - 16th Street Baptist Church
- Tuscaloosa’s Natural History Museum
- Montgomery:
  - Civil Rights Memorial
  - Wall of Tolerance
Botanical Gardens, Huntsville

- 112 acres
- Nature Center
- Children’s Garden
- Garden Railway
- Garden of Hope

Birmingham

Alabama Theatre
- Dec. 26, 1927
- Silent Films
- Mickey Mouse Club
- Grease, Mamma Mia, Wizard of Oz

16th Street Baptist Church
- African-American House of Worship
- Hosted civil rights rallies
- Bombed by KKK, 1963
Natural History Museum, Tuscaloosa

- Several Exhibits & collections
- Hodges Meteorite
- “Museum Expedition”
- Gift Shop

Montgomery

Civil Rights Memorial
- honors memory of deceased
- black granite table
- close to where MLK, JR. held boycott

Wall of Tolerance
- make pledge to promote tolerance
- digital scroll of names
- quote of Robert Kennedy’s speech
Welcome to Georgia ("The Peach State")

- Atlanta:
  - World of Coca-Cola
  - Zoo Atlanta
- Unicoi State Park & Lodge, Helen
- Savannah:
  - Creepy Crawl Pub Tour
  - Sixth Sense Savannah

Welcome We're glad Georgia's on your mind
Atlanta
World of Coca-Cola
- Secret Formula Vault
- Turner Field Coca-Cola Bottle
- Coca-Cola “Free-Style”

Zoo Atlanta
- rare species
- Express Train
- rock-climbing
- carousel
- petting zoo

Unicoi State Park & Lodge, Helen
- 100 lodge rooms
- 6 picnic shelters
- 7.5+ miles of hiking & biking trails
- fishing
- playgrounds
Savannah

**Creepy Crawl Pub Tour**
- Most popular walking tour
- After-hour pub visitations
- Experienced guides

**Sixth Sense Savannah**
- Hampton-Lillibridge House
- Colonial Park Cemetery
- Savannah Theater

South Carolina
Final Destination - South Carolina ("Palmetto State")

- Hilton Head Island Resort & Spa
- Fort Sumter, Charleston
- Myrtle Beach:
  - Alligator Adventure
  - Ripley’s Museum

Hilton Head Island Resort & Spa

- Palmetto-lined boardwalks
- Holistic, relaxing environment
- 5+ types of massages
- Kids club 😊
Fort Sumter, Charleston

- Starting point of the Civil War
- 30 min. cruise around Fort
- Museum inside
- 3 1/2 hours to explore

Myrtle Beach

- Alligator Adventure
  - new Bats exhibit
  - tigers & other felines
  - albino alligators
  - live alligator feedings
  - river tour

Ripley's Believe It or Not!
- Mirror Maze
- Haunted Adventure
- 3D Moving Theater
- Believe it or not! Odditorium
Hope you enjoyed the Trip!
The Great American Road Trip
Georgia, Florida, New York

Map and Routes
Georgia City Routes

Stone Mountain Park
Atlanta, GA

- 3,200 Acres
- Dozen Attractions
- Largest campgrounds
- Two championship golf courses
Aquarium
Atlanta, GA

- 8 million gallons of water
- Over 120,000 sea animals
- World’s largest aquarium

Tellus Science Museum
Cartersville, GA

- 120 seat Planetarium
- Fee $8 per child
- 40 foot T-rex
Coca-Cola Space Science Center
Columbus, GA

- Opened in 1996
- Four major components
- Annually receives 10,000 people
- 6$ per person

Callaway Gardens
Pine Mountain, GA

- 13,000 acres
- 9 restaurants
- 10 mile bike trail
- Extensive Pine mountain
Peaches

- Not indigenous to Georgia
- Medium size peach=38 calories
- Introduced to Georgia in 1571
- Millions of bushels grown every year.

Florida City Routes
Walt Disney World Resort
Orlando, FL

- Includes theme and water parks
- This summer $69 per person
- Two water parks
- Four theme parks

Universal Studios
Orlando, FL

- 100 year anniversary
- Wet N Wild water park
- Three main hotels
- 120$ Admission
Adventure Island
Orlando, FL

- 30 acre water park
- Slides, waterfalls, waves, and pools
- $37.95 per person

Legoland
Winter Haven, FL

- 150 acre interactive theme park
- More than 50 rides
- $75 per person
Zoo Miami
Miami, FL

- 740 acres
- 100 exhibits
- 2,000 animals
- 40 endangered species

New York City Routes
Statue of Liberty
Liberty Island, NY

- Gift from France
- Located in New York Harbor
- Symbol of Freedom

Times Square Visitor Center and Museum

- Confetti Wish Wall
- Broadway exhibit
- Centennial Ball Light Show
- Located in New York City
Empire State Building
New York, New York

- 102 floors
- 1,860 steps
- Took 45 days to construct
- Total cost was $40,948,900

Central Park
New York, New York

- 843 Acres
- 1st large city park
- Constructed in 15 years
- Annually receives 20 million visitors
Grand Central Station
New York, New York

- Built in 1913
- 67 train tracks
- Two different levels
- Cost 80 million dollars

Places to revisit

- Central Park
- New York City
- Universal Studios
  Orlando, Florida
- Georgia Aquarium
  Atlanta, Georgia
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<td><strong>Participant(s):</strong></td>
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Impact II Grant Program

My Geosciences program requires constant changing and updating to meet the requirements of the new standards as well as the new student population entering this CP level 9th grade class. I work to ensure that the Geosciences curriculum is both innovative and creative. Labs and activities that are selected for students are based on their relevance and alignment to the new NGSS, Common Core, and the California State and National Science Standards as well as the close relationship to the real life. All new updates consider students learning styles through the application of technology and hands-on experiences. The materials used in the GeoScience curriculum include the state approved standardized Earth Science textbook from Prentice Hall, 20 laptops that have been equipped with virtual labs and reinforcement activities including Google Earth and My World, various lab supplies for the classroom labs, handheld GPS units, as well as teacher-created PowerPoint lectures. Technology, engineering, creativity, critical thinking and problem solving, along with real life applications are emphasized in each unit.

My Mapping unit brings together science, engineering, and technology into my GeoScience classroom. This unit begins with the review and application of basic map reading skills, such as latitude, longitude, and scale. We then apply these skills to read and create topographic maps. Students transform these graphs into profile graphs and study them to understand the impact of topography on natural disasters. Once mastered, we launch into Global Positioning Systems (GPS) and Global Informational Systems (GIS), including what they are, how they work, and how they apply to both science research and everyday life. In order for students to fully comprehend the technology of GPS and GIS, they complete a Google Earth project. They analyze and create tours of various landforms, including uploaded photos and links. The unit culminates with the application of all that they have learned with the understanding of Geocaching. My goal is to help students realize the engineering and technology aspect of science while experiencing real world materials and applications. The activities in this unit help me evaluate my student’s comprehension of the topics by applying their knowledge and use of technology. Students have a foundation for understanding everything from basic map reading skills, to reading and creating topographic maps, to learning and using GPS and GIS, to creating tours in Google Earth, and finally learning about and experiencing the new trend of Geocaching. The GPS, GIS, Google Earth, and Geocaching topics could be applied to almost any subject, including the Social Sciences, Math, Computers, Government, etc.

Examples of the invaluable technology that is utilized in the Mapping unit of the Geoscience course is the Google Earth computer program, a well-known GIS system. This program provides informative GPS data and mapping resources that can be utilized in various ways. The Google Earth Tour is all student-centered and allows for experiential learning. It helps students explore mapping in a 3D virtual lab setting all while utilizing the number one GIS system on the planet! In an extension of the Mapping unit, as part of the Earthquake and Volcanoes Unit, we use the GIS system “My World.” Students use triangulation from data provided by the USGS to locate the epicenter of the Sumatra earthquake that resulted in the December 2004 tsunami. In the same unit Geocaching is introduced to the students. This is a real world GPS treasure hunting activity. Students
find school based caches and then are challenged to find the ones created in both their own communities as well as those created by the Santa Monica National Park System. It has been gratifying to observe the surprise and excitement on the students’ faces when they find a cache or explore a new area in their hometown that they never knew existed. It gets them excited about science and GPS.

It is my objective to inspire my students to become active participants in our community. Students receive information and make independent opinions about the scientific data that has been presented. For example, in the Mapping Unit, students read a current science research articles and answer four common core based questions requiring evaluation and relevance. The students interject scientific facts they have learned to create essay type answers that express their ability to understand the information and understand implications.

As stated above, the curriculum is assessed through a combination of standardized quizzes, tests, lab reports, and activities. I have found that the more varied I can make my assessments, the more data I can collect regarding their comprehension. Depending on the outcome of the assessments given through Datawise, I revisit any core science concept that was not grasped by a majority of the students. It is my belief that comprehension of the material and being able to think and apply knowledge is the crux of the course.

Students display a positive response to the activities and material presented in this evolving curriculum. Informally, the students have provided great feedback as to what content areas are effective and what adjustments could be made to improve the course. I track their feedback and evaluate suggestions for course improvement. As a science teacher it is my goal to make science come alive and be meaningful to students as they make connections between Geoscience and world events and trends.

This grant will permit me to provide more relevant materials for the classroom to support my hands on learning activities and provide field-trips and guest speakers. Students have been unable to go to the Griffith Observatory during our Astronomy Unit, or Anacapa Island during our Oceanography Unit, or the Santa Monica Mountains for our Mapping Unit. There are climate change and geology speakers that I would like to invite to share their experiences with the students but have been unable to pay for their services. In the future, especially with education budgets declining, I strive to bring the very best to my students every day. I thank you for your consideration.
## November 2013

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<td>NO School (Veterans Day)</td>
<td>1. <strong>DVD</strong>: Earth The Biography – Rare Planet <em>46min.</em> w/ Q’s</td>
<td>1. WU#1: pg. 11 – vocabulary – define 5 words at top of page…</td>
<td>1. <strong>Test</strong>: Ch. 22 (datawise) – unit #5 <strong>Test</strong>: Ch. SS, O, G (datawise) – unit #4 2. Turn in Packets 3. <strong>Activity</strong>: Mapping CA (Due Monday) HW: Finish CW</td>
<td><strong>GIS/Mapping →</strong> 1. <strong>Computers</strong>: Nat’l Geo Game – Family Adventures <strong>see link on my webpage</strong> - do all adventures (6 in total) – at HARD level 2. <strong>Computers</strong>: Lat/Long game 3. Work on CA Map HW: Finish CA Map</td>
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<td>3. <strong>Notes</strong>: Sec 1.3 4. <strong>Activity</strong>: Where you live (colored pencils) HW: Finish CW Book – pg. 17 Q’s #1-7</td>
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<td>1. WU#2: Maps, Mapping, &amp; Location (pg. 11/12) 2. Review HW 3. <strong>Activity</strong>: Reading a Map (map, ruler) 4. Article w/ Essay Q’s: First Detailed Map of Global Forest Change HW: Finish CW</td>
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<td><strong>1. WU#6: Contour Map Worksheet #3</strong></td>
<td><strong>1. WU#7: What is GPS?</strong></td>
<td><strong>In Library – Google Docs Tutorial</strong></td>
<td>Quarter 2 Progress</td>
</tr>
<tr>
<td>3. WS: Death Valley Hike Map</td>
<td><strong>2. Lab: Tragedy at Lake Nyos (candle, matches, goggles, vinegar, baking soda)</strong></td>
<td><strong>2. Lab: Find it (box, string, tape, map)</strong></td>
<td><strong>2. Google Earth Intro</strong></td>
<td>1. WU#8: GIS Today</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td><strong>10</strong></td>
<td><strong>11</strong></td>
<td><strong>12</strong></td>
<td><strong>13</strong></td>
</tr>
<tr>
<td>HW: Work on Project</td>
<td>HW: Work on Project</td>
<td>TOUR DUE</td>
<td>HW: Finish Project</td>
<td>HW: Download f-Phone app called “location” it is free, if you have another type of smart phone, download any app that can tell you real time Latitude and Longitude</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td><strong>17</strong></td>
<td><strong>18</strong></td>
<td><strong>19</strong></td>
<td><strong>20</strong></td>
</tr>
<tr>
<td>Finish presentations as needed...</td>
<td><strong>1. Activity: GeoCaching on Campus</strong></td>
<td><strong>1. WS: Review Guide – Mapping Unit</strong></td>
<td><strong>1. Test: Mapping (datawise)</strong></td>
<td>Rally Day</td>
</tr>
<tr>
<td>1. WU #9: What is GeoCaching?</td>
<td><strong>2. Computers: GPS Interactive – Where are you?</strong></td>
<td>2. Find all work from Mapping Unit and put it all together/finish it...</td>
<td>2. Turn in Packets</td>
<td></td>
</tr>
<tr>
<td>2. Notes: GeoCaching</td>
<td>HW: With parent permission log-on to GeoCache.com. choose a local GeoCache and try to find it.</td>
<td>HW: With parent permission log-on to GeoCache.com. choose a local GeoCache and try to find it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Clip – What is GeoCaching (1:52) <a href="http://www.youtube.com/4VFeYZTY">Video</a></td>
<td><a href="http://www.youtube.com/QR2th-JW">Intro to GeoCaching</a></td>
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<tr>
<td>HW: Create GeoCache Account online</td>
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</table>

**NO School (Winter Break)**

<table>
<thead>
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<th>27</th>
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NO School (Winter Break)

<table>
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<tr>
<th>30</th>
<th>31</th>
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</table>

NO School (Winter Break)
Explore with a GPS

Welcome to the Santa Monica Mountains National Recreation Area's GPS (Global Positioning System) activity page. Here you will find information on what a GPS is, what activities you can do with them, and even a listing of the ParkCaches that the National Park Service maintains in the mountains.

A Brief Introduction to GPS

A GPS is a device, usually handheld, that tells you where you are in the world. The GPS unit (about the size of a cell phone) receives signals from over 20 satellites in space to center in on your position. This information is displayed on a computer type screen as coordinates such as Latitude and Longitude. The more satellite signals your GPS can receive the more accurate your location is shown.

Yet, your GPS can also be used to tell you how to get somewhere. Your GPS knows where you are, but you can tell it the location of somewhere else (as long as you have the coordinates) referred to a waypoint and the GPS will direct you to that location. An example would be from the top of a mountain peak back to your car.

What activities can you do with a GPS?

One of the fastest growing activities using a GPS is referred to a geocaching. Think of it like a treasure hunt where your GPS has the coordinates of the treasure and you have to hike, bike, climb, or even swim to get to it. These treasures are commonly known as caches. Click here to learn about all the different types of caches.

What do you need to look for a cache?

The most important thing you'll need is a GPS unit. They range in price from $75 and up. The more expensive the system the more features it will have.

For a list of over 1,000,000 caches worldwide, you'll have to create a FREE account with www.geocaching.com. Geocaching.com is where you can search for, log, and even hide your own caches.

Lastly, pick a place to start your cache adventure. A good place to begin is near your home or if you are visiting the Los Angeles Area, the Santa Monica Mountains has around 500 caches.
Exploring the Santa Monica Mountains with a GPS

The Santa Monica Mountains National Recreation Area is made up of a multitude of land agencies from the National Park Service, California State Parks, Mountains Recreation Conservation Authority, Los Angeles and Ventura County parks, and even city parks. This provides for a one of a kind opportunity to experience different types of caches. The drawback for you as a visitor is that this can make it confusing to understand where you can do these activities and what types of caches can you find or hide.

The Santa Monica Mountains National Recreation Area has created a park wide ParkCaching program to invite cachers to the park by providing approved and legal caches in the park. These earthcaches give you the experience of finding caches while also learning about your national park. A list of the park owned earthcaches are below:

- Sandstone Peak – The top of the Santa Monica Mtns!
- Inspiration Point – How the mountains formed!
- A View By De-Fault
- A Turbulent Time In History

Because earthcaches have no item to collect, we invite you to take a brief quiz on what you learned, and earn an official certificate from the National Park Service that you can print and even frame!

- Sandstone Peak Quiz
- Inspiration Point Quiz
- A View By De-Fault Quiz

So what’s next?

Parks are working to create a uniform policy regarding all types of GPS activities. As the world of GPS based activities continues to develop and expand, visitors like you will be key in the preservation and protection of our resources for future generations through programs such as Cache In Trash Out and leave no trace principles.

Additional Information
www.geocaching.com
www.earthcache.org
Title 36, Code of Federal Regulations
("36 CFR"). Volume 1, Chapter 1, Parts 1-5.

Did You Know?

Comprising 153,075 acres, Santa Monica Mountains National Recreation Area is the world's largest urban national park. It has more area codes (5) and zip codes (26), including the notable 90210 zip code of Beverly Hills, than any other unit in the National Park System.
### Chart: Map Types – Advantages & Disadvantages

**Directions:** Use Ch. 1 sec. 3 of your book to fill in the following chart.

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercator Projection</td>
<td></td>
<td></td>
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<tr>
<td>Robinson Projection</td>
<td></td>
<td></td>
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<tr>
<td>Conic Projection</td>
<td></td>
<td></td>
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<tr>
<td>Gnomonic Projection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Activity: Mapping California

Directions: (BE NEAT!)
Using your textbook (Ch. 13A & Appendix D), classroom maps, any internet resources, and colored pencils, fill in the following information on your California map. *NOTE – Do all Labeling in Black Ink.

1. General Info – Label the following in Black Ink
   1. Pacific Ocean
   2. Nevada
   3. Arizona
   4. Baja California/Mexico
   5. Oregon

2. Geomorphic Provinces – Mountains and Ranges colored BROWN, Deserts colored YELLOW, and Central Valley colored GREEN  *Each must be colored & labeled  *NOTE: shade in Lightly!
   1. Sierra Nevada Mountains
   2. Klamath Mountains
   3. Cascade Ranges
   4. Coast Ranges
   5. Transverse Ranges
   6. Peninsular Range
   7. Great Basin Desert
   8. Mojave Desert
   9. Colorado Desert
   10. Great Central Valley

3. Volcanoes are to be marked with a RED volcano symbol and labeled
   1. Salton Buttes
   2. Mount Shasta
   3. Clear Lake
   4. Medicine Lake
   5. Lassen Peak
   6. Amboy Crater
   7. Mammoth Mountain
   8. Coso

4. Earthquake Fault lines are to be drawn in ORANGE and labeled
   1. San Andreas Fault
   2. Owens Valley Fault
   3. Santa Ynez Fault
   4. Garlock Fault
   5. San Jacinto Fault
   6. Coast Range Fault
   7. Melones Fault
   8. San Gabriel Fault

5. National Parks are to be marked with a GREEN tree symbol & labeled
   1. Yosemite
   2. Joshua Tree
   3. Death Valley
   4. Channel Islands
   5. Sequoia
   6. King’s Canyon
   7. Redwood

6. Waterways: draw the water ways in the designated color and label each
   Lakes- color BLUE
   1. Castaic Lake
   2. Sacramento-San Joaquin Delta
   3. Salton Sea
   4. Lake Oroville
   5. Lake Parris
   6. Pyramid Lake
   7. Shasta Lake
   8. Lake Tahoe
   9. Mono Lake
   10. Colorado River
   11. Feather River
   12. Sacramento River
   13. San Joaquin River
   14. Santa Clara River

   Rivers- color PURPLE
   1. Colorado River
   2. Feather River
   3. Sacramento River
   4. San Joaquin River
   5. Santa Clara River
   6. Owens River
   7. Eel River
   8. Kern River
   9. Kings River
   10. Sunset Beach
   11. Lost Coast
   12. Redwood
   13. King’s Canyon
   14. Redwood

7. Major Cities:
   1. San Francisco
   2. San Diego
   3. Sacramento
   4. Los Angeles
   5. Thousand Oaks
   6. Eureka
Map of California
Computers: Latitude & Longitude

- Go to: http://www.kidsgeo.com/geography-games/latitude-longitude-map-game.php
- Scroll down to the Map Game where it says “Hi my name is Hannah…”
- Click the “NEXT” button to read the info and answer the questions.

1. What is the goal of this game?

2. Latitude is the measurement of distance from the ____________. The Equator is at ____°.

3. Above the Equator latitude is measured in degrees ___________ (° ____).

4. Below the Equator latitude is measured in degrees ___________ (° ____).

5. Longitude is the measurement of distance from the ____________. This is at ____°.

6. West of the Prime Meridian, longitude is measured in degrees ___________ (° ____).

7. East of the Prime Meridian, longitude is measured in degrees ___________ (° ____).

8. What happens if you click on the wrong blue circle? (What is your consequence?)

9. How many times must you find Hannah before the clock runs out in order to move on to the next level?

Play the Game!
How many times did you find Hannah in each of the following levels?

10. Level 1 = ________________ 25. Level 16 = ________________
11. Level 2 = ________________ 26. Level 17 = ________________
12. Level 3 = ________________ 27. Level 18 = ________________
13. Level 4 = ________________ 28. Level 19 = ________________
14. Level 5 = ________________ 29. Level 20 = ________________
15. Level 6 = ________________ 30. Level 21 = ________________
16. Level 7 = ________________ 31. Level 22 = ________________
17. Level 8 = ________________ 32. Level 23 = ________________
18. Level 9 = ________________ 33. Level 24 = ________________
19. Level 10 = ________________ 34. Level 25 = ________________
20. Level 11 = ________________ 35. Level 26 = ________________
21. Level 12 = ________________ 36. Level 27 = ________________
22. Level 13 = ________________ 37. Level 28 = ________________
23. Level 14 = ________________ 38. Level 29 = ________________
24. Level 15 = ________________ 39. Level 30 = ________________

40. If you got past Level #30 – what level did you get to? ________________
41. What was your final score? __________________

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National Geographic Game – Family Adventures

http://education.nationalgeographic.com/education/multimedia/interactive/map-tools-family-adventure/?ar_a=4

Directions:
For each Route you play you must:
  - Choose a team color
  - Pick “HARD” as your difficulty level
  - On the last screen, after the last question, use the information given to answer the two questions listed under each route below...
  - When you complete each route you must hit the “Back” arrow to get back to the home screen

Part 1: Land Adventures
A. Presidential Route
   ▪ How long did this game take you? ________________
   ▪ What title were you given? ______________________

B. Ancient Cities Route
   ▪ How long did this game take you? ________________
   ▪ What title were you given? ______________________

C. Marco Polo Route
   ▪ How long did this game take you? ________________
   ▪ What title were you given? ______________________

Part 2: Sea Adventures
A. Caribbean Island Route
   ▪ How long did this game take you? ________________
   ▪ What title were you given? ______________________

B. Polynesian Island Route
   ▪ How long did this game take you? ________________
   ▪ What title were you given? ______________________

C. Arctic to Amazon Route
   ▪ How long did this game take you? ________________
   ▪ What title were you given? ______________________
Determining Location

Today we use maps and computer programs to help us plan our routes. Long ago, people had to rely on maps that were made using data and information that were collected by travelers and explorers. Today computer technology is available to anyone who wants to use it. Mapmaking has changed a lot throughout recorded history.

After Christopher Columbus and others proved that Earth was not flat, mapmakers began to use a global grid to help determine location.

Global Grid Scientists use two special Earth measurements to describe location. The distance around Earth is measured in degrees.

- Latitudes is the distance north or south of the equator, measured in degrees. Earth is 360 degrees in circumference.
- Longitudes are the distance east or west of the prime meridian, measured in degrees. Lines of longitude run north and south. The prime meridian is the line of longitude that marks 0° of longitude as shown in Figure B.

Reading Strategy

Sample answer:
a. I expect to learn about latitude and longitude.
b. Latitude lines measure degrees north and south of the equator; longitude lines measure degrees east and west of the prime meridian.
c. I expect to learn about different types of maps.
d. There are many different types of maps. Maps are hard to make accurately. Different map types have different advantages and disadvantages.

INSTRUCT

Determining Location

Use Visuals

Figure B Help students find point D on the grid in this figure. Ask: What is the latitude and longitude of point D? (45°N, 75°W) What major city is near point D? (Montreal, Canada) If an earthquake occurred near point D, are people at point A likely to feel it? Why or why not? (No, point D is in the Western Hemisphere and point A is in the Eastern Hemisphere.) Visual, Logical
ASSESS PRIOR KNOWLEDGE
Use the Chapter Pretest below to assess students' prior knowledge. As needed, review these concepts.

Review Science Concepts
Section 1.1 Review the parts of the solar system, and the concept that the solar system is just one part of the Milky Way galaxy, which is just one part of the universe. Review with students that denser objects sink while less dense objects float. This will help students understand how Earth's layers formed.
Section 1.2 Remind students that Earth's liquid water and atmosphere make it unique among the planets.
Section 1.3 Have students recall the locations of North America, the equator, the prime meridian, and the International Date Line on a world map. Review the compass rose (N-S-E-W).
Section 1.4 Review the concept of a system. Discuss living and nonliving (biotic and abiotic) factors in the environment.
Section 1.5 Encourage students to recall the idea that an observation is something you notice with your senses.

Review Math Skills
Ratio Students will need to understand ratios and how ratios can be written (as a fraction or with a colon). Direct students to the Math Skills in the Skills Handbook at the end of the student text.

Chapter Pretest
1. True or False: Our solar system consists only of Earth and the sun. (False)
2. Object A is denser than water. If object A is dropped into a cup of water, what will happen to the object? (c)
   a. Object A will float on top of the water.
   b. Object A will float in the middle of the water.
   c. Object A will sink to the bottom of the cup.
3. What is Earth known to have that other planets in our solar system are not known to have? (c)
   a. an atmosphere
   b. volcanoes
   c. liquid water
   d. rings
4. What is the name of the imaginary horizontal line that goes around Earth's middle? (a)
   a. equator
   b. prime meridian
   c. international date line
5. Which of these imaginary lines cut through Greenwich, England? (b)
   a. equator
   b. prime meridian
   c. international date line
6. Fill in the locations for west, W east, and south on the compass rose to the right.
7. What is a storm that brings strong heavy rains, and coastal flooding? (b)
   a. tornado
   b. hurricane
   c. typhoon
1.3 Representing Earth’s Surface

Determining Location
- Latitude and longitude are lines on the globe that are used to determine location.
  - Latitude is distance north or south of the equator, measured in degrees. 90°
  - Longitude is distance east or west of the prime meridian, measured in degrees. 180°

Problems with Maps

Maps and Mapping – Just Read
- No matter what kind of map is made, some portion of the surface will always look either too small, too big, or out of place. Mapmakers have, however, found ways to limit the distortion of shape, size, distance and direction.

Topographic Maps
- Topographic maps represent Earth’s surface in three dimensions; they show elevation, distance directions, and slope angles.
  - Contour lines are lines on a topographic map that indicate an elevation.
  - Contour interval is the distance in elevation between adjacent contour lines.

What Is a System?
- A system is any size group of interacting parts that form a complex whole.
- Closed systems are self contained, energy can move, matter does not (ex: an automobile cooling system, coffee cup w/ lid).
- Open systems allow both energy and matter to flow in and out of the system (ex: a river system).
Activity: Where You Live

Materials:
- Map
- Colored pencils

Directions:
1. Color the map at the bottom of this paper using the key below:
   
   Oceans = blue
   Continent = green
   Tropic of Cancer = pink
   Tropic of Capricorn = purple
   Prime Meridian = yellow
   Arctic Circle = brown
   Equator = red
   Antarctic Circle = grey

Questions:
1. List the 7 continents.

2. List the 3 major oceans.

3. Which way does Latitude run? North/South or East/West

4. Which way does Longitude run? North/South or East/West

5. Find 0° latitude. What are the latitude° intervals on your globe as you move north?

6. What is the name of the line at 0° latitude?

7. What is the name of the latitude band at 23.5° N?

8. What is the name of the latitude band at 66.5° N?

9. Find 23.5° S. What is the name of this band?

10. Find 66.5° S. What is the name of this band?

11. Find 0° longitude. What is the name of this line?

12. Find 0° longitude. What are the longitude° intervals on your globe as you move west?

13. Estimate the latitude and longitude of where you live.

---

West Longitude

<table>
<thead>
<tr>
<th>World Longitudes and Latitudes (cylindrical projection)</th>
<th>East Longitude</th>
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<tbody>
<tr>
<td>180°</td>
<td>160°</td>
</tr>
<tr>
<td>70°N</td>
<td>60°N</td>
</tr>
<tr>
<td>10°W</td>
<td>20°W</td>
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</table>
Table 1: Technology and Earth Science

<table>
<thead>
<tr>
<th>Type of Equipment</th>
<th>Capabilities</th>
</tr>
</thead>
</table>
| Weather Satellites | - Monitor atmospheric temperature and humidity, ground and surface seawater temperature and cloud cover, and water-ice boundaries.  
  - They can help locate sources of distress signals.  
  - They are able to scan Earth’s surface in one 24-hour period. |
| Navigation Satellites | - These assist ships and submarines to determine their exact location at any time. |
| Exact Satellites | - The first Landsat satellite was launched in 1972. Landsat 7 was launched in 1999.  
  - They provide data on Earth’s landmasses, coastal boundaries, and coral reefs.  
  - Pictures taken are transmitted to ground stations around the world.  
  - They orbit Earth every 99 minutes and complete 14 orbits per day.  
  - Total coverage of Earth is achieved in 16 days. |
| Global Positioning System (GPS) | - This system combines satellite information with computer technology to provide location information in three dimensions: latitude, longitude, and altitude.  
  - Three satellite signals are detected by a receiver. The distance from the satellites to the receiver is calculated, and the location is determined using the triangulation method.  
  - A fourth signal is then used to mathematically determine exact position. |
| Long-Baseline Interferometry (VLBI) | - VLBI utilizes a large network of antennas around the world to receive radio waves from space objects such as quasars.  
  - In Earth science, VLBI is used in geodesy, or the measurement of the geosphere.  
  - Using the arrival times of radio waves from quasars, the position of radio telescopes on Earth are determined to within millimeters of their position.  
  - Small changes in the telescope positions allow scientists to study tectonic plate motions and other movements of Earth’s crust with great precision and accuracy. |

### Reviewing Concepts

1. Describe the two sets of lines that are used on globes and some maps.
2. What happens to the images on the globe when they are transferred to a flat surface?
3. What is the purpose of contour lines on topographic maps?
4. What two lines mark zero degrees on the globe? In which directions do these lines run?
5. Why is the Mercator projection map still in use today?
6. What types of advanced technology are used in mapmaking today?

### Critical Thinking

7. Why are there so many different types of maps?

### Math Practice

8. How can data from VLBI be used in mapmaking today?
9. An area on a topographic map has the following contour line configuration: First, the lines are fairly widely spaced. Then they are closely spaced. Finally, they are circular. Describe the topography represented by these lines.

### Solution

10. The distance in centimeters on the map is approximately 5.5 cm. The distance on the ground is approximately 3.43 km.

---

1. Lines of latitude are east-west circles around the globe. Lines of longitude run north and south.
2. They become distorted.
3. Contour lines indicate elevation.
4. The lines are the equator, which runs east and west, and the prime meridian, which runs north and south.
5. It is useful to sailors because although size and shape are distorted, it shows directions accurately.
6. Sample answer: satellites, computers, high-powered telescopes, sonar, GPS, VLBI
7. Each type of map is particularly useful in some capacity. Conic projections are good for small-scale maps such as road maps. Topographic maps help geologists and hikers. Mercator projections help sailors to navigate.
8. Because small-scale changes in position can be detected by VLBI technology, movements of Earth’s crust can be measured precisely.
9. The land starts out relatively flat and rises steeply to the top of a hill.
Maps, Mapping, & Determining Location

Use Fig. #9 on page 12

1. From which point is Latitude measured? ________________________

2. From which point is Longitude measured? ________________________

Use Fig. #8 on page 11

3. What is the latitude and longitude of points:
   A = ________________________
   B = ________________________
   C = ________________________
   D = ________________________
   E = ________________________

4. What major city is near point D?

5. If an earthquake occurs near point D, are people at point A likely to feel it? Why or why not?
Identifying Location

We use maps and computer programs to help us plan our routes. In the past, people had to rely on maps that were made using data and notation that were collected by travelers and explorers. Today, technology is available to anyone who wants to use it, and it has changed a lot throughout recorded history. Yet Christopher Columbus and others proved that Earth was not flat. People began to use a global grid to help determine location.

Global Grid

Scientists use two special Earth measurements to locate places. The distance around Earth is measured in degrees. Latitude is the distance north or south of the equator, measured in degrees. Earth is divided into 360 degrees in circumference. Longitude is the distance east or west of the prime meridian, also measured in degrees. The prime meridian is the line of longitude that runs north and south. The equator is the line of latitude that runs east to west around the globe. All points on the circle have the same latitude. The point at the middle of the globe, at 0°, is the equator. Lines of longitude run north and south. The meridian is the line of longitude that runs north and south. The prime meridian is the line of longitude that runs east to west.

Figure 8 Global Grid

Section 1.3

1. Focus

Section Objectives

1.6 Locate points on Earth's surface by their latitude and longitude.
1.7 Describe the advantages and disadvantages of different types of maps.
1.8 Explain what makes topographic maps different from other maps.

Reading Focus

Build Vocabulary

Paraphrase: Have students look up the vocabulary words for this section in the Glossary and then rewrite the definitions in their own words. Help students remember latitude lines run horizontally across Earth with the mnemonic "Lat lies flat." Similarly, help them see that longitude lines run the "long way" over Earth.

Reading Strategy

Sample answer:

a. I expect to learn about latitude and longitude.

b. Latitude lines measure degrees north and south of the equator; longitude lines measure degrees east and west of the prime meridian.

c. I expect to learn about different types of maps.

d. There are many different types of maps. Maps are hard to make accurately. Different map types have different advantages and disadvantages.

2. Instruct

Determine Location

Use Visuals

Figure 8: Help students find point D on the grid in this figure. Ask: What is the latitude and longitude of point D? (45°N, 75°W) What major city is near point D? (Montreal, Canada) If an earthquake occurred near point D, are people at point A likely to feel it? Why or why not? (No, point D is in the Western Hemisphere and point A is in the Eastern Hemisphere.)
Activity: Reading a Map

Materials: US Map  World Map  Metric Ruler  Calculator

Analysis:
1. Find the distances between the following cities:
   a. Los Angeles → Indianapolis = ___________ cm
   b. Indianapolis → Boston = ___________ cm
   c. Boston → Atlanta = ___________ cm
   d. Atlanta → Los Angeles = ___________ cm

2. What is the round trip distance (in cm) from:
   a. Los Angeles → Indianapolis → Boston → Atlanta → Los Angeles = ___________ cm

3. Find the latitude and longitude locations for the following cities: ( _N / S _° , _E / W _°)
   a. Los Angeles, California = ___________, ___________
   b. Indianapolis, Indiana = ___________, ___________
   c. Boston, Massachusetts = ___________, ___________
   d. Atlanta, Georgia = ___________, ___________
   e. Washington D.C. = ___________, ___________
   f. Denver, Colorado = ___________, ___________

4. Name the hemispheres (N, S, E, W) that each city is located:
   a. Los Angeles, California = ___________, ___________
   b. Buenos Aires, Argentina = ___________, ___________
   c. Cape Town, South Africa = ___________, ___________
   d. Tokyo, Japan = ___________, ___________
   e. Moscow, Russia = ___________, ___________

5. a. What is the scale on the United States map? ___________ cm = ___________ km
   b. What does the scale on the map tell you?

6. Using the scale on the map find the distances (in kilometers) between the following cities:
   (Hint: #cm × 200km ÷ 1.6cm)
   a. Los Angeles → Indianapolis = ___________ km
   b. Indianapolis → Boston = ___________ km
   c. Boston → Atlanta = ___________ km
   d. Atlanta → Los Angeles = ___________ km

7. What is the round trip distance (in cm) from:
   a. Los Angeles → Indianapolis → Boston → Atlanta → Los Angeles = ___________ km

8. a. Are the lines of latitude and longitude on this map all straight?  Yes  No
   b. What type of map are you using?

9. a. Could contour lines be used to show topography on a map of this scale?  Yes  No
   b. Explain why or why not.
Directions:
- Read the article below.
- On your own paper answer the following questions in paragraph form...
  1. What is the main idea of the text?
  2. Why is this study so important to all aspects of science?
  3. Describe the collaboration that occurred to make this mapping of Global Forest Change possible. Use at least one detail from the text to support your answer.
  4. Read this quote from the text, "Hansen and colleagues say the global data sets of forest change they have created contain information that can provide a transparent, sound and consistent basis to quantify critical environmental issues." Explain what they meant.

Nov. 14, 2013 — A University of Maryland-led, multi-organizational team has created the first high-resolution global map of forest extent, loss and gain. This resource greatly improves the ability to understand human and naturally-induced forest changes and the local to global implications of these changes on environmental, economic and other natural and societal systems, members of the team say.

In a new study, the team of 15 university, Google and government researchers reports a global loss of 2.3 million square kilometers (888,000 square miles) of forest between 2000 and 2012 and a gain of 800,000 square kilometers (309,000 square miles) of new forest.

Their study, published online on November 14 in the journal Science, documents the new database, including a number of key findings on global forest change. For example, the tropics were the only climate domain to exhibit a trend, with forest loss increasing by 2,101 square kilometers (811 square miles) per year. Brazil's well-documented reduction in deforestation during the last decade was more than offset by increasing forest loss in Indonesia, Malaysia, Paraguay, Bolivia, Zambia, Angola and elsewhere.

"This is the first map of forest change that is globally consistent and locally relevant," says University of Maryland Professor of Geographical Sciences Matthew Hansen, team leader and corresponding author on the Science paper.

"Losses or gains in forest cover shape many important aspects of an ecosystem including, climate regulation, carbon storage, biodiversity and water supplies, but until now there has not been a way to get detailed, accurate, satellite-based and readily available data on forest cover change from local to global scales," Hansen says.

To build this first of its kind forest mapping resource, Hansen, UMD Research Associate Professor Petr Potapov and five other UMD geographical science researchers drew on the decades-long UMD experience in the use of satellite data to measure changes in forest and other types of land cover. Landsat 7 data from 1999 through 2012 were obtained from a freely available archive at the United States Geological Survey's center for Earth Resources Observation and Science (EROS). More than 650,000 Landsat images were processed to derive the final characterization of forest extent and change.

The analysis was made possible through a collaboration with colleagues from Google Earth Engine, who implemented the models developed at UMD for characterizing the Landsat data sets. Google Earth Engine is a massively parallel technology for high-performance processing of geospatial data and houses a copy of the
entire Landsat image catalog. What would have taken a single computer 15 years to perform was completed in a matter of days using Google Earth Engine computing.

Hansen and his coauthors say their mapping tool greatly improves upon existing knowledge of global forest cover by providing fine resolution (30 meter) maps that accurately and consistently quantify annual loss or gain of forest over more than a decade. This mapping database, which will be updated annually, quantifies all forest stand-replacement disturbances, whether due to logging, fire, disease or storms. And they say it is based on repeatable definitions and measurements while previous efforts at national and global assessments of forest cover have been largely dependent on countries' self-reported estimates based on widely varying definitions and measures of forest loss and gain.

Dynamics from local to regional to global scale are quantified. For example, subtropical forests were found to have the highest rates of change, largely due to intensive forestry land uses. The disturbance rate of North American subtropical forests, located in the Southeast United States, was found to be four times that of South American rainforests during the study period; more than 31 percent of U.S. southeastern forest cover was either lost or regrown. At national scales, Paraguay, Malaysia and Cambodia were found to have the highest rates of forest loss. Paraguay was found to have the highest ratio of forest loss to gain, indicating an intensive deforestation dynamic.

The study confirms that well-documented efforts by Brazil -- which has long been responsible for a majority of the world's tropical deforestation -- to reduce its rainforest clearing have had a significant effect. Brazil showed the largest decline in annual forest loss of any country, cutting annual forest loss in half, from a high of approximately 40,000 square kilometers (15,444 square miles) in 2003-2004 to 20,000 square kilometers (7,722 square miles) in 2010-2011. Indonesia had the largest increase in forest loss, more than doubling its annual loss during the study period to nearly 20,000 square kilometers (7,722 square miles) in 2011-2012.

Hansen and colleagues say the global data sets of forest change they have created contain information that can provide a "transparent, sound and consistent basis to quantify critical environmental issues," including the causes of the mapped changes in the amount of forest; the status of world's remaining intact natural forests; biodiversity threats from changes in forest cover; the carbon stored or emitted as a result of gains or losses in tree cover in both managed and unmanaged forests; and the effects of efforts to halt or reduce forest loss.

For example, Hansen says, that while their study shows the efforts of Brazil's government to slow loss of rainforest have been effective, it also shows that a 2011 Indonesian government moratorium on new logging licenses was actually followed by significant increases in deforestation in 2011 and 2012.

"Brazil used Landsat data to document its deforestation trends, then used this information in its policy formulation and implementation. They also shared these data, allowing others to assess and confirm their success," Hansen says. "Such data have not been generically available for other parts of the world. Now, with our global mapping of forest changes every nation has access to this kind of information, for their own country and the rest of the world." Maps: http://earthenginepartners.appspot.com/science-2013-global-forest
First Detailed Map of Global Forest Change Questions

1.) What is the main idea of the text?

The main idea of the text is the first high-resolution global map of forest extent, loss and gain. The new map was created by a, University of Maryland-led, multiorganizational team. It talks about the new study that reports a global loss of 2.3 million square kilometers of forest between 2000 and 2012 and a gain of 800,000 square kilometers of new forest. The new study documents the new database and some key findings on global forest change.

2.) Why is this study so important to all aspects of science?

This study is important to all aspects of science because loss and gain of forests effect everything. It effects many things in an ecosystem like climate regulation which can effect water supplies. Water supplies can also effect biodiversity. The effect on biodiversity can then cause an effect on carbon storage. That's why the new study is important to all aspects of science.

3.) Describe the collaboration that occurred to make this mapping of Global Forest Change possible. Use at least one detail from the text to support your answer.

The analysis was made achievable through collaboration. Collaboration was with colleagues from Google Earth Engine. They carried out the models developed at UMD for characterizing the Landsat data sets. What would've taken a one computer 15 years to complete, was finished within a matter of days.

4.) Read this quote from the text, "Hansen and colleagues say the global data sets of forest change they have created contain information that can provide a transparent, sound and consistent basis to quantify critical environmental issues." Explain what they meant.

The quote is basically saying that the data they have found shines light onto environmental issues. It also gives them a solid foundation.
1) What is the main idea of the text?

The main idea is about the decrease of forest on planet Earth. The global loss rate is about 20,000 square kilometers of forest destroyed per year. At this rate there will be no more forest to see. The global grow rate from 2000 to 2012 was a gain of 800,000 square kilometers of new forest, but that still is not enough growth to match the decrease of the forests world wide. With a new high-resolution global mapping system developed by the University of Maryland and Google Earth Engine, changes to the forest will be more accurately documented. This information will help at the local level and as well world wide so we can better help our planet thrive.

2) Why is this study so important to all aspects of science?

This study is so important because we all need trees to live on earth. Trees are important because they produce oxygen in our atmosphere. One of the important aspects of science is mapping. When The University of Maryland, Google and government researchers got together, their findings were the first of its kind. The new database collected was a full picture of our plants forests. Including Loss, gain of forest size, ecosystems like carbon storage, water supplies, and many more vital facts about the health of our plants forests. This study can be used by anyone from a local level to a global scale.

3) Describe the collaboration that occurred to make this mapping of Global Forest Change possible.

Colleagues from Google Earth Engine in collaboration with the UMD together collect and compile the most accurate database to date. They took information from Landsat 7 data from 1999-2012. Using over 650,000 images from satellites to measure changes in the forest and other types of land cover. Google high performance processing of geospatial data and the Landsat image catalog was completed in days rather the years. Giving us all invaluable information about the forest all over the world.

4) "Hansen and colleagues say the global data sets of forest change they have created contain information that can provide a transparent, sound, and consistent basis to quantify critical environmental issues."

The information Hansen and his colleagues have collected is proving to be vital to many countries around the world. All of this information can be accessed on the World Wide Web. Indonesia made a law that all loggers had to be licensed in hope that fewer trees being cut down. However they doubled their loss of forest from one year to the next. On the other hand Brazil made great effort and cut their deforestation by half. Thanks to Hansen, his colleagues, UMD, and Google we have the data we need at our fingertips to help prevent further loss our forest worldwide.
Essay Questions

1. The main idea of the text is informing us, the readers, of a new global map that tracks the loss and gain of forestation worldwide. The article tells us how the making of the map took place, also the research put into constructing the map. The article also covers rates of deforestation throughout areas of the world (Indonesia, Malaysia, Paraguay, Bolivia, Zambia, and Angola). The main purpose of this article was to show us the process of a new global map, by explaining the scientists and researches journey into creating it.

2. The loss and gain of forestation serves an importance because the map is a demonstration of how human kind inflicts an impact on the environment. Most sciences are impacted in some way just be human existence and this serves as an example. It gives us a way of understanding the changes that we bring to the environment, which is very important in the study of earth science. Although some changes come naturally, a lot is due to forests being cut down by humans.

3. The collaboration that made Global Forest Change possible was between Google Earth Engine and government researches. Google earth Engine came as a big help for the project because (as it says in the text) what would have taken a single computer 15 years was accomplished in a matter of days using Google earth Engine. Hansen's team says that the mapping tool greatly increases resolution of the data received.

4. "Hansen and colleagues say the global data sets of forest change they have created contain information that can provide a transparent sound and consistent basis to quantify critical environmental issues." This quote basically means that Hansen and his colleagues have discovered a way to keep tabs of fluctuating numbers on the rates of forestation worldwide. The 'critical environmental issues' are the dangers that we pose a threat to harming the environments including the forests.
Global Forest Change

The main idea of this text is about the first detailed map of Global Forest Change. This resource "improves the ability to understand human and natural forest changes and global implications of the changes on environmental, economic and other natural systems." This new study is being researched by a team of 15 google and government researchers. They report a global loss of 23 million square kilometers of forest. This all happened between 2000 and 2012 with a gain of 182 million square kilometers of new forest.

This study is very important to all aspects of science. Forests shape many important aspects in an ecosystem. These include climate control, carbon storage, biodiversity, and water supplies. Until now, detailed data has been unavailable to us. Now, they have satellite-based and readily available to get data from the forest cover changes.

Many things had to happen for this to be possible. It took a UNQ professor and 5 other UNQ geographical researchers drawing on decades-long experience in the use of satellite data to measure changes in the forests. They used more than 650,000 Landsat images. They also had access to Google Earth Engine.

The quote, "Hansen and colleagues say the global data sets of forest change, they have created certain information that can provide a transparent, sound and consistent basis to qualify critical"
Article: Global Forest Change

1) What is the main idea of this text?
The main idea of this text is about forest change. The article describes how 15 different universities, Google and government researchers are working on a new high resolution map for forest gain and loss. It describes how the map will work and how it will be useful. The last thing it talks about is how we are losing 2.3 million acres of forest but gaining 800,000 acres.

2) Why is this study so important to all aspects of science?
This study is important to all aspects of science because first, if the forests were cleaned out, where would we be? The carbon levels would rise dramatically and it would get pretty hot. Second, it would damage the ecosystem, (and the biology the study of life) the animals wouldn’t have home, and if plant life was gone us and all the animals would go with it. It affects every piece of science.

3) Describe the collaboration that occurred to make this mapping of Global Forest Change possible. Use at least one detail from the text to support your answer.
The collaboration that occurred has many people with it. Google, government researchers, and over 10 different universities. They all reported a loss of 2.3 million square acres of forest gone. But they also found 800,000 new acres of forest. The article states "without Google’s search engine what took only 2 days, would have taken 15 years ".

4) Read this quote from the text, "Hansen and colleagues say the global data sets of forest change they have created contain information that can provide a transparent, sound and consistent basis to quantify critical environmental issues." Explain what they meant.
This quote could mean a lot of things. But basing what I read on the article it could mean, the team could have discovered a new map that could show and help forest damage. It also says in the quote environmental issues. Therefore they could use this map for possibly ocean issues, fire damage, air pollution.
period 7
11/25/13

Article: First Detailed Map of Global Forest Change

The main idea of this article is that it shows how much square miles of forests have been lost on the planet. The information that is given is remarkable! It gives the information you need of what you want to know, such as where the forest is located or how much of the forest remains. “This is the first map of forest change that is globally consistent and locally relevant,” says University of Maryland Professor of Geographical Sciences Matthew Hansen, team leader and corresponding author on the Science paper.

It is important to all aspects of science because it tells you which forests have been cut down or how many forests are still standing tall. It gives enough information about how much square miles of forest loss have been lost over the past years or just recently. They will also know the carbon storage, climate regulation, biodiversity and also water supplies. The data that is given is well thought out for those people that would like to help the forest, so they know in what direction they need to go.

The collaboration that occurred to make the mapping of Global Forest Change possible was having all the information and research that was needed available, and even having more than what was required. “This resource greatly improves the ability to understand human and naturally-induced forest changes and the local to global implications of these changes on environmental, economic and other natural and societal systems, members of the team say.” Working together in a group effort it is easier to see how or who gets affected to explain the changes in the forests.

"Hansen and colleagues say the global data sets of forest change they have created contain information that can provide a transparent, sound and consistent basis to quantify critical environmental issues." This particular quote means that they are trying to put down forests on maps that are still on earth to show how much green lands we have left. Also, it would show how to prevent forest loss. The reason to prevent forest loss is because it is home to many animals. In addition, without forests we would not have enough oxygen. The loss of forest life would create more carbon dioxide without the trees and plants. It is important for them to have people stop cutting down the forest, since it is the homes of animals and other creatures.
Article: First Detailed Map of Global Forest Change

1. What is the main idea of the text?
   -The main idea of the text is that there is finally a new and efficient way of being able to map forests. It is able to improve on the ability to understand human and naturally induced forest changes and the after effects of the changes such as economical changes on the environment, and other natural societal systems. In the new study done by the University of Maryland, they have reported a global loss of 888,000 square miles of forest between the years 2000 and 2012, and only a gain of 309,000 square miles of new forest. This increase in forest loss wasn’t in just one spot either; there were reports of forest loss in Indonesia, Malaysia, Paraguay, Bolivia, Zambia, and Angola. “Losses or gains in forest cover shape many important aspects of an ecosystem including, climate regulation, carbon storage, biodiversity and water supplies, but until now there has not been a way to get detailed, accurate, satellite-based and readily available data on forest cover change from local to global scales,” says University of Maryland Professor of Geographical Sciences Matthew Hansen. These facts make it clear that if we stay on this path of forest destruction there won’t be any more forests left in those countries.

2. Why is this study so important to all aspects of science?
   -The problem affects all types of subjects such as the environment and how Oxygen gets into the air. Less trees in that area means there’s going to be less oxygen being released into the air in that area. The economic systems such as businesses will flourish because of the things they will be putting where the forest used to be but is it really worth it. On top of all this, it won’t only be destroying animals and homes but also possibly people’s lifestyle could be changed by having a forest cut down. This study is also very important because it’s the first map of forest change that is globally consistent and is correct. This will help us as we go along to keep an eye on the growth rate of the trees and the loss rate.

3. Describe the collaboration that occurred to make this mapping of global forest change possible.
   -The UMD used satellite data to measure changes in forest and other types of land cover. They found 650,000 land sat image data from 1999 to 2012 from a free archive at the United States Geological Survey’s center for Earth Recources Observation and Science. This finding helped finally characterize the forest extent and change. The analysis was made possible by colleagues from Google Earth Engines who implemented the models developed at UMD for characterization. What would have taken 15 years with a single computer was completed in just days using the Google Earth Engine. Its due to those satellites that they are now able to get so much more of an exact reading of the forests and what ends up happening to them.
Chapter 1
Standardized Test Prep Questions

Directions:
Choose the letter that best answers the question or completes the statement.

1. The ______ strongly influences the other three “spheres” because without life their makeup and nature would be much different.
   (A) atmosphere
   (B) hydrosphere
   (C) geosphere
   (D) biosphere

2. The science that includes the study of the composition and movements of water, as well as coastal processes, the seafloor, and marine life is ________.
   (A) geology
   (B) oceanography
   (C) meteorology
   (D) astronomy

3. Which of these situations is(are) an example of an open system?
   I. a car’s cooling system
   II. a boiling teakettle
   III. a loaf of bread in a sealed plastic bag.
   IV. your digestive system
   (A) I only
   (B) II & IV
   (C) I & III
   (D) I, II, III & IV

Directions:
Use the figure given to answer Questions 4, 5, and 6.
If you can’t read the diagram, use pg. 31 of your textbook.

4. What is the latitude and longitude for point A on the map?

5. Locate the state of Florida on the map. What is the approximate location of its southernmost point?

6. Why does the continent of Antarctica appear to be stretched out?

7. The three principal layers of Earth are differentiated by their density. List these three layers by increasing density.
Determining Latitude and Longitude

Using maps and globes to find places and features on Earth’s surface is an essential skill required of all Earth scientists. The grid that is formed by lines of latitude and longitude form the basis for locating points on Earth. Latitude lines indicate north-south distance, and longitude lines indicate east-west distance. Degrees are used to mark latitude and longitude distances on Earth’s surface. Degrees can be divided into sixty equal parts called minutes (‘), and a minute of angle can be divided into sixty parts called seconds (”). Thus, $31°10\_20'$ means 31 degrees, 10 minutes, and 20 seconds. This exercise will introduce you to the systems used for determining location on Earth.

**Problem:** How are latitude and longitude calculated, and how do they indicate a particular location on the globe?
Part 1: Determining Latitude

FIGURE A
1. Locate the Equator on the globe. Sketch and label the Equator. Label the Northern and Southern Hemispheres.

2. Make an angle by drawing a line from point A on the Equator to point B (the center of Earth). Then extend the line from point B to point C in the Northern Hemisphere. The angle you have drawn (<ABC) is 45º. By definition of latitude, point C is located at 45ºN latitude.

3. Draw a line through point C that is also parallel to the Equator.
   What is the latitude at all points on this line? ___________ °N   -   Record this number on the line.

4. Make an angle by drawing a line from point A on the Equator to point B. Then extend the line from point B to point D in the Southern Hemisphere. The angle you have drawn (<ABD) is 25º. By definition of latitude, point D is located at 25ºS latitude.

5. Draw a line through point D that is also parallel to the Equator.
   What is the latitude at all points on this line? ___________ °S   -   Record this number on the line.

FIGURE B
6. How many degrees of latitude separate the latitude lines on Figure B? _____ °

7. Determine the latitude for each point A–F. Be sure to indicate whether it is North or South of the Equator. Record.
   A. = ____________________________
   B. = ____________________________
   C. = ____________________________
   D. = ____________________________
   E. = ____________________________
   F. = ____________________________

8*. Use a globe or map to locate the cities listed below. Record their latitude and longitude to the nearest degree.
   A. Moscow, Russia
   B. Cape Town, South Africa
   C. Thousand Oaks, California

9*. Use a globe/map to find the name of a city that is equally as far South of the Equator as Thousand Oaks is North.
   Name of City = ____________________________ & ________ °S

Part 2: Determining Longitude

FIGURE C
10. Sketch and label the Prime Meridian. Label the Eastern and Western Hemispheres.

11. How many degrees of longitude separate the longitude lines on Figure C? _______ °

12. Determine the longitude for each point A–F. Be sure to indicate whether it is East or West of the Prime Meridian.
   A. = ____________________________
   B. = ____________________________
   C. = ____________________________
   D. = ____________________________
   E. = ____________________________
   F. = ____________________________

13*. Use a map to find the name of a city that is equally as far East of the Prime Meridian as Thousand Oaks is West.
   Name of City = ____________________________ & ________ °E

Part 3: Conclusion Questions
1. a. What is the maximum number of 1 degree longitude lines that can be drawn on a globe? __________________
   b. What is the maximum number of 1 degree latitude lines that can be drawn on a globe? __________________

2. Why do longitude lines converge (come together) while latitude lines do not? __________________
Section 1.3 Representing Earth's Surface

This section explains various types of globes and maps used to represent Earth's surface.

Reading Strategy

Monitoring Your Understanding: Preview the Key Concepts, topic headings, vocabulary, and figures in this section. List two things you expect to learn. After reading, state what you learned about each item you listed. For more information on this Reading Strategy, see the Reading and Study Skills in the Skills and Reference Handbook at the end of your textbook.

<table>
<thead>
<tr>
<th>What I Expect to Learn</th>
<th>What I Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>b.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
</tr>
</tbody>
</table>

Determining Location

Match each description to its term.

- 1. the distance north or south of the equator
  Term: a. longitude  b. globe  c. eastern, western  d. prime meridian  e. northern, southern  f. latitude  g. equator

- 2. the distance east or west of the prime meridian
- 3. the line of latitude around the middle of the globe at 0 degrees
- 4. the line of longitude at 0 degrees
- 5. the two hemispheres formed by the equator
- 6. the two hemispheres formed by the prime meridian and the 180° meridian
- 7. a spherical model of Earth

Maps and Mapping

8. A(n) ________ is a flat representation of Earth's surface.

9. Match the name of the map type with the correct example below.
   - Robinson Projection
   - Mercator Projection
   - Gnomonic Projection
   - Conic Projection
   A. ________
   B. ________
   C. ________
   D. ________

Topographic Maps

10. Circle the information that topographical maps show.
   a. the round shape of Earth with no distortion
   b. the depth of Earth's layers
   c. separations between different climates
   d. the elevation of Earth's surface

Advanced Technology

11. Is the following sentence true or false? The process of collecting data about Earth from a distance (such as from orbiting satellites) is called remote sensing.

12. Circle the things scientists can study using satellite remote sensing.
   a. rivers and oceans
   b. fires
   c. pollution
   d. natural resources
Topographic Maps: Ash Hill vs. Oak Hill

1. Draw in and complete the profile view of the mountains below...

2. Color the diagram below:
   - Red – 50 meters and above
   - Orange – 40-50 meters
   - Yellow – 30-40 meters
   - Green – 20-30 meters
   - Blue – 10-20 meters
   - Purple – 0-10 meters

3. Approximately how tall is Ash Hill?

4. Approximately how tall is Oak Hill?

5. a. Which mountain is slightly taller?
   b. By how much?

6. How many meters of elevation are there b/t contour lines on the topographic map?

7. Are the contour lines closer together on Ash Hill or Oak Hill?

8. Which mountain has steeper slopes?
Topographic Maps

- **Topography** - defined as the shape or three-dimensional quality of the Earth's surface.

What is a Topo Map?

- Show differences in elevation for the features in the area.
- Like cutting a mountain in slices.
- Takes 3-dimensional Earth and represents it in 2-dimensions (flat).
- Connects dots of same elevation points to make contour lines. (makes a circle)

Contours

A **contour line** is an imaginary level line that connects points of equal elevation.

If you walk along a contour line you neither gain or lose elevation.

Introduction

- U.S. Geological Survey (USGS) has developed “topo” maps for a large part of the U.S.
- *Just Read*.

Examples of Topographic Maps

![Typical USGS Topographic Map](image)

Rules of Topo Maps

- The rule of Vs: sharp-pointed V usually is a stream or valley with the V pointing upstream.
Rules of Topo Maps

- The rule of Os: closed loops are normally uphill on the inside and downhill on the outside, and the innermost loop is the highest area.

Spacing of contours

- Closely spaced contours indicate steep slopes
- Widely spaced contours indicate shallow slopes
- Contours should be labeled to the elevation value
- Contour lines do not cross

Selecting Contours

- The contour interval should be small enough to give the desired detail
- Usually every fifth contour line is shown in a wider line, this is called a index line
- Usually by 10's, 20's or 100's feet

Hill or Hole???

Depression and hill look the same; note the contour value to distinguish the terrain

JUST READ

Rules for Making Topo Maps

- 1. Map is always made from an aerial view
- 2. Every point on a contour line represents the exact same elevation
- 3. Contour lines can never cross one another
- 4. Moving from one contour line to another always indicates a change in elevation
The Trouble with Topos – Scale WS

Metric System

Information:
1 cm = 10 millimeters
1 meter = 100 centimeters
1 kilometer = 1,000 meters

Scales:
1. You already know that different maps use different scales, but just how far is 250,000 millimeters? In the table below, convert the new scale into cm, m, and km.

<table>
<thead>
<tr>
<th>Scale</th>
<th>How many centimeters?</th>
<th>How many meters?</th>
<th>How many kilometers?</th>
</tr>
</thead>
<tbody>
<tr>
<td>250,000mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62,500mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24,000mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10,000mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,000mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12mm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Examples: 250,000mm x $\frac{1 \text{ cm}}{10 \text{ mm}} = 25,000 \text{ cm}$
25,000cm x $\frac{1 \text{ meter}}{100 \text{ cm}} = 250 \text{ meters}$
250meters x $\frac{1 \text{ km}}{1,000 \text{ m}} = .25 \text{ km}$

2. If you were going to draw your classroom on a regular size piece of paper (28cm x 21.5cm), what would be a good scale to use and why?
Contour Map Worksheet #3

The topographic map below represents a location in North America.

1. What is the elevation at the intersection of Jones Road and Smith Road?
   1. 450 m
   2. 500 m
   3. 550 m
   4. 600 m

2. What is the elevation of the highest contour line on hill W?
   1. 440 m
   2. 510 m
   3. 560 m
   4. 610 m

3. On which side of hill X is the steepest slope found?
   1. north
   2. east
   3. southeast
   4. southwest

4. In which general direction is Trout Brook flowing when it passes under Smith Road?
   1. northeast
   2. northwest
   3. southeast
   4. southwest

5. Which diagram best represents the profile along a straight line between points A and B?

   - [Diagram 1]
   - [Diagram 2]
   - [Diagram 3]
   - [Diagram 4]
Lake Nyos

At 9:30 p.m. on August 21, 1986, a cloudy mixture of carbon dioxide (CO₂) and water droplets rose violently from Lake Nyos, Cameroon. As the lethal mist swept down adjacent valleys, it killed over 1700 people, thousands of cattle, and many more birds and animals.

The bodies of those that died were generally devoid of trauma. Most victims appeared to have simply fallen asleep and died from asphyxiation. Many died in their beds. One survivor was Joseph Nkwain from Subum. He was awakened at about midnight by a loud noise.

"I could not speak. I became unconscious. I could not open my mouth because then I smelled something terrible... I heard my daughter snoring in a terrible way, very abnormal... When crossing to my daughter's bed... I collapsed and fell. I was there till nine o'clock in the (Friday) morning... until a friend of mine came and knocked at my door... I was surprised to see that my trousers were red, had some stains like honey. I saw some... starchy mess on my body. My arms had some wounds... I didn't really know how I got these wounds... I opened the door... I wanted to speak, my breath would not come out... My daughter was already dead... I went into my daughter's bed, thinking that she was still sleeping. I slept till it was 4:30 p.m. in the afternoon... on Friday. (Then) I managed to go over to my neighbors' houses. They were all dead... I decided to leave... (because) most of my family was in Wum... I got my motorcycle... A friend whose father had died left with me (for) Wum... As I rode... through Nyos I didn't see any sign of any living thing... (When I got to Wum), I was unable to walk, even to talk... my body was completely weak." — From A. Scarth (1999)
Lab: Tragedy at Lake Nyos

Overview:
Lake Nyos was formed by a volcanic eruption five centuries ago. It has been an inactive volcano as of late and has not been a problem for the people of Cameroon. In August of 1986 many people and cattle died suddenly and tragically due to carbon dioxide poisoning that Lake Nyos released. This lab is going to investigate what happened on that fateful day at Lake Nyos and see what can be done to prevent a disaster such as that from happening ever again.

1. Activity: This is a map of Lake Nyos and the surrounding area. Complete the topographic map by creating contour lines at 3 meter intervals. Start at 91 meters and work your way out!

2. Using the letters marked on the map.
   a) What is the highest point?
   b) What is the lowest point?
3. Air has a density of approximately 1.2 kg/m³ whereas Carbon Dioxide (CO₂) has a density of 1.98 kg/m³ if I were to pour air and carbon dioxide in a glass making the gases layered.
   a) Which would be on the bottom and which would be on the top of the glass?
   b) Why?

4. Observation: Observe the light provided by your teacher...
   a) What element must be present for the candle to burn?
   b) What element must be present for humans to breathe?

5. Experiment: "GOGGLES MUST BE WORN"
   When vinegar and baking soda are mixed you create carbon dioxide.
   - In a beaker put three spoonfuls of baking soda and 50ml of vinegar together.
   - Once the reaction begins to occur take the manila folder and "pour" the gas out of the beaker down the folder towards the candle. DO NOT ACTUALLY POUR THE LIQUID DOWN THE FOLDER JUST THE GAS!
   a) Describe what happens to the candle:

The same gas that was made in the beaker was the same one that "poured" out of Lake Nyos. Based on your observation of the candle, imagine the same thing happening at Lake Nyos but on a much larger scale.
   b) How did many of the people and animals die near Lake Nyos?

6. Computers: Search the Internet to find...
   a) How many people died in the Lake Nyos tragedy?
   b) How many animals were killed?

7. The people and animals in the villages surrounding Lake Nyos died by asphyxiation, which means they suffocated to death.
   a) By looking at your topographic map that you made in Question #1, and knowing the density of carbon dioxide, explain why the village was the hardest hit.

2. Activity: The carbon dioxide gas covered a 15 mile (25km) radius around Lake Nyos.
   - On the map, shade in the area that was hit with the carbon dioxide gas.

3. Studies of Lake Nyos revealed that there was more CO₂ forming at the bottom of the lake that could cause the tragedy to occur again. An attempt was made in 2001 to de-gas the lake using an electronic pump that would simulate an eruption. Currently scientists believe the lake is under control but more pipes should be installed to make sure something like this does not occur again. The picture below is an example of the pumping system.
   a) What are pumps bringing from the bottom of the lake to the surface?
The topographic map below represents a location in North America. A grid system of letters and numbers along the edges of the map is provided to assist in finding locations. Elevations are expressed in feet.

1. What is the approximate elevation at grid location J-4?  
   A. 140 ft   C. 200 ft  
   B. 170 ft   D. 230 ft

2. What is a possible elevation at point X (grid location 3-D)?  
   A. 485 ft   C. 555 ft  
   B. 545 ft   D. 685 ft

3. If a person at point W (grid location 2-B) travels uphill, in which direction is the person traveling?  
   A. northwest   C. southwest  
   B. northeast   D. southeast

4. What is the elevation difference of the entire length of the Excelsior River?  
   A. 0 ft   C. 225 ft  
   B. 200 ft   D. 250 ft

5. Which profile best represents the topography along a straight line from point Z (6-B) to point Y (3-M)?  
   A. (1)   C. (3)  
   B. (2)   D. (4)
Lab: Mapping Mt. Capulin

What is a topographic map (or topo map)? These maps provide a way of showing a 3 dimensional landscape on a 2 dimensional surface. The most distinctive features of a topographic map are the contour lines. Each line represents an imaginary line that connects points that are the same elevation above sea level. Thus, if you walk along a contour line, you would not climb up or down, but stay at the same elevation at all times. USGS maps, the standard topographic map, draw contour lines in brown, labeled at intervals with numbers that represent the elevation above sea level or, in the case of bathymetric maps, the elevation below sea level. Other colors you might find on USGS topo maps are green for vegetation, blue for water features, red for major roads, and grey or black for human developments such as smaller roads, railroads and buildings.

Topo maps are used by most often for navigation so that hikers and explorers can get a sense of the terrain. They are also used by scientists to observe things based on their location and their elevation. Contour lines are spaced at regular intervals (every 10 feet above sea level is marked with a different line for instance). Thus, the closer 2 lines are together, the steeper the area. Hills can be identified by concentric circles that grow smaller and smaller until you reach the peak of a hill. Depressions such as a dried out pond or the crater of a volcano are generally shown with hatched contour lines.

On your map of Mt. Capulin 1 cm = 250 feet on the actual mountain. If the bottom of the box equals 6,250 feet above sea level, the contours on the chart can be labeled to correspond to the actual mountain.

Materials:
- Clear Box
- Clear Lid for box
- Mt. Capulin model
- Dry Erase Marker
- Water (colored – optional)
- Bucket
- 250mL Beaker *used to transfer water from bucket to model box
- Ruler
- 1 sheet of Transparency paper
- Tape

Directions:
1. Place a piece of tape up one side of the box – next to the volcano.
2. Using the ruler and the marker, mark the tape with 1 cm marks from the bottom to the top.
3. Place the Mt. Capulin model securely in the bottom of the container.
4. Pour water into the container to a height of 1 cm.
5. Cover the box with the top.
6. Tape the Transparency paper to the top of the box.
7. Draw a directional symbol on the upper right hand corner of your paper.
8. Trace where the water hits the model of Mt. Capulin. **(These are called contour lines.)**
9. Remove the Lid
10. Add 1 more cm of water. (The depth is now 2 cm.)
11. Replace the lid.
12. Trace on your transparency sheet where the water hits the model.
13. REPEAT this process (steps #8-#11) until Mt. Capulin is covered with water.
15. Carefully remove transparency sheet from the box.
16. Place the transparency under the white sheet of paper and trace your topography diagram onto the white paper. **(you can use an overhead projector, the window, or a clear clipboard to see your diagram. You can also go over your transparency lines to make them dark enough so that when the paper is placed over it, the lines can be seen.)**
17. On your white paper, Add: a title, a contour interval key, and color your mountain.

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18. On your new map...
   a. Using a ruler, draw a line across your map – make sure the line crosses the highest point of the mountain.
   b. Label the start of the line “A” and the end of the line “B”
   c. Use an edge of a piece of paper and place it on your line, make a tick mark at each contour line
   d. Label the tick marks by their true elevation (bottom line = 6,250ft)
   e. Make a graph using the contour lines (x axis = elevation)
      i. You are making a profile view, just like you did on the laptops!
   f. Connect the dots and label your axis!
19. Staple your map to your questions.

Analysis Questions:

1. Topographic maps are maps that show differences in ______________ of the features on the surface of the Earth.

2. Who uses topographic maps most often?

3. How are elevations shown on any topographic map?

4. When would a topographic map not have a 0-elevation contour line?

5. Describe the general shape of the contour lines on your map.

6. a. What is the contour interval of your topographic map (the model)?

   b. What is the contour interval of the true Mt. Capulin? (see overview for help)

7. Which side of the mountain has the steepest slope? circle one North South East West

8. Where are the contour lines closer together on your map? circle one North South East West

9. Describe the relationship between the slope of the mountain and the distance between contour lines.

10. a. What is the total elevation of the highest point of your model?

    b. What is the total elevation of the highest point of the true Mt. Capulin? (see overview for help)

11. Looking at your map and your model, what is Mt. Capulin?
Chart: Map Types – Advantages & Disadvantages

Directions: Use Ch. 1 sec. 3 of your book to fill in the following chart.

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercator Projection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robinson Projection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conic Projection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gnomonic Projection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Topographic Mapping Exercise 2: The Concept of Contours

Part 1
Directions:
It is important to be able to visualize what features on a map look like on the ground. Draw a line from each of the following profiles of structures on the left to the correct contour diagram on the right.

1. 2. 3. 4. 5.

A. B. C. D. E. F.

Part 2
Directions:
Place the letter next to the contour drawing in the space to the left of the appropriate written description. Assume the top of the page is north.

1. Has two peaks of equal height with a saddle between them
2. Has a crater in the top
3. West slope is gradual; east slope is steep
4. Has two peaks; the west is two contour intervals higher than the east
5. Symmetrical hill

A. B. C. D. E. F.
Computers: TASA – Which is the easiest trail to San Carlos?

http://www.tasagraphicarts.com/activities/profile.html

**Note: You need Shockwave to play this animation!

To find the least strenuous hike to San Carlos peak it would be helpful to use a topographic map to create a profile of the peak. In this activity you will learn how topographic maps are used to make profiles of geologic areas.

**Directions:**
- Click the forward button *(arrow inside the animation)* to start the activity.
- Follow the directions on each slide
- You will NOT be able to progress to the next slide until you have completed each activity. If you hit the back button it will take you back to the first slide where you will have to start from the beginning.

**Turn in:** (on your own paper)
- Once your Graph has been completed, **Draw & Label** your Graph.
- Copy Questions:
  - How do you find the slope of a mountain?
  - What is the slope of San Carlos?
  - Which of the two paths would be the least strenuous (easiest) to reach the top of San Carlos?
Death Valley Hike Map

in Death Valley we will be hiking from Zabriski Point down Gower Gulch, where we will be met by the van or bus. The hike is shown on the attached map. Use the map to answer the following questions.

1. There are three flags on the map. The first flag, at the upper right of the map, is at the start of the hike. There are two trails. On the map, the trail in Gower Gulch is a dark line, and the other trail to Golden Canyon is a dotted line. Which trail starts by going over a small ridge/hill?

2. As you hike downhill, which trail is easier, the one that branches off to the right or the one that branches off to the left?

3. What is the distance in miles from the start of the hike to the second flag, where you will see mine openings?

4. The third flag is near the sea level contour line. What does that mean about the elevation of the bus?

5. Which is steeper, the hike from the 1st flag to the 2nd flag, or the hike from the 2nd flag to the 3rd flag?

6. In what general direction will you be hiking?

7. What is the distance of the hike? (Hint: look at the profile)

8. What is the change in elevation of the hike?

9. What is the gradient of the hike? _______ ft/mile

10. One index contour is labeled on the map. What is its elevation?

11. On the profile, draw a flag at the location of the third flag. ⬤ ⬤ ⬤

12. How would you describe the place that is marked with "XSTOT"?
   a. top of a hill
   b. bottom of a valley
   c. inside a closed depression

13. What is the contour interval of this map?
Article: What is GPS?

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS.

How it works:

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. Essentially, the GPS receiver compares the time a signal was transmitted by a satellite with the time it was received. The time difference tells the GPS receiver how far away the satellite is. Now, with distance measurements from a few more satellites, the receiver can determine the user's position and display it on the unit's electronic map.

A GPS receiver must be locked on to the signal of at least three satellites to calculate a 3D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude, and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track, trip distance, distance to destination, sunrise and sunset time and more.

How accurate is GPS?

Today's GPS receivers are extremely accurate, thanks to their parallel multi-channel design. When first turned on and GPS with multi-channel designs maintain strong locks, even in dense foliage or urban settings with tall buildings. Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. Garmin® GPS receivers are accurate to within 15 meters on average. Newer Garmin GPS receivers with WAAS (Wide Area Augmentation System) capability can improve accuracy to less than three meters on average.

The GPS satellite system

The 24 satellites that make up the GPS space segment are orbiting the earth about 12,000 miles above us. They are constantly moving, making two complete orbits in less than 24 hours. These satellites are traveling at speeds of roughly 7,000 miles an hour.

GPS satellites are powered by solar energy. They have backup batteries onboard to keep them running in the event of a solar eclipse, when there's no solar power. Small rocket boosters on each satellite keep them flying in the correct path.

Here are some other interesting facts about the GPS satellites (also called NAVSTAR, the official U.S. Department of Defense name for GPS):
- The first GPS satellite was launched in 1978.
- A full constellation of 24 satellites was achieved in 1994.
- Each satellite is built to last about 10 years. Replacements are constantly being built and launched into orbit.
- A GPS satellite weighs approximately 2,000 pounds and is about 17 feet across with the solar panels extended.
- Transmitter power is only 50 watts or less.

Sources of GPS signal errors

Factors that can degrade the GPS signal and thus affect accuracy include the following:
- Ionosphere and troposphere delays - The satellite signal slows as it passes through the atmosphere. The GPS system uses a built-in model that calculates an average amount of delay to partially correct for this type of error.
- Signal multipath - This occurs when the GPS signal is reflected off objects such as tall buildings or large rock surfaces before it reaches the receiver. This increases the travel time of the signal, thereby causing errors.
- Receiver clock errors - A receiver's built-in clock is not as accurate as the atomic clocks onboard the GPS satellites. Therefore, it may have very slight timing errors.
- Orbital errors - Also known as ephemeris errors, these are inaccuracies of the satellite's reported location.
- Number of satellites visible - The more satellites a GPS receiver can "see," the better the accuracy. Buildings, terrain, electronic interference, or sometimes even dense foliage can block signal reception, causing position errors or possibly no position reading at all. GPS units typically will not work indoors, underwater or underground.
- Satellite geometry/shading - This refers to the relative position of the satellites at any given time. Ideal satellite geometry exists when the satellites are located at wide angles relative to each other. Poor geometry results when the satellites are located in a line or in a tight grouping.
- Intentional degradation of the satellite signal - Selective Availability (SA) is an intentional degradation of the signal once imposed by the U.S. Department of Defense. SA was intended to prevent military adversaries from using the highly accurate GPS signals. The government turned off SA in May 2000, which significantly improved the accuracy of civilian GPS receivers.
Article: What is GPS?
Questions Sheet

Directions:
- Read the Article: What is GPS?
- Answer the following question in complete sentences on your OWN paper.

1. What does GPS stand for?

2. What is GPS?

3. Where and when does GPS work?

4. In your own words, describe briefly "how" GPS works.

5. a. What is meant by a “2-D” location?

   b. To determine your 2-D location how many satellites are needed?

6. a. What is meant by a “3-D” location?

   b. To determine your 3-D location how many satellites are needed?

7. How accurate are the newer Garmin receivers?

8. How are GPS satellites powered?

9. What is the official DOD name for the GPS satellites?

10. What year was the GPS system completed?

11. Pick one of the sources of GPS signal error and describe it in your own words.

12. a. What was Selective Availability?

   b. When was Selective Availability turned off by the US government?
Activity: Find it!

In this activity you will learn the basic concept of Global Positioning Systems (GPS) using triangulation and measurement on a small scale in the classroom. You will discover how GPS and navigation integrate mathematics and scientific concepts to create a standard for locating people and objects. This activity helps you understand both the need for and methods of navigation.

Overview:

How is it possible that we can even pinpoint exact locations on the Earth when it is so huge? How about finding an exact location in space? Do you think that is hard? Yes, it is! Often, we create small-scale models to represent large-scale objects, like a globe of the Earth. This helps us gain a better understanding of where things are in relation to each other. The small-scale model is usually a good representation of the real thing: Can you point out the United States on the globe? How about Africa? Now, let's think of a girl named Maya canoeing around Canada. Where might she be? Sure, we can point at the area where Maya might be, but how do we find exactly where she is? Well, today we will learn how engineers help us find our location anywhere on Earth using a thing called Global Positioning System (GPS) and satellites in space.

Satellites can help us know exactly where something is on Earth. Have you ever looked outside at night and seen a star that is moving slowly though the sky? Well, that may not be a star and might actually be a satellite instead. There are hundreds of them orbiting the Earth as we speak. In fact, the Earth even has a natural satellite. Do you know what it is? The moon! Engineered or man-made satellites can be instruments or machines that record different data measurements from outside the Earth's atmosphere for various purposes such as scientific research, weather research and prediction, navigation and observing the Earth. GPS satellites help us find a location by triangulating the position of an object or person as they move. These satellites do this by receiving and transmitting signals. Basically, a signal is sent from a computer or a person in one location on Earth up to a satellite orbiting the Earth and back down to the same person or computer somewhere else.

Engineers have always been involved with designing satellites, getting them into space, and analyzing their data. Therefore, engineers need to have a good understanding of science, space and aeronautical engineering. Engineers also need to understand mathematics and navigation systems here on Earth. Today, we are going to become engineers and use math to find a location of someone on a map. We will figure out how many satellites we need to find our exact location. We can find that location by modeling GPS satellites and receivers.

Pre-Activity Questions: (answer on your student sheet)

1. What will you learn in this activity?
2. Why do we create models, small or large?
3. How do GPS satellites help us find a location?

Materials:
Each group needs:

- 1 box (approx. 12"L x 11"W x 7"H; preferably so that the height of the box is less than the width and length)
- 5 ft. of string
- Scissors
- Metric Ruler
- 1 Lg. Sticky note
- Tape
- 1 Bottom of Box Map
- Student Sheet (one per person)

Procedure:

Part 1

- Help find a lost child! She is lost in the park!
- Using the following three measurements locate the spot on the map where the child's phone has been located...

  Note: Locate the letter on your box (A, B, C, or D)
  Cut your string into the three measurements posted on the board (Corresponds with your letter)
  Tape the appropriate string to the appropriate wall (make sure it is in the center)
  Bring the other ends of the string together to see where they meet

  RECORD the location of the lost child in your data section
  - Wall #1: - see teacher's board
  - Wall #2: - see teacher's board
  - Wall #3: - see teacher's board

Part 2

- Pick a place on the map where you want your "unknown" location to be
  Note: Do NOT write on the map!
- Measure the distance (in cm) from that point to each of the center marks on each of the three marked walls of the box using string and a ruler
  Note: Do NOT cut the string!
- RECORD your measurements & your location on your data sheet
- Now, your box has a location on it, and three measurements to go along with it.
- Record your 3 measurements on your sticky note – see below...
- Place sticky note inside the box for the next group

| Group #: ________ |
| Wall 1: ________ |
| Wall 2: ________ |
| Wall 3: ________ |
Part 3
- Trade boxes (and sticky notes) with a group in another row (preferably far away from you!
- Your goal is to use the measurements provided to locate the other group's mystery location.
- With the information given, you will use the measurements to:
  - **RECORD** the three measurements on your data sheet.
  - Measure the string into the three lengths provided.
  - Cut the string into each of the three lengths.
  - Use a small piece of tape to secure each length of string to the matching center of the wall.
    *Note: Make sure you use the correct length string on the correct side of the box.*
  - Using the three cut strings, find (triangulate) the mystery location on the map.
    *Note: Pull all of the strings tight to see where they meet.*
  - Find the mystery location - **RECORD**.
  - Then check with the students who made the model to see if you are correct.
  - Retrieve your box and sticky note from the other group once they too have found the location.

Clean-up
- **Throw away the sticky note**
- CAREFULLY - peel the tape and string off the box - **Throw away the cut pieces of string**
- Place the boxes back where you got them from.
- Any leftover **uncut** string from your provided 5 ft, please return to your teacher.

Data:
1. Where is the lost child? ________________________________

2. Your Mystery Location:
   a. Wall #1 measurement: ______________________________
   b. Wall #2 measurement: ______________________________
   c. Wall #3 measurement: ______________________________

3. a. Wall #1 measurement: ______________________________
   b. Wall #2 measurement: ______________________________
   c. Wall #3 measurement: ______________________________
   d. Other Groups Mystery Location: _____________________
      *(fill in once you find it)*

Analysis Questions:
1. Can you think of other ways that you could describe where a specific point is using distances?

2. What might happen if you did not accurately report the measurements to the other group?

3. If this was not on a small scale and the point is actually where someone was lost, what would happen if an engineer did not accurately report the measurements?

4. This was a small-scale model of what a GPS system does. In a real GPS system, the points on walls of the box represent what?

5. a. If you wanted to specify a point some distance above the bottom of the box, what additional information would you need to provide?
   b. In a large-scale system, like the Earth, what would that distance represent (ie. What is the scientific term for height in the atmosphere)?

6. What geometrical concept did we use to find the specified location?

7. Is this the same method that GPS satellites and receivers use to find a specified location?

8. How many "satellites" did we need to find the mystery locations on your map?

9. In your own words define/describe triangulation?

10. What do engineers need to understand to design satellites for GPS?
GIS is everywhere. Most people at this point think to themselves "I don't use it", but they do. GIS in its simplest form is "computerized mapping". A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS allows users to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.

According to Canalys (worldwide analyst company) there were approximately 41 million GPS units sold in 2008, and in 2009 the number of GPS enabled cell phones in use had exceeded 27 million. Without even thinking, tens of millions of people access directions and look-up local businesses from these hand-held devices every day. Let's tie this back to our big picture here, GIS. The 24 GPS satellites orbiting earth are constantly broadcasting data about their location and exact time. Your GPS device or phone receives and processes the signals from three to four of these satellites to figure out where it is located. Points of interest, addresses (lines or points), and aerial or road data is all stored in a database that is accessed by your device. When you submit data, such as posting a geo-Tweet (a location-based Tweet on Twitter), checking in on Foursquare, checking in on Facebook, or rating a restaurant you are adding data to one or more GIS data sources.

Popular GIS Applications
The most prevalent desktop GIS application is free, and quiet powerful. With over 400 million total downloads Google Earth is by far the most used GIS application in the world. While many people use Google Earth to look for fun things such as a friend's house, crop circles, and other oddities, Google Earth also allows you to add georeferenced images, view parcel data, and find routes.

Benefits of GIS
Even before the average computer user was using GIS on a near daily basis, everyone has benefited from it. The government uses GIS to decide voting districts, analyze demographics, and even time street lights. The real power of GIS is that it is more than a map, it is a map that can show us exactly what we want to see.

How has GIS become such an integral part of society almost seamlessly? Google, Garmin, and others were not creating products with "Hey, the mass public needs GIS" in mind, no, they were meeting needs. Humans think geographically. "Who, What, When, Where, Why, and How" those are the five W's right? Place is extremely important to people. When studying how human populations have acted over the past millennia it is easy to see how geography dictated culture. Today, place still dictates much of our lives: property values, crime rates, education standards, these can all be classified by place. It is interesting to see when a technology has become so ingrained in a society that people don't consider it when they use it, they just use it. Like with cell phones, cars, microwaves, etc. (that list could be very long).

Personally, as someone who loves maps and loves computers and works in the GIS field I think it is great that an eight-year-old has the ability to look-up their friends address and show their parents exactly where they are going, or for family members to be able to see pictures of those they love where they were taken, and so many more cool things that GIS allows us to do without thinking.

Kyle Stoner is a GIS professional from Texas. He operates GeoBuilder and can be reached at kyle.stoner@geobuilder.com

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**Article: GIS Today**

**Questions**

**Directions:**
- Read the article: GIS Today
- On your OWN paper, answer the following questions in complete sentences

**Questions:**

1. Do you think you use GIS?

2. In your own words, what is GIS?

3. How do you "add data" to a GIS data source?

4. What is the most prevalent GIS application?

5. What does the government use GIS for?

6. Why was GIS developed?
**What Is GIS?**
- Geographic Information Systems
- Computer-based technology for viewing and manipulating any type of data that can be referenced geographically (e.g., time and space)

**GPS to GIS**

**Why is this Important?**
- GIS is about finding patterns in data.
- Integrates data from a variety of sources.
- See patterns and trends that are invisible to the naked eye.
- Introduces the advantages of maps and databases.

**Examples of GIS**
- Car navigation systems
- Lace-based field GPS networks
- Weather forecasts
- Google Maps
- Google Earth
- 3D on Google "street view"
- ArcMap for GIS training
- GIS Application: Pizza Delivery
- Poly Model
- ArcGIS revenue

**What is Google Earth?**
- A global digital map that helps visualize the world
- Enables exploration and discovery of the world
- Provides a platform for education and research
- Supports environmental monitoring and conservation
- Facilitates global communication and collaboration

**CNMS Marine Mammal Monitoring Program**

**http://www.cnms.org/mammals**

- Sperm whale
- Geographic information system for marine mammals
- Data collection and analysis
- Conservation and management

**Cajamarca Project**

**http://www.cnms.org/cajamarca**

- Networked monitoring of marine mammals
- Data integration and analysis
- Environmental monitoring and conservation
- Community engagement and education

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Computers: Introduction to Google Earth

If needed: Download Google Earth: Going to this URL will allow you to download the latest version of Google Earth. http://earth.google.com/ - click on Download and follow the steps from there.

1. Open Google Earth and wait for it to load

2. Toolbar on Left of screen
   - At the upper left is the “Search” box.
   - Enter “980 Fremont St, Monterey, CA” into the text box.
   - Press Enter.
   - Scroll down to “Layers”.
   - Check the box for “Places”. After it loads, you should have an image near the address you just typed in.

   Where are you?
   (Describe where this address is, what type of place do you think you are at?)
   Hint: If you scroll over the marker it will tell you the name of the place.

3. Now the screen should look like the one to the right.
   - What happens when you press the “X”?

4. Enter “Point Lobos State Reserve” into the “Search” box and press Enter.
   - Located on the right hand side of the screen is a control panel that is hidden until you scroll your mouse over it (See image below).
   - If the control panel does not show up, go to View> Show Navigation and click “Automatically”.
   - Play with all three of the controls to learn what they do.

5. Turn on the Borders and Labels box (Check it) if it is not already checked
   - Zoom in and look around until you find “The Pit” and “Whalers Cove”.
   - Use the controls to change the viewpoint so that looks towards the South and is inclined enough so that you can see water on the other side of the Pt Lobos peninsula.
   - Your eye altitude (number shown at the far lower right) should be about 1000 or 3200 ft.
   - Note the dark translucent strip across the bottom of the screen. It shows information about what you are viewing in Google Earth.

6. Starting from the left it shows the date that the digital image was taken of that area.
   - Moving towards the center it shows the latitude, longitude, and elevation (respectively) of the location where your mouse is located.
   - On the far right is the eye altitude, i.e., the distance above sea level of an eye seeing the view.
   - Move the mouse around.
   - Which of the following numbers change as you move your mouse around? (Note: You may want to circle more than one)
     a. date of digital image
     b. latitude
     c. longitude
     d. elevation
     e. elevation of viewpoint

7. Locate the Search Box and enter your home address.
   - Zoom into your neighborhood so that the “Eye Alt” is between 60 to 1200 ft.
   (Remember: the “Eye Alt” is located in the lower right hand corner of the screen)
   - Position your mouse pointer over the address on the map and record the:
     Latitude: ____________________________
     Longitude: __________________________
     Elevation: __________________________

8. Locate the Search Box and enter your school address.
   (2323 North Moorpark Road, Thousand Oaks, CA 91360)
   - Zoom in so that your “Eye Alt” is between 600 to 1200 ft.
   - Position your mouse pointer over the address on the map and record the:
     Latitude: ____________________________
     Longitude: __________________________
     Elevation: __________________________

9. Repeat the steps above for the following locations. Use the suggested “Eye Alt” for maximum viewing.
   a. Pentagon; Eye alt 2400 – 4000 ft.
     Latitude: ____________________________
     Longitude: __________________________
     Elevation: __________________________

   b. Hoover Dam, Eye alt 2000-4000 ft.
     Latitude: ____________________________
     Longitude: __________________________
     Elevation: __________________________

10. Note the toolbar across the top of the screen:
    a. Scroll your mouse across them to read about what each of them do.
    b. Use the ruler to measure the distance from the Hoover Dam to the Las Vegas Strip
    Distance = __________________________
    (Be sure to use metric units.)
Using Google Earth to Display Geologic Landforms

Introduction:
One of the most useful tools to have been developed recently for an Earth scientist's arsenal of tools is Google Earth™. The folks at Google™ did their homework when they developed this neat, and quite often, addictive, application for viewing satellite images of Earth's entire surface from any altitude or angle. What's especially cool is that the program allows you to view landforms in three dimensions, giving the program an extra element of realism.

A feature that is particularly useful, especially to Earth science teachers, is the ability to create "tours" of any place on Earth you desire. Your goal in this project is to create a "tour" of a series of landforms of geologic interest. You will have to use Google Earth™ to find landforms that fit the topic of your project. You may also need to use the Internet or other references to find other locations of these landforms.

Project Requirements
You will select one of the types of landforms from your chosen index card. Using any references you choose, you will find five places on Earth that are excellent examples of the type of landform you have chosen. You would be wise to utilize both the Internet and references from the library to assist you in finding examples of the landforms you seek. Once you have selected the five locations, you must complete the following requirements.

1) Create a Google Earth™ tour using the detailed, illustrated instructions written by Mr. Eric Fermann of Eastchester High School. He has created an excellent guide that will assist you in the creation of your electronic tour. (See PPT handout & my website)

1) You will present your tour to the class using a combination of PPT and Google Earth, describing how each of the five locations in your tour demonstrates the type of landform you have chosen as your project topic.
   • Options: You can embed your tour into your PPT or, you can screen shot your tour into your PPT.

   • In your PPT include:
     • Title page
     • Overall background info - Type of landform and describe it... add a photo!
     • For EACH of your 5 Locations...
       • Include a description of where the landform is located in the world, including where it is found (including latitude & longitude, elevation)
       • Include screen shot from Google Earth Tour of your landform (above shot AND sideways eye view shot)
       • Include: Diagrams / video clips / photos of landform
       • What feature is at that location?
       • Why that landform feature is an example of your project topic?
       • Include two interesting facts about that landform.

• Set the timing of your presentation so that each location on the PPT tour has at least one minute for you to describe it to the class (5 - 8 minutes total).

• Once your tour and PPT is completed:
  • Title your Tour and PPT with your Landform name, Group #, and Period
  • Save your tour as a .kmz file and send it to my Google Docs account
    (hfarrall@sojeniousd.org)
  • Save and send your PPT to my Google Docs Acct. with your Landform name, Group #, and Period (hfarrall@sojeniousd.org)

• When ALL DONE...
  • Show your teacher the completed Google Earth Tour (for credit)
  • Double check you emailed your teacher your Tour AND PPT
  • You will sign up for a presentation time slot to present your PPT Slide Tour

Remember: Thoroughness and accuracy are your two most important objectives in this portion of the project!

PPT Rules to remember:
• Bullet points on each slide, NO paragraphs
• Check your spelling!
• Keep the background of each slide simple and not too busy
• Include a graphic of some sort on EACH page!
• Minimum of 12 slides (one title page, one background info, 2 per landform), Maximum of 20 slides

Presentation skills to remember:
✓ Know who is reading what
✓ Have note cards prepared for what you are responsible for, you should NOT be reading directly from the slide (NEVER turn you back on your audience)
✓ READ your slides BEFORE you present
✓ Know how to pronounce any words on your slides
✓ Be able to answer questions on your landform.
✓ Make sure any video clips are short, appropriate, and relevant

NOTES:
• ALL Project info and tutorials are located on my website under the "Projects" Tab
• How to Screen Shot for PC's:
  - Click "Control and Print Screen"
  - Open up PAINT
  - Click "Control V" to paste into Paint
  - Edit screen shot from there, you can select using Control X or the CUT feature, etc...

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Google Earth Workshop

1. Making a folder
At the top of the page, under Add, go to Folder Ctrl+Shift+N
Name your folder and click OK and it will be saved to “My Places”. Click on the folder to highlight it and make a placemark to go into the folder.

2. Placemarks
Go to the location and get the exact view that you want to show. Either under Add or on directly the toolbar, add the...

Now you can add a description of the location. The default placemark will be a yellow push pin. If you want something else, click the pushpin in the upper right hand corner and you will have many choices. If your new folder was highlighted when you made your placemark, the placemark will show up just below the folder in my places. Don’t worry, you can always drag it to the folder later.

3. Adding an image to the Placemark
You can find an image on the Web, copy the URL and place that image into the placemark. Click the Add Image button, and Don’t forget to click OK at the bottom.

4. Adding your own image to the Placemark You can upload your pictures to a photo site such as Picassa or Flickr, and paste in the resulting URL.

5. Ruler tool The ruler tool can determine the distance of a straight path, or a path of your choosing.

6. Profile You can place a permanent path and save it. Then right click on the path and choose Show Elevation Profile.

7. Adding a link to a Place mark. Same as adding an image, but use Add Link.

8. Touring
Once you have a number of placemarks in your folder, you may make a tour. Highlight the folder and you will see a folder button appear in the lower right hand corner of My Places. When you click it, you will be touring the sites, using the control bar that shows up on the Google Earth window.

9. **Saving a file** - Right click on the file folder, and choose *Save Place As*. Alternatively, you can find the command under the FILE menu. The resulting .kmz file can be stored and shared. When it is opened, it immediately opens Google Earth and places the folder into Temporary Places.

10. **Saving an Image** - You may save any image by choosing the File Menu and Save, and then click on *Save Image*. It will be saved as a .jpg image that you can place anywhere on your computer.

11. **Topographic Maps** - the National Geographic topographic map overlays, which can be downloaded from [http://www.gelib.com/ng-topo.htm](http://www.gelib.com/ng-topo.htm) are seamless and change scale as you zoom in. The USGS Topographic Maps found at [http://www.gelib.com/usgs-topographic-maps-2.htm](http://www.gelib.com/usgs-topographic-maps-2.htm) are a series of 7 ½ minute Topographic maps complete with legends. They can be saved individually to My Places.

12. **Adding an overlay** - You can add your own overlay, best stored at an online site, by *Add > Image Overlay*, or using the overlay button. You must then move the overlay to fit the Google Earth image and pulling, pushing and rotating it with the green corners that can be seen when you are in the Properties mode. Also, when viewing in Properties, you can adjust the transparency of the overlay.

13. **Historical** - You can look at 15-20 years of satellite images of any location by *View > Historical Imagery*.

14. **3D Buildings** - Only one of many wonderful features found under layers.

15. **Sky, Moon and Mars** - These can be found at *View > Explore > Earth, Sky, Mars and Moon*

**Resources**


National Geographic Topographic Maps [http://www.gelib.com/ng-topo.htm](http://www.gelib.com/ng-topo.htm)

Honors Geology Website: [http://www.hwscience.com/Geology/Honors/index.html](http://www.hwscience.com/Geology/Honors/index.html)
**Shield Volcanoes**

- Gently slopes downwards
- Looks like a Hawaiian warrior's shield
- Composed of thousands of fluid lava flows that spread great distances
- Are the tallest volcanoes in the world
- A volcanic landform
- Can be produced by hot spots
- Can also occur along the mid-oceanic ridge

---

**Background info**

- Southern Hemisphere's largest extinct shield volcano
- Now eroded down to half its original height
- Its last eruption was 25 million years ago
- 265.37° E, 150.176° W
- 3,792 elevation
- When eruptions stopped, the volcano had risen to 2 km above the sea
- Last eruption was 20 million years ago
- Largest crater in southern hemisphere

---

**Mauna loa, Hawaii**

- Its in the south central part of the island of Hawaii
- The world's largest and one of its most active volcanoes
- Erupted 33 times since its first well-documented historical eruption in 1803
- Most recent eruption was in 1984
- Its lava flows have reached the sea.
- 19.479° N, 155.603° W
- 13,680 elevation

---

**Mount Warning, Australia**

- Estimated at about 0.5 million years old
- Most recent eruption in 1982 and 1983 A.D.
- Likely to erupt again in the next 100 years
- 80% of Mount Warning's surface has been covered in lava flows
- Third active volcano in Hawaii
- 1982 eruption caused possibly by movement
- 32.29° N, 155.87° W
- 627 feet is the elevation

---

**Heart Peaks, Canada**

- It is the third largest center in the northern Cordillera
- Last eruption was during ice ages
- 55.67°N, 131.97°W
- 5000 ft elevation
- Volcano consists of maif cic lava flows with a thickness up to 430 m
- Last eruption was 10000 years ago

---

**Hualalai, Hawaii**

- Estimated at about 100,000 years old
- Most recent eruption in 1800 and 1801 A.D.
- Likely to erupt again in the next 100 years
- Over 60% of Hualalai's surface has been covered in lava flows
- Third active volcano in Hawaii
- 1982 eruption caused possibly by movement
- 19.68° N, 155.67° W
- 6271 feet is the elevation
Newberry Volcano, Oregon

- Elevation is 7,985 feet
- 40 miles east of the Cascade Range
- Large potentially active
- Last eruption was 950 AD
- 309 square miles
- 7,985 feet is the elevation
- 43.6892° N, 121.35° W

Two Interesting Facts

- Shield volcanoes are big volcanoes that are built almost entirely of fluid lava, and is produced by gas from the earth's core.
- In northern California and Oregon, many shield volcanoes have diameters of three or four miles and heights of 1,500 to 2,000 feet.

Shield Volcano Video

http://www.youtube.com/watch?v=bruk6Ys68F4
What is Geo-Caching?

History of GeoCaching

On May 2, 2000, at approximately midnight, eastern savings time, the great blue switch controlling selective availability was pressed. Twenty-four satellites around the globe processed their new orders, and instantly the accuracy of GPS technology improved tenfold. Tens of thousands of GPS receivers around the world had an instant upgrade.

The announcement a day before came as a welcome surprise to everyone who worked with GPS technology. The government had planned to remove selective availability - but had until 2005 to do so. Now, said the White House, anyone could "precisely pinpoint their location or the location of items left behind for later recovery." How right they were.

For GPS enthusiasts, this was definitely a cause for celebration. Internet newsgroups suddenly teemed with ideas about how the technology could be used.

On May 3, one such enthusiast, Dave Ulmer, a computer consultant, wanted to test the accuracy by hiding a navigational target in the woods. He called the idea the "Great American GPS Stash Hunt" and posted it on an internet GPS users' group. The idea was simple: Hide a container out in the woods and note the coordinates with a GPS unit.

The finder would then have to locate the container with only the use of his or her GPS receiver. The rules for the finder were simple: "Take one item, leave one item." He set up the very first GeoCache in Portland, Oregon and the game took off around the world...

Overview

Geocaching is an entertaining game of exploration and discovery that allows GPS receiver users to search for "caches," or hidden objects, that have been placed somewhere on Earth. Caches have been set up all over the world by thousands of people in thousands of places. Locations of the caches are cataloged online at www.geocaching.com. To search for a cache, a user would first find a listing of locations online, input the latitude and longitude coordinates as a "waypoint" into his or her GPS receiver, and then use the receiver to find the cache. The cache is generally a container in which small items are hidden. Once found, a cache may provide the visitor with a wide array of rewards, including trinkets, messages, or other surprises. The geocacher can then physically log his or her visit and, if desired, take a trinket from the cache and leave one in its place. Geocachers may also report and log their visit to the cache online.

"The Earth is effectively a sphere, so how do we describe where a point is on its surface?" -National Atlas of the United States of America

Location, location, location. In order to make use of a GeoCache, you must know where it is. The location of a GeoCache is given in terms of longitude and latitude. It is important for gamers to understand the coordinate system that describes the position of any point on Earth's surface.

How is the game played?

At its simplest level, geocaching requires these 8 steps:

1. Register for a free Basic Membership at www.geocaching.com
2. Visit the "Hide & Seek a Cache" page.
3. Enter your zip code and click "search."
4. Choose any geocache from the list and click on its name.
5. Enter the coordinates of the geocache into your GPS Device.
6. Use your GPS device to assist you in finding the hidden geocache.
7. Sign the logbook and return the geocache to its original location.
8. Share your geocaching stories and photos online.

What is a Cache?

Geocaches vary greatly in size and appearance. In the field you will see everything from large, clear plastic containers to film canisters to a fake rock with a secret compartment. So, how do you find the cache?

Once you know the cache's latitude and longitude, you need to get a general idea of the cache's size. The size is shown on each cache page. In its simplest form, a cache always contains a logbook for you to log your find. Larger caches may contain a logbook and any number of items. These items turn the adventure into a true treasure hunt. You never know what the cache owner or visitors to the cache may leave for you to enjoy.

Remember, if you take something, leave something of equal or greater value behind. It is recommended that items in a cache be individually packaged in a clear, zipped plastic bag to protect them from the elements.

When you are finished, put the cache back exactly as you found it, even if you think you see a better spot for it. Finally, visit the cache page to log your find and share your experience with others. Reminder: NEVER move a cache from its original location!

Analysis Questions:

1. a. What event sparked the creation of GeoCaching?
   b. Why was this event relevant and so important?
2. Where was the very first GeoCache located?
3. In your own words, what is GeoCaching?
4. What must gamers understand about the Earth in order to play the game?
5. What are the first two things you need to know about a cache in order to find it?
6. When you find a cache what do you do?
7. What should you never do to a cache?
What is GeoCaching?

- The word geocache (GNSS-cache) comes from two words:
  - "Geo" is the Greek "Geo", meaning "Earth".
  - "Cache", which is a safe place for hiding or storing something.
  - It can also be thrilling, which is hidden.

- Outdoor adventure game for GPS users of all ages.

- The basic idea is to use a cache (hidden containers) and share the locations (latitude/longitude) of these caches on the Internet.

- GPS users can then use the coordinates to find the caches.

- The visitor may take something from the cache, leave something, and/or sign the logbook.

- The "Find" is then logged on the Internet website where statistics about found and hidden caches are maintained.

Video: What is GeoCaching?

- What is GeoCaching (1:52)
- [http://youtu.be/C-qxYV9kx4k](http://youtu.be/C-qxYV9kx4k)

Worldwide Geocaches

GeoCache Containers

- Usually a weather-resistant container such as Tupperware, Rubbermaid, or surplus ammo box, NO GLASS!

What's in it?

- Logbook
- Trinkets to trade
- Extra maps, books, software, hardware, CDs, videos, pictures, coins, tools, games, etc.
- Information sheet that explains the container and geocaching, as well as contact information.
- Disposable camera (optional)

What do you need?

- Tools:
  - Coordinates from GeoCache website
  - GPS Receiver (or cell phone app)
  - Compass

- Optional:
  - Food
  - Water
  - Cache supplies
What's the point?

Geocaching can be thought of in three parts:

- The journey to reach the cache area.
- The challenge of actually finding the cache container.
- The fun of creating and interesting or clever geocache for others to find.

Both can be equally rewarding.

On my website – extra credit...

- Geocaching - Exploring the Santa Monica Mountains
  - Go to: [www.geocaching.com/santa-monica-mountains](http://www.geocaching.com/santa-monica-mountains)
  - You will need to create a Geocach Account (it's free)

- When hiding, follow all rules and regulations of the NPS & make sure you have your parents' permission
  - **You will need a GPS or an app for GPS on a smartphone (if you have an iPhone - download the 'Locater' app, it's free)

- To get credit:
  - Do the hike & take pictures for proof
  - When finished, take the quiz on website above & print out certificate
Geocaching is the real-world treasure hunt that's happening right now, all around you. There are 2,291,802 active geocaches and over 6 million geocachers worldwide. Learn more about geocaching and how you can join the adventure.
### Geocaching on Campus

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Computers: GPS – Where in the world are you?

Directions:
- Go to: http://www.ideallearningmedia.org/asset/at0/10_int_gps/
- Read the intro page, then click the "Next" green arrow in the bottom right corner.

1. What does GPS stand for?

2. What is the minimum number of GPS satellites orbiting the planet at any one time?

3. Explain why there are so many GPS satellites and how it affects the GPS receiver.

4. List and describe the 3 types of information continuously broadcasted from each GPS satellite.

5. What does the PRN code tell the GPS receiver?

6. How many GPS Satellite signals does your receiver need in order to determine your location?

7. What enables the GPS receiver to determine the amount of time it took for the signal to travel from the satellite to the receiver?

Interactive
- 8. On the interactive, what was the difference in timing for satellite #1?

NEXT
- 9. What is the speed of light?

10. In reality, what must GPS receivers factor into their radio signal speed?

Interactive
- 11. Write your math problem here (w/ units).

12. How far away is satellite #1?

NEXT
- 13. Does the GPS receiver know where you are now?

NEXT Interactive
- 14. On the interactive, what was the difference in timing for satellite #2?

NEXT
- 15. Write your math problem here (w/ units).

NEXT
- 16. How far away is satellite #2?

NEXT
- 17. Does the GPS receiver know where you are now?

NEXT
- 18. How far away is satellite #3?

NEXT
- 19. Describe how the data from the 3 satellites now pinpoints your location?

NEXT
- 20. What is one thing that can greatly affect the accuracy of a GPS?

NEXT
- 21. What is needed for a GPS receiver to reset its clock?

NEXT
- 22. Now that you have been found, how far off can the GPS be in meters?

The End – Welcome back to civilization!
Review Guide: Mapping Unit

Directions:
- Use all the information given to you in this mapping unit to answer the following questions...

Questions:
1. Define: Latitude
2. Define: Longitude
3. What is the name of the line at 0° latitude?
4. What is the name of the line at 0° longitude?
5. What happens to the images on the globe when they are transferred to a flat surface?
6. Why are there so many different types of maps?
7. How many total 1 degree latitude lines can fit on a globe?
8. How many total 1 degree longitude lines can fit on a globe?
9. Know how to read Lat/Long points on a map...
   (Practice on page 31 of your textbook – Q’s 4-7)
10. What is a Topographic Map?
11. On a topographic map, how can you tell the difference between steep slopes and flat areas?
12. On a Topographic map, what is the rule of “V”s”?
13. What is a Contour line?
14. What is a Contour Interval?
15. Know how to translate a topographic map into a profile view...
   (you can practice here: http://www.tasagraphicsarts.com/activities/profile.html)
16. On a topographic map, how is a depression noted?
17. A map with a scale of 1:2000 means what?
18. Lab: Lake Nyos – What happened to the town and why did it happen?
19. What is GPS?
20. How does a GPS work?
21. If I wanted to know Lat/Long and Altitude of a location how many satellites would I need?
22. What am I given for only a 2D location on a GPS?
23. What geometrical concept did we use to find a location using GPS systems?
24. Describe GIS. What is it?
25. What are some sources of interference for GPS signals? (list at least 3)
26. What is GeoCaching?
27. What do the terms “Geo” and “Cache” mean?
28. What two things do you need to know about a cache before you go looking for it?
Shield Volcano

Part 1: Making the Profile

1. Find Mauna Loa, the main volcano of the island of Hawaii. Go to the big island and find the caldera at 19°27' N and 155°35' W.
2. Use the ruler tool to draw a line from one end of the island to the other passing directly over the caldera. Save it as Mauna Loa. Open the line up and right-click on it. You will find the option of Show Elevation Profile.
3. Go to the Edit Menu at the top of the page and choose Copy Image. Insert that image into this document (Ctrl+V).

Part 2: Calculations

1. Choose one side of the volcano, and calculate the slope in ft/mile.
   a. Start __________ miles __________ feet
   b. End __________ miles __________ feet
   c. Distance = __________ miles __________ feet
   d. Elevation change = __________ ft
   e. Slope = __________ ft/mile

Cinder (Scoria) Cone: Go to Amboy, CA. Just southwest of the little town, you can find a distinct cinder cone, called Amboy Crater. Amboy Crater is in the Eastern Mojave Desert. The area lies on the adjacent Basin and Range Plateau. This region is responsible for the volcanism of the area.

Part 1: Make and insert the profile, using the directions above.

Part 2: Calculations. Show the same data and calculations as above, except that you are going to have to change the distance from feet to miles in order to calculate the slope.

-slope in ft/mile, ________________

Composite Volcano

Choose a composite volcano to measure (not Mount Saint Helens). Make sure that you have chosen one that has a typical shape which has not been greatly altered by erosion.

Name of Volcano = ________________
Location of Volcano = ________________

Part 1: Make and insert the profile, using the directions above.

Part 2: Calculations

Data and calculations

1. slope in ft/mile, ________________

Analysis

Compare the sizes and slopes of the three volcanoes.
For each of the volcanoes, answer the following questions:
1. What process is responsible for the formation of the magma that created the volcano?
2. What is the origin of the magma (melted, solid, or intermediate) that created the volcano?
3. What evidence did you have on Google Earth for the above answer?
4. How does the genesis and composition of the lava affect the size and slope of the volcano?
5. Will you expect the volcano to be hazardous to local inhabitants? Why?

Research

Research the history of the composite volcano that you chose. Has it erupted recently? Does it have any interesting history? What is the plate boundary that is responsible for its formation? Write 1-2 paragraphs about the volcano. Please use your own words.
Earthquakes & Tsunamis

Student Instructions

December 26, 2004 is a date that we will long remember, for this was the day that a massive tsunami devastated coastlines along the Indian Ocean. These tsunami waves, which hit Indonesia, Thailand, India, Sri Lanka, and the east coast of Africa, were triggered when the largest earthquake in 40 years hit Indonesia. This magnitude 9.0 earthquake led to a sequence of 15 quakes across the Andaman region. According to Incorporated Research Institutions for Seismology (IRIS), roughly 1200 km of plate boundary slipped in this event, leading to a displacement along the fault plane of approximately 15 m. An unthinkable 283,106 people were killed by this earthquake and tsunami that occurred on the west coast of Northern Sumatra (USGS).

A tsunami is a series of waves that can be generated by any disturbance that displaces a large mass of water. Earthquakes have been the cause of 83% of the tsunami in the Pacific Ocean (NOAA). While science does not yet allow us to predict earthquakes, modern technology could make it possible to give several hours of notice of the potential tsunami. Such a system of warnings is in place across the Pacific Ocean but not in the Indian Ocean. Until recent events, regions in the Indian Ocean have been home to far less seismic activity than Pacific regions.

Earthquakes occur when tectonic plates collide at their boundaries. In the case of this major 2004 earthquake, thrust-faulting on the interface of the India plate and the Burma plate released elastic strains that had been building up for centuries from ongoing subduction of the India plate beneath the Burma plate. With respect to the interior of the Eurasia plate, the India and Australian plates move toward the northeast at a rate of approximately six centimeters per year (USGS).

Scientists must have seismic data from at least three different locations in order to locate the epicenter of an earthquake. Early earthquake detection and busy sensor data, if available, can be used to provide early warning to areas in danger. Not every earthquake triggers a tsunami, but major quakes that displace large quantities of water often have that end result.

In this activity, you will use data from three different seismograph stations to locate the epicenter of the earthquake that triggered the devastating 2004 tsunami. You will then explore the effects of the resulting tsunami.

Latest revision:
This lesson will use My World software to locate the epicenter of the 9.0 M earthquake that shook the Indian Ocean on December 26, 2004. You will use a graph of distance in arrival time to S-waves and S-waves to three different seismograph stations. This will allow you to determine the distance of each station from the epicenter. With this information, you will construct appropriately-sized buffer zones around each of the stations. The point where all three buffer zones intersect marks the location of the epicenter. You will then compare your measurements to those released by the United States Geological Survey.

Next you will analyze population density in the region, locate areas of extensive post-tsunami flooding, and estimate average tsunami velocities by measuring distances between points and dividing these distances by wave travel time. Finally, you will review the locations of working warning centers and ocean telemeters and make evaluations about further global needs for early detection and warning systems.

Author: Debbie Defalquy. Published: August 2006

Part I: Using My World to Locate an Epicenter

Opening My World and Existing Project File:

- Launch My World by double clicking on the My World icon.

- My World opens in "Construct Mode" and has three main parts: Data Libraries on the left, a Layer List in the middle, and the Map on the right-hand side.

- To open and existing My World project, select Open Project from the File pull down menu. Navigate to the file named quake_tsunami.m3za and select Open.

- After the project loads, notice that the "Visualize" tab is now active. In the initial view of the project, you should see a map of the continents with the countries outlined. The 130 red icons on the map represent the IRIS Global Seismic Network. Data from these seismographic stations is used to track global seismic activity.

- Practice Checking and Unchecking the Global Seismic Network in the Layer List to see how you can turn a layer Off and On.

- Select the Zoom In tool from the toolbar. Construct a box around the Indian Ocean to zoom into by clicking in the upper left region and dragging the cursor down to the right. When you release the mouse button, you will be zoomed into the region we are studying. If you make a mistake, click on the Zoom Out All button on the toolbar and start over.

Making Selections and Creating New Layers:

- Click on the Analyze tab and choose Select By Value. Select records from Global Seismic Network whose Station Is "PALK". Check the box next to "Make Selection a New Layer" and type "PALK Station" in the Result Name field. Click OK. If desired, the icon appearance can be changed by double clicking on the icon and making selections from the menu that opens.

- Repeat this process to select the BMN and ABWA stations, making each of these selections a new layer with an appropriate name.

Author: Debbie Defalquy. Published: August 2006

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Locating the Epicenter of an Earthquake

To locate the epicenter of an earthquake, scientists analyze seismograms, such as this one, from at least three different seismograph stations.

The patterns marked by the seismic waves allow scientists to measure the difference in arrival times between the faster P-waves (primary, longitudinal waves) and the slower S-waves (secondary, transverse waves). This data can be used in conjunction with a chart or graph to determine the distance of the seismograph from the epicenter of the earthquake, the approximate magnitude of the earthquake, and the amplitude of the strongest wave.

In this exercise, we are going to focus on the location of the epicenter. The greater the difference in arrival times of P- and S-waves, the further the station is from the epicenter.

In December 2004, seismograms such as the one shown at left were analyzed to determine the following differences in arrival times of P- and S-waves. Use the graph below to fill in the following chart on your student answer sheet.

If the distance from the seismograph to the epicenter is known for at least three stations, triangulation allows scientists to determine the location where all three data sets intersect. In the example at right, buffer zones are drawn around three cities. If the distance of the epicenter from Detroit is 1200 km, then a circle can be drawn around the city representing all possible locations; the epicenter must lie along one of the points on the circle with a radius of 1200 km. If data from a second city is accounted for, then the circles will likely intersect in two locations, narrowing the search from an infinite number of points down to two possible points on the map. From the example, one can see that the outer edges of three “buffer zones” will only intersect at a single point: the location of the earthquake’s epicenter.

Table 1: Seismic Data from Three Seismic Stations for Sumatra Quake (December 26, 2004)

<table>
<thead>
<tr>
<th>Seismic Station</th>
<th>Difference in P and S Wave Arrival Times</th>
<th>Distance to Epicenter (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PALK</td>
<td>3 min. 3 sec.</td>
<td></td>
</tr>
<tr>
<td>ENH</td>
<td>4 min. 55 sec.</td>
<td></td>
</tr>
<tr>
<td>MBWA</td>
<td>5 min. 23 sec.</td>
<td></td>
</tr>
</tbody>
</table>

Data in the above table was provided by the National Earthquake Information Center (NEIC), a branch of the United States Geological Survey (USGS).
Now we will use the tools available in My World to locate the epicenter of the earthquake.

- Click on the Analyze tab and highlight "Make Buffer Around..." Create Buffer For: PALX. Change the units to kilometers, and then enter the distance you determined by reading the graph above. (NOTE: If you enter the number first and then change the units to kilometers, then the program will actually perform the unit conversion. Therefore, make sure you select the correct units (kilometers) before entering the numerical values.) Leave the default choice, Don't Dissolve Buffers, selected. Fill in the Result Name field with the words 'PALX Buffer' and click OK.

- If the buffer zone appears filled in with a solid color, then double click on the icon in the left column and change the Transparency to 100% and select Apply when the pop-up menu appears.

- Repeat this process of creating buffer zones for the ESNM and MBWA Stations as well. If you measured carefully and correctly, then all three buffer zones should intersect at a single point.

- Select the Zoom In Tool and zoom in to the point of intersection.

- Select the Pointer Tool and hover your pointer over the point of intersection of all three buffer zones. At the bottom of your window, observe the Cursor Location. These points represent the latitude and longitude of the location of your Pointer Tool in decimal degrees. Record your measured epicenter location on your answer sheet.

- Turn in the epicenter layer by checking the box next to it. This represents the actual epicenter, as measured and recorded by the United States Geological Survey.

- Select the Measurement Tool. Click on your measured epicenter and drag the cursor until it is hovering over the center of the actual epicenter. If needed, Zoom In further. Record the Segment Length, which is listed at the bottom of the screen. Record this value.

- Select the Get Information Tool. A box pops up that reads: "Get Information for Layer..." From the pull down menu, select epicenter and click OK. Using the information tool, click on the blue star that represents the actual epicenter of the earthquake. Record the information from this table onto your answer sheet.

- Zoom Out to the Indian Ocean. With the epicenter layer still checked, select the Link Tool.

- A flag should pop up at the epicenter icon. This means that this layer contains hyperlinks. Click on the flag and select the links one at a time. These links are both animations that require that you have Quick Time on your computer. If you need to download this program, go to http://nctr.msw.usgs.gov/indo_1994.html After viewing these animations, respond to the corresponding question on your answer sheet.

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**Part II: Exploring Tsunami in My World**

**Locate Affected Regions**

- Turn off all layers except for Countries and epicenter. Use the Zoom In Tool to zoom back into the affected region.

- Turn on Countries with Demographic Trends. Under the name of this layer, there is an "L" in a box. Click this box. A legend should appear at the bottom of the map.

- Select the Get Information Tool. Select Get Information for Layer: Countries w/ Demographic Trends from the pull down menu and click OK. Now when you click on a country, the name and information stored for that country will pop up in a table form. Use the information tool as needed to answer the questions below. Record your answers on your answer sheet.
  - Which is the most heavily populated country with an Indian Ocean coastline?
  - What is the population of this country?
  - What country is located closest to the epicenter of the earthquake that caused the tsunami waves?
  - What is the population of this country?
  - A tsunami is a series of high energy waves that travel outward circumstantially in all directions from the source. Based on this information, list the countries that were most likely to be affected by tsunami waves emanating from this epicenter.

- For further perspective, click on the Link Tool to view a photograph from Sri Lanka and two photographs taken in Indonesia, one of which is a satellite image.

- Turn off Countries with Demographic Trends. Turn on the layer named World Cities. Make sure that the legend is showing at the bottom of the map.
• Turn on the layers named Rivers and '4 World Shaded Relief'.

• Click on the Analyze Tab. Under By Spatial Relationship, select By Distance. Select Records From World Cities That Are Less Than 2000 kilometers From Records In epicenter. Make Selection. A new layer titled Major Cities < 2000 km from epicenter. Click OK.

• Change the symbol for your new layer into something that stands out, such as black dots.

In the Visualize view, highlight the layer you just created. Click the icon above that looks like a data table. This pulls up all records in this layer. How many major cities are located within 2000 km of the epicenter?

• Click on the Population column in order to sort this column in descending order, so that the greatest populations are on top. What is the name of the city in this layer with the greatest population? What is the population? What other factors besides horizontal distance from the epicenter affected the threat posed by the tsunami waves to selected cities? Record your answers on your answer sheet.

• Turn on the Affected Coastal layer and observe how these locations compare to your conclusions about the areas hardest hit by this tsunami.

**Calculating Tsunami Speeds**

Tsunami can travel at speeds far greater than wind-driven waves because they have a much longer wavelength. To get an overall sense of how quickly this tsunami was traveling, we will compute crude average velocities over several large stretches of ocean.

• Turn on Arrival of first wave. You will use this image and the measurement tool to determine the average speed of the first tsunami wave. First, use this image to approximate the number of hours that it took for the first tsunami wave to reach each of the locations listed below. Enter this information into the table provided. If necessary, use the Identify Tool to create a Selection in order to locate each area.

• From the Edit pull down menu, select Preferences. Under My World Measurement Units, select Miles and click OK.

Select the Measurement Tool icon and measure the rough distances between the epicenter and the locations listed in the table that follows.

After recording the measurements onto your answer sheet, divide each distance by time to calculate the average speeds of the tsunami waves over various stretches of ocean. Note that the wave moves at different speeds depending on factors such as wavelength and ocean depth; however, we are simply interested in getting a general idea of how fast tsunami travel across the open ocean.

<table>
<thead>
<tr>
<th>Approximate Location</th>
<th>Distance from epicenter (miles)</th>
<th>Time between earthquake and arrival of first wave (hours)</th>
<th>Average Speed (miles/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East coast of Sri Lanka</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NW tip of Australia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horn of Somalia (NE coast)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East coast of Madagascar</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Arrival time data above is from the National Oceanographic & Atmospheric Administration (NOAA).

**Observing Relationships between Bathymetry and Tsunami Wave Height:**

Tsunami wave heights vary greatly with the bathymetry of the ocean floor and distance from the source. For example, when a tsunami wave approaches shallow water it begins to "feel bottom" and therefore it slows down and piles up.

• Turn off Arrival of first wave and turn on Max wave height. You may notice that the waves did not just propagate from a point, but instead it occurred along long fault line. Turn on Plate boundaries and observe the relationship between this layer and the Max wave height layer.

• In order to compare bathymetry to wave height, open two smaller windows, called Child Windows that can be compared side-by-side. Make sure that you are zoomed all the way into the Max wave height layer. From the Windows pull-down menu, select New Child Window.

• While this child window is still open, turn off the Max wave height layer and open a second child window of the ocean floor bathymetry (4 World Shaded Relief layer).

• Shrink each child window so that they can both be viewed simultaneously. Notice the vertical stretches of shallow water in the Indian Ocean. Click along different points of these shallow areas and see how that compares to the changing wave height. Look for anomalies in the Max wave height layer and search for connections to the depth of the ocean at these locations.

Author: Debbie Delaney

Revised: August 2006

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Implementing Early Detection and Warning Systems:

Until the 2004 tsunami, a major event of this sort had not occurred in the Indian Ocean in over 60 years. Unfortunately, there is no early detection system in place in the Indian Ocean, but there have been six tsunami monitoring stations in the Atlantic for over forty years now. Tsunameters are buoy stations and bottom pressure recorders that detect tsunamis and make use of two-way satellite communication (see figure at left, provided by NOAA). Prior to this technology, scientists were forced to rely solely on seismic information and coastal tide gauge measurements to predict possible tsunamis. While these are valuable forms of indirect measurement, this data is often too late or is simply problematic because it is subject to interpretation.

After recent devastating events in the Indian Ocean, the US government funded the expansion of original network of six Atlantic tsunameters into fifteen buoy stations, ten in the Pacific and five in the Atlantic and Caribbean. With continued funding and international support, this network could be expanded even further. Not only would these direct tsunamis measurements allow for affected coasts to be warned and evacuated, it would also help the Tsunami Warning Centers to avoid false alarms which are costly and decrease public confidence in warning systems.

- In the Visualize mode, turn off Rivers, World Cities and 4 World Shaded Relief.
- Turn on Tsunameters and warning centers. With tsunameters highlighted, click on Zoom to Selected Layer.
- Click on the Link Tool and a link should appear at each of the fifteen tsunami buoys and at each of the three warning center locations.
- Click on the links for at least two of the tsunameters and record the real-time data on your answer sheet.
- Click on the warning centers in Hawaii and Alaska to visit the home pages of each of the tsunami warning centers. Then click on the warning center link in Seattle Washington to visit the site of the Pacific Marine Environmental Laboratory.
  - What does DART stand for?
  - Click on the 'Background' link. What is the purpose of DART?
  - Hit the back button and then click on the 'Mooring System' link. Click on the link to view the animation. Explain how data travels from its source to the local warning centers.
- Close My World. Do not save changes to project.

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Part III: Tsunami Extension Activities

1. Visit this site: http://www.twc.noaa.gov/ For fun, click on, "Experience a Virtual Earthquake." Next select, "Click HERE for current tsunami information!" Select the National Weather Service Tsunami Brochure. Follow the link to find out what you should do in the event of a tsunami. Record your answers in the space provided on your answer sheet.

2. Visit this site: http://nctr.odl.noaa.gov/indo_1204.html Explore the available global scale maps on maximum wave heights, observed arrival times and etc. Record any interesting observations on your answer sheet.

3. Visit the site http://earthguide.ucsd.edu/tsunam/tsunami/index.html to read more about tsunami. Describe how tsunami are detected in the Pacific Ocean by tsunameters made up of bottom pressure sensors and buoys. Specifically, what is it that the tsunami meters measure as a means of “tsunami detection.” Record your answer on the worksheet provided.

4. Research the plans for future expansion of the existing tsunami warning system. Do you feel that developing a global tsunami warning system is a valuable use of public funds? Justify your answer. If you answered yes, then where should the next tsunami meters be placed and why? Should the US run this project alone, or should some type of global agreement be set up? Explain.

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Author: Debbie Defranco

Revised: August 2006
Part I: Exploring Tsunami in My World

1. Name the most heavily populated country with an Indian Ocean Coastline?
   - What is the population of this country?

2. What country is closest to the epicenter of the earthquake that caused the tsunami waves?
   - What is the population of this country?

3. A tsunami is a series of high energy waves that travel outward circuitously in all directions from the source. Based on this information, list the countries that were most likely to be affected by tsunami waves emanating from this epicenter.

   

Questions about affected cities:

4. How many major cities are located within 2000 km of the epicenter?

5. What is the name of the city in this layer with the greatest population?
   - What is the population?

6. What other factors besides horizontal distance from the epicenter affected the threat posed by the tsunami waves to selected cities?

   

Calculating average speeds of tsunami waves:

1. Use the measure tool and complete the table below.

<table>
<thead>
<tr>
<th>Approximate Location</th>
<th>Distance from epicenter (miles)</th>
<th>Time between earthquake and arrival of first waves (hours)</th>
<th>Average Speed (miles/hr)</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<td></td>
</tr>
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Part III: Tsunami Extension Activities:

1. Visit this site: [http://tektite.ucsd.edu/](http://tektite.ucsd.edu/) For fun, click on, "Experience a Virtual Earthquake." Next select, "Click HERE for current tsunami information." Select the National Weather Service Tsunami Brochure. Follow the link to find out what you should do in the event of a tsunami. Record your answer in the space below.

2. Visit this site: [http://oaic-pmel.noaa.gov/indo_1204.html](http://oaic-pmel.noaa.gov/indo_1204.html) Explore the global scale map of maximum wave heights, observed arrival times and etc. Record any interesting observations here.

3. Visit the site [http://earthquakes.ucsd.edu/taunami/tour.html](http://earthquakes.ucsd.edu/taunami/tour.html) to read more about tsunami. Describe how tsunami are detected in the Pacific Ocean by buoys. Specifically, what is it that the buoys measure as a means of "tsunami detection?"

4. Research the plans for future expansion to the existing tsunami warning system. Do you feel that developing a global tsunami warning system is a valuable use of public funds? Justify your answer. If you answered yes, then where should the next buoys be placed and why? Should the US run this project alone, or should some type of global agreement be set up? Explain.
| **District:** | Las Virgenes Unified School District |
| **School:** | Lindero Canyon Middle School |
| **Participant(s):** | Robin Paul |

| **Lesson Plan Title:** | Intergalactic Mail: A Journey through Our Solar System |
| **Lesson Plan Grade Levels:** | 7, 8, 5, 6, 10, 12, 11, 9 |
| **Lesson Plan Subject Areas:** | Language Arts/Reading (SAGE Category), Science (AMGEN Category), Visual Arts |
Intergalactic Mail: A Journey through Our Solar System

Students are intrigued by the unknown. Outer space, a vast frontier of things we have yet to discover, is a compelling topic because there are so many unanswered questions waiting to be explored. The Intergalactic Mail project allows students a great deal of leeway to set the parameters of their project as they examine things found in our solar system. There are many options regarding not only the topics students can choose, but also the format (digital or paper) and design of the finished project. Thus, the project is very student driven and allows for a great deal of personal expression.

As students explore outer space, they write postcards from four distinct locations designed to help them become familiar with different types of celestial bodies found in the solar system. Thus, they become familiar with characteristics of an inner or terrestrial planet (Mercury, Venus, Earth, or Mars), an outer planet or gas giant (Jupiter, Saturn, Uranus, or Neptune), a dwarf planet (Pluto), and a smaller space object (an asteroid, comet, or meteoroid). This project is the culminating activity in our study of the solar system. It allows students to not only put the knowledge gained in the classroom into perspective, but also to conduct research of their own in areas that are compelling to them.

Our study of the solar system begins with a couple of teacher-made videos that combine lecture material with real world NASA photos and video clips. These lessons are designed to give students a familiarity with our solar system. Students gather data in their “Hitchhiker’s Guide to the Solar System” notes which later become the framework for their future explorations.

As students begin the project, research topics for each postcard are designed to help the students focus their efforts. Students begin with a description of their space object’s basic and general characteristics. From there, they describe and explain things that are unique to their celestial body, with a focus on things that won’t normally be found in a typical textbook. Finally, students are challenged to make a case relating to their celestial body. Would it be beneficial for NASA to send a probe, either manned or unmanned, to this location? Their arguments need to weigh factors such as distance, time to travel to the location, and conditions that would be encountered there, such as atmospheric pressure, temperatures, storms, and so on. They are encouraged to look at past explorations, if any, to see what the benefits were and how pitfalls were overcome. Students need to provide evidence, based on their research, to
make a case as to why we should/should not visit a particular planet, asteroid, comet, or meteor.

Pluto postcards make a case either for or against Pluto being reinstated as a planet. Students look at arguments put forth by experts in the field of astronomy on this topic and then develop their own opinions. For example, how is “planet” defined by the International Astronomical Union? In making a case, students can take any point of view that they like, provided they can make a convincing argument with factual data to support their assertion.

On the day that the postcards are due, we have a class discussion/debate. First we examine whether or not Pluto should be a planet. Then we discuss what location NASA should explore with probes or expeditions. These topics are so engaging that students of all ability levels participate and anxiously share their point of view. Students eagerly attempt to convince others that NASA’s limited budget should be spent on exploration of a particular planet.

The Intergalactic Mail project supports California State Science Standard 4e for eighth grade science as well as the newly adopted common core writing standards designed for literacy in science and technical subjects for grades 6-12. In addition, the project is cross-curricular in nature because it not only encompasses science, but also language arts, and the visual arts. Students are also encouraged to use technology. Digital postcards or auditory messages, such as a “Captain’s Log” style recording, can be submitted instead of a paper postcard. This is also beneficial for students because it addresses multiple learning styles and allows student to present their findings in a modality that is comfortable for them. Skills used in this project, such as making a case and supporting it with evidence, are also used on other assignments throughout the school year so that it is reinforced and applied to other situations.

Assessment of the project is based on a rubric. This gives students guidelines for project expectations up front so they can be more successful. As a result of the project, students are now aware of current expeditions, such as the Mars rover “Curiosity,” the international space station, and the “New Horizons” probe that should reach Pluto in July of 2015. Many students are now connecting to the NASA website regularly and are coming into class with updates about what is going on in our solar system. The project has indeed provided a positive impact on student learning about outer space.
Intergalactic Mail

Purpose: To demonstrate your understanding of various celestial bodies and their characteristics.

Materials: • Solar System Notes • Researched solar system data • 5X8 index cards (4) • Colored pencils • Digital presentation media (optional)

Procedures:
1. Select one inner planet, one outer planet, one asteroid, comet, or meteor, and Pluto for your research.
2. Create a postcard from each of your four locations. Include the following data on your postcard:
   • **Front**: a colorful student drawn illustration, or series of illustrations showing something about your planet, asteroid, comet, or meteor.
   • **Back**: include data in the following areas:
     o **General characteristics** (for example, things that all terrestrial planets have in common relating to structure, location, atmosphere, gravity, size, temperature, physical make up, and so on.)
     o **Basic characteristics** (things particular to the object you are researching, such as length of day, length of year, mass, axis tilt, average temperatures, and so on. For asteroids, comets, and meteors tell about the particular one that you are researching.)
     o **Unique Data** (Describe or explain at least three things about your object that are interesting, indicates in-depth research, and are particular to that object.
     o **Make a case**
       ▪ (Should/shouldn’t NASA send a probe/manned expedition to this location to find out more? Why/why not? Use specific evidence from your research. Consider factors such as distance, time to travel to the location, conditions that would be encountered there such as atmospheric pressure, temperatures, storms, and so on. Have probes explored this area before?)
       ▪ **For Pluto**, instead make a case for whether we should reinstate Pluto’s status as a planet or not. (Provide
evidence, based on research, to support your argument. For example, how do astronomers define “planet”?

3. You may choose to send a digital postcard through e-mail or on a CD or create an auditory message (for example: “Captain’s log from Mars...”) in an MP3 type format. Please plan ahead as technical difficulties will not extend your due date.

Observations:
- Remember to explain everything in your own everyday language.
- Be sure that your data reflects appropriate research and effort. This will be difficult if you wait to the last minute... plan ahead.
- Neatness counts. Take pride in your work.
- DUE DATE:

Conclusion: Be creative and have fun on your journey through the solar system!
Intergalactic Mail

Inner Planet
- Appropriate Illustration (2) _______
- General Characteristics (3) _______
- Basic Characteristics (3) _______
- Unique Data / research (6) _______
- Make a Case / evidence (6) _______

Outer Planet
- Appropriate Illustration (2) _______
- General Characteristics (3) _______
- Basic Characteristics (3) _______
- Unique Data / research (6) _______
- Make a Case / evidence (6) _______

Pluto
- Appropriate Illustration (2) _______
- General Characteristics (3) _______
- Basic Characteristics (3) _______
- Unique Data / research (6) _______
- Make a Case / evidence (6) _______

Asteroid, Comet, or Meteoroid
- Appropriate Illustration (2) _______
- General Characteristics (3) _______
- Basic Characteristics (3) _______
- Unique Data / research (6) _______
- Make a Case / evidence (6) _______

Total _______
### Lesson Plan Information

- **District:** Las Virgenes Unified School District
- **School:** Lindero Canyon Middle School
- **Participant(s):** Robin Paul, Beth McGrath

<table>
<thead>
<tr>
<th>Lesson Plan Title:</th>
<th>Mission Rockhound: An Exploration of the Geologic Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson Plan Grade Levels:</td>
<td>7, 8, 10, 12, 11, 9, 5, 6</td>
</tr>
<tr>
<td>Lesson Plan Subject Areas:</td>
<td>Language Arts/Reading (SAGE Category), Science (AMGEN Category), Visual Arts</td>
</tr>
</tbody>
</table>
Mission Rockhound: An Exploration of the Geologic Cycle

How would you like to be a secret agent, hot on the trail of the agents of weathering, erosion, and deposition? Mission Rockhound is an open-ended project that gives students the opportunity to do just that. The project is the culminating activity in our geologic cycle unit. Students enjoy taking on the secret agent persona as they do fieldwork to search for geologic features that they previously learned about in class. Students then take photos and prepare a “top secret” file on their findings.

The project is introduced with a short video that we shot, edited, and produced ourselves. The video shows the classroom teacher, disguised as a secret agent, examining various geologic features in a local park. Students are challenged to name the geologic features that they see in the film as they watch. The “Mission Impossible” theme song provides the background music and small video segments from the opening credits of the movie are interspersed throughout the video. This video parody of “Mission Impossible” immediately catches the students’ interest and builds excitement for the project.

Mission Rockhound brings to life the concepts of weathering, erosion, and deposition. At the same time, it illustrates the process of fieldwork as an important way to gather data in the field of science. It encourages students to see things in a new way as they look at an ordinary landscape through new eyes, seeing extraordinary features that are the result of forces reshaping our earth. Each project submitted by the students is unique because they all bring their own experiences to their descriptions. In addition, the project allows for personal expression as each student describes where he or she went, what he or she saw, and then they relate it to the factual data they learned about how the feature was formed. Most students also enjoy the secret agent persona and creatively fit that in to their scientific description.

Multiple learning styles are addressed by this project because students write descriptive paragraphs based on factual data, they show features in photographs, and they move about in the field to find the geologic features. This allows both strong and weaker students to get the most out of the experience as they apply higher level thinking skills and a detailed analysis of the factual data to their output in their “top secret” file. Learning is taken out of the text and becomes student centered as each student decides what features they will look for and how they will describe what they saw in a scientific way. Many students are so excited and inspired by the idea of showing off their fieldwork in a “top secret” file, they show extra features beyond the two that are required for the project.
Mission Rockhound not only supports California State Standards relating to earth science (grade six standards 2a, 2b, 2c, and 2d) and investigation and experimentation (grade six standards 7b and 7h), but also embodies the newly adopted common core writing standards for literacy in science and technical subjects for grades 6-12.

Prior to beginning the project, students have seen and discussed a couple of teacher made Powerpoints, which described and showed pictures of various types of weathering, erosion, and deposition. Each student completed a journal called Mother Nature’s Guide with key facts about the types of weathering, erosion, and deposition they saw in the Powerpoint presentations. Pictures used in the Powerpoints showed a variety of settings, from national parks to our own neighborhood, that helped the students relate more to the real world processes being shown. The journal provided a backdrop for further investigation into the topic.

Students also performed some lab activities to help give them first-hand knowledge of the processes of chemical weathering, mechanical weathering, and deposition. In the lab “Shake, Rattle, and Roll,” students placed granite chips, marble chips, and halite chips in small containers with water. They compared the original mass to the mass of each mineral after it had been shaken up in the water for 3 minutes, 6 minutes, 9 minutes, and 12 minutes to see the effects of mechanical weathering. The lab “Chemical Quarry” gave students the opportunity to observe differences in how water and a dilute hydrochloric acid breaks down two different types of rock. The process of deposition was observed in the lab “Riddling Rock.” This allowed students to see how sediment size affects the deposition of rock.

By the time students went out into the field, they were well prepared to look for geologic cycle features. The process of writing about things seen in the field will be applied later this year to the students’ study of insects, so the skills will be used again and reinforced with a slightly different topic. The project itself is scored with a rubric that is aligned to the project guidelines. This sets students up for a successful experience on the project.

Mission Rockhound is a science project, but it also incorporates both language arts and the visual arts. Thus, it affects student learning in multiple disciplines. The project can easily be adapted to a variety of levels and a variety of topics. Our science classes are heterogeneously grouped with gifted students, special needs students, and everything in between. The one thing that is universal about this project is that students all participate with great enthusiasm and the process positively impacts every child.
Purpose: Your mission, should you choose to accept it, will be to locate two different examples of weathering, erosion, or deposition, photograph them, write a brief description, and prepare a “top secret file” with all of the details. You have two weeks to accomplish this mission. Please read the details below:

Materials: • File folder  • Cardstock  • 2 (or more) photographs

Procedure:
1. Choose two different examples of weathering, erosion, or deposition from the following list: (NOTE: you are NOT looking for igneous, metamorphic, and sedimentary rocks. You are looking for examples of weathering, erosion, and deposition.)
   • freezing & thawing
   • plant roots
   • abrasion
   • oxidation
   • acid rain
   • landslide
   • slump
   • creep
   • oxbow lake
   • deflation
   • alluvial fan
   • delta
   • sand dunes
   • waterfalls
   • glacier

2. Locate your two formations and take photos. YOU should appear in the photo next to your formation. You may also wish to take a close up photo of the formation. (Note: You may NOT use photos downloaded from the internet.)

3. Prepare your “top secret file” (file folder) with photos and information about your formations:
   • Cover:
     • Creative title (Use Mission Rockhound, or create your own.)
     • Picture of you as a “secret agent”
     • Interactive display (such as a sliding pocket, spin the dial, or pop up) showing something about weathering, erosion, and deposition
     • Name, date, and period
2. **Inside Panels:** (One panel for each formation you observed)
   - Creative title
   - Text block (neatly written or typed) that explains in your own everyday language the process of weathering, erosion, or deposition for the formation you observed. (Refer to Mother Nature’s Guide and your text for factual data.)
   - Photo of you with your geologic formation (include a caption telling where the photo was taken)
   - Interactive display (such as a sliding pocket, spin the dial, or pop up) showing additional illustrations and/or information about your formation.
   - Use Backing Paper for your title, photo, and text block.
     - Cut a slightly larger backing paper from a different color of paper.
     - Attach the backing to your title, text block, and photo. Then attach into your folder.

### 4. Discuss this assignment with your parents/guardians and make sure they know when and where you will be exploring the out of doors. **Do NOT go alone.**

5. This paper will not self-destruct but you may recycle it when you fully understand the instructions and have accomplished your mission.

**Observations:**
- Separate directions are available for the interactive displays.
- Be creative and have fun with this assignment.

**Conclusion:** Your project is due on: _______________________________
**Purpose:** To observe the affects of mechanical weathering on various rock samples.

**Materials:**
- Marble chips
- Granite chips
- Halite chips
- Magnifying lens
- Three small containers with lids
- Electronic balance

**Procedure:**
1. Find the weight of the container.
2. Using three different containers weigh out 15 grams of each of the following substances (remember to subtract the weight of the container):
   - Weigh out 15 grams of marble chips in container
   - Weigh out 15 grams of Granite chips in container
   - Weigh out 15 grams of Halite chips in container
3. Add enough water to the container to completely cover the chips.
4. Observe with hand lens and record your observations on the data table.
5. Screw lid on the container tightly and shake for 3 minutes.
6. Use your hand lens to observe the contents of the container and record your observations on the data table.
7. Carefully pour off the water, blot the mineral chips and dry the container. Use the balance scale to find the mass each of the types of mineral chips (remember to subtract the weight of the container). Record the mass of each of the mineral chips in the data table.
8. Repeat steps 3 through 7 three more times for a total of 12 minutes of shaking. Every 3 minutes record your observations in the data table.
9. Return all chips to the materials table and rinse out the containers.

**Observations:**

**OBSERVATIONS OF MARBLE CHIPS**

<table>
<thead>
<tr>
<th>Original Mass</th>
<th>Mass 3 Minutes</th>
<th>Mass 6 Minutes</th>
<th>Mass 9 Minutes</th>
<th>Mass 12 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>g</td>
</tr>
<tr>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
</tr>
</tbody>
</table>

**OBSERVATIONS OF GRANITE CHIPS**

<table>
<thead>
<tr>
<th>Original Mass</th>
<th>Mass 3 Minutes</th>
<th>Mass 6 Minutes</th>
<th>Mass 9 Minutes</th>
<th>Mass 12 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>g</td>
</tr>
<tr>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
</tr>
</tbody>
</table>
### Observations of Halite Chips

<table>
<thead>
<tr>
<th>Original Mass</th>
<th>Mass 3 Minutes</th>
<th>Mass 6 Minutes</th>
<th>Mass 9 Minutes</th>
<th>Mass 12 Minutes</th>
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<tbody>
<tr>
<td>g</td>
<td>g</td>
<td>g</td>
<td>g</td>
<td>g</td>
</tr>
<tr>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
<td>Observations:</td>
</tr>
</tbody>
</table>

#### Analysis:

1. Which type of chip changed the most over time? Describe the change.

2. What do you think would happen to the chips if they were shaken for a day or longer?

3. What type of rock in our experiment would be the most resistant to this type of mechanical weathering? Explain why.

4. If you were a sculptor deciding on what material to use for an outdoor statue which of these 3 materials would you use? Explain why.

#### Illustration: (titled, labeled, & colorful)

#### Conclusion: Describe the processes of mechanical weathering that you observed in this lab.
**Chemical Quarry**

**Purpose:** To observe the processes in chemical weathering.

**Materials:**
- Marble chips
- Granite chips
- Gloves
- Hydrochloric Acid
- test tubes
- Magnifying lens
- Eye goggles

**Procedure:**

**Day 1:**
1. Use tape to label test tubes 1-2. One member of your lab group will label tube 1. A second group member will label tube 2.
2. Use the scale to measure: (One member of your group will weigh the granite. Another member will weigh the marble.)
   - 5 grams of granite in test tube 1.
   - 5 grams of marble in test tube 2.
3. Your teacher will add enough hydrochloric acid solution to test tubes 1 and 2 to cover all of the chips.
4. Observe the control test tubes, 3 & 4. Your teacher will measure 5 g of granite chips in test tube 3 and 5 g of marble chips in test tube 4. Then the teacher will add enough distilled water to cover all of the chips.
5. Observe each test tube after 20 minutes and record in the data table. Look at size, shape, texture, and color of the solution.
6. Allow the chips to sit in the solutions for at least one night.

**Day 2:**
7. Observe each test tube and record in the data table. Look at size, shape, texture, and color of solution.
8. Put on a glove and eye goggles.
9. Gently pour contents of each test tube, one at a time, into the strainer and rinse with water for 30 seconds.
10. Dry chips with a paper towel being careful to keep each sample separate.
11. Weigh each sample on the scale and record in the data table.
12. Return the marble and granite chips to the materials table and rinse out the containers. Return eye goggles to the materials table and wash your hands.

**Observations:**

<table>
<thead>
<tr>
<th>Type of rock</th>
<th>Marble</th>
<th></th>
<th>Granite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of solution</td>
<td>HCl</td>
<td>Distilled Water</td>
<td>HCl</td>
</tr>
<tr>
<td>Original mass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 min observations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 2 mass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 2 observations</td>
<td></td>
<td>297</td>
<td></td>
</tr>
</tbody>
</table>
Analysis:
1. What changes were observed in each sample?

2. Based on your observation what variables affected the rate of weathering?

3. Which is more resistant to chemical weathering, marble or granite? Give evidence to support your answer.

4. If we wanted to test the affect of acid on the rocks, why did we also test them in the water?

5. Name 2 sources of acid that will chemically weather rock.

Illustration: (colorful, titled, labeled)

Conclusion: Describe the processes of chemical weathering that you observed in this lab.
Purpose:
   Analyze sediment sizes

Materials:
   - Tray
   - Riddles (3)
   - Beaker
   - Cup of sediment

Procedure (Part I):
1. Place the largest riddle screen on the beaker
2. Place the middle sized screen on top of the large screen
3. Place the smallest sized riddle screen on top of the middle size screen
4. Pour the sediment onto the screen
5. Illustrate the sediment that drops into the beaker
6. Lift all riddles and remove the small sized screen
7. Place the riddles back on the beaker
8. Illustrate the sediment that drops into the beaker
9. Lift up the riddles and remove the medium sized screen
10. Place the largest riddle back on the beaker
11. Illustrate the sediment that drops into the beaker
12. Dump all the sediment back into the sediment cup
13. Stack riddles and return them to the supply table

Illustrations: (One label for each of the 3 illustrations)

Conclusion: Why do rocks come in different sizes? Explain the two factors that affect the rate of weathering rocks.
PART II: **DEPOSITION** *(the sediment race)*

**Purpose:** Determine the order sediments are laid down in streams, rivers and oceans.

**Procedure:**
- Fill beaker with water (do not fill completely, leave room at the top)
- Select small, medium and large sizes of sediment to test the speed of deposition.
- Rate the speed of deposition as $1^{st}$, $2^{nd}$ and $3^{rd}$ for the small, medium and large sediment sizes.

**Observations:**

<table>
<thead>
<tr>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment size</td>
<td>Sediment Size</td>
</tr>
<tr>
<td>Speed of Deposition</td>
<td>Speed of deposition</td>
</tr>
</tbody>
</table>

**Test 3**

| Sediment size | |
| Speed of Deposition | |

**Illustration:** Based upon what you know about deposition of sediment in water illustrate a cross section of sediment of a streambed. Show the sediment sizes. (Color and label)

**Conclusion:** Based on what you have observed, explain the order sediments are laid down in streams, rivers and oceans? Why are sediments laid down in this order?
<table>
<thead>
<tr>
<th>District:</th>
<th>Oxnard Union High School District</th>
</tr>
</thead>
<tbody>
<tr>
<td>School:</td>
<td>Pacifica High School</td>
</tr>
<tr>
<td>Participant(s):</td>
<td>Diane Winter-Walorinta</td>
</tr>
</tbody>
</table>

| Lesson Plan Title:   | An Elemental Journey             |
| Lesson Plan Grade Levels: | 7, 8, 10, 12, 11, 9 |
| Lesson Plan Subject Areas: | Science (AMGEN Category) , Health |
An Elemental Journey

The purpose of this unit, aligned to the Common Core State Standards, is to teach students that elements are not abstract ideas found on the periodic table, but rather are the building blocks of our universe, our planet, and our bodies. This unit takes students on a journey of scientific and social learning. We begin the unit by exploring how elements are made inside stars, where elements are found on Earth, how the elements are distributed in their bodies, and finally how they keep our bodies healthy. The culminating project for this unit was a community project co-partnered with the Ventura County Food Share. The mission of this project was to empower our students to realize that they can eat healthy even while living at the poverty line—an idea in opposition to the common beliefs within the community.

This unit started with a discussion about how some elements are made inside stars during fusion reactions while the rest of the elements are created when the star explodes during a supernova. A short video called Hyperspace was used to build a visual representation of this stellar process. Students next completed a lab on Spectral Analysis and flame tests to learn how scientists can determine which elements make up the universe.

Next, students completed an activity called “Spot the Periodic Table.” To engage in this activity, students went outside the classroom to explore. With the help of an information guide sheet, students began to identify and appreciate how few elements make up the majority of the world around us. Students then returned to the classroom and put together a jigsaw of the human body. This puzzle enabled them to see that the human body is made from the same elements that make up Earth but in different proportions. In order to verify the existence of these surrounding elements, students performed a lab to test the calcium in their bones, iron in their food, oxygen in the air they breathe, and carbon that makes up their bodies. Next, students were given a basic review of calculating math percentages before they calculated the value of the elements inside their body based on element percentages and body mass. Students were very enthusiastic about discovering their values and were eager to compare values with other students. As an exciting aside, I have never seen students calculate so quickly.

The next step in our elemental journey was to learn that elements are actually called minerals in their bodies and how other elements combine to make vitamins essential to their health. To foster a deeper understanding of this type of chemical conversion, students conducted research on vitamins and minerals in various foods. They learned about nutrient content and began to realize why certain foods, often called “Super Foods,” contain many of the vitamins and minerals that their bodies need to stay healthy. The students noted how eating just eggs, spinach, and broccoli could provide them with all the nutrients they need. Students then participated in the Royal Society of Chemistry’s Global Experiment of 2013 by testing the vitamin C content of foods grown locally and posted their results on the international data base where they were able to compare their findings with findings around the world. Then students were assigned a nutrient (mineral or vitamin) on which to do further research and created a presentation for the class. They then presented either a PowerPoint or informational video. The final summative assessment for this unit incorporated all the CCSS content covered.
After completing the unit from a scientific perspective, I posed a question to the students as to what challenges our community faces in terms of eating healthy at the poverty line. The students responded that buying healthy food is too expensive, they do not have time to prepare nutritious meals, or they had no kitchen in which to cook. They do not know how to prepare meals with the food they are given, and to add to this challenge, many of our students are the ones responsible for cooking for their younger siblings. To help create a bridge between their newfound scientific knowledge and the realities of the fiscal and social issues they face in the community, I challenged them to a “Hunger Games” competition. I worked with our local food share to create a list of foods that our community would have access to if they received food from food share. I assigned the students the task of creating a balanced and delicious, easy-to-prepare meal, utilizing only food that our local food share acquires through donations. The students competed over two days. Their culinary creations where judged by executive chefs from our community and the president and other executive members of Ventura County Food Share. Students learned that preparing healthy and nutritious food was easy and does not have to be expensive. This new understanding was an important lesson for many of our students. Most of our students are from Hispanic households, and statistics reveal that these households are two times more likely to be food insecure as non-Hispanic households. Also, statistically speaking, many of our students have a greater risk of obesity and diabetes than other groups. As a follow-up to this project, Ventura County Food Share will partner with the winners of this competition to work in a community food truck. This program is designed for the students to create and deliver their vitamin and mineral rich, nutritious (and delicious!) meals to the hungry families in our community.

“Participating in the Hunger Games competition was a one-of-a-kind experience. I was really excited to participate and be part of a group trying to help the community. We were able to take simple ingredients that may be overlooked and turn them into a complete and filling meal. The creation of the menu or dish was probably the hardest part. Afterwards, things were easy and fun. I hope to do this again next year and be able to create an amazing meal!” – Alicia Cruz, Student.
# Teaching Unit Overview – An Elemental Journey

<table>
<thead>
<tr>
<th>Day</th>
<th>Lesson Plan</th>
<th>State Standards</th>
</tr>
</thead>
</table>
| 1   | Lecture – Where do elements come from? Article – Where do elements come from? | NGSS:  
• Nuclear Fusion: HS – SS1-3  
• Learning Objective: Students will communicate scientific ideas about the way stars, over their life cycle, produce elements. |
| 2   | Video – Hyperspace: Star Stuff Episode (from BBC)  
WS - Video Notes : Star Stuff | NGSS:  
• Nuclear Fusion: HS – SS1-3  
• Learning Objective: Students will write notes from a the BBC video – Hyperspace detailing how the universe began, stars and planets are created and elements are created when a certain stars achieve a supernova stage and explode. |
| 3   | Lab – Spectral Analysis | NGSS:  
• Elements: HS – PS1-1  
• Science and Engineering practices  
  o Practice 3: RST.6-8.3  
• Learning Objective: Students will use emission tubes and flame test to identify elements based on their emission spectra and characteristic flame test color and relate this to how scientist know what elements make up our universe. |
| 4   | Activity – Spot the periodic table (20 min)  
Activity – What am I made of? (25 min) | NGSS:  
• Elements: HS-PS1-1  
CCSS:  
• CCR Reading Anchor #7  
  o RST.6-8.7  
• Learning Objective: Students will relate chemistry to the world around them by spotting element that they can see. Students will understand that the human body is made of the same elements that make up the Earth, but in different proportions. |
| 5   | Activity – The Value in Me | NGSS:  
• Elements: HS-PS1-1  
CCSS:  
• Science and Engineering Practices  
  o Practice 5 – Using mathematics and computational thinking  
• Learning Objective: Use percentages to calculate the monetary value of a stated quantity of an element, given the market value of that element. Students will calculate what they themselves might be worth as a collection of these elements. |
| 6   | Lab – The Elements in Me | NGSS:  
• Elements: HS – PS1-1  
• Science and Engineering practices  
  o Practice 3: RST.6-8.3  
• Learning Objective: Students will prove through laboratory investigation that there is calcium in their bones, Iron in foods we eat, Carbon in our bodies, and Oxygen in the air we breathe. They will prove this by Claim, Evidence, and Reasoning argumentation. |
| 7  | Lecture – Minerals | CCSS:     |
|    |                  | • Core Idea ETS1 – Engineering Design – Humanity faces major global challenges today such as the need for supplies of clean water and food.... |
|    |                  | **CTE - Career and Readiness:** |
|    |                  | • #6 Practice personal health and understand financial literacy. |
|    |                  | **Learning Objective:** Students will understand that minerals are the elements that are found in their body and are essential to their health. They can get these from food in their diet. |

| 8  | Lecture – Vitamins | CCSS:     |
|    |                  | • Core Idea ETS1 – Engineering Design – Humanity faces major global challenges today such as the need for supplies of clean water and food.... |
|    |                  | **CTE - Career and Readiness:** |
|    |                  | • #6 Practice personal health and understand financial literacy. |
|    |                  | **Learning Objective:** Students will understand that vitamins are compounds of elements that are found in their body and are essential to their health. They can get these from a variety of food. |

| 9  | Lab – Global Experiment 2013 by the Royal Society of Chemistry: Vitamin C content in food | NGSS: |
|    |                                              | • Science and engineering practice |
|    |                                              | o RST.11.12.3 |
|    |                                              | **CCR speaking and listening anchor #1:** |
|    |                                              | • Prepare for and participate effectively in a range of conversation and collaboration with diverse partners, building on other’s ideas and expressing their own..... |
|    |                                              | **Learning Objective:** The aim of the experiment is to find out which fruit or vegetable contains the most vitamin C and to put the class results onto the Global Experiment 2013 website so that students can compare their data with other schools around the world. |

| 10 | Review of Unit – An Elemental Journey | NGSS and CCSS: Review of all standards |
|    |                                     | **Learning Objective:** |

| 11 | Exam – An Elemental Journey | Summative assessment of all standards |
|    |                             | **Learning Objective:** Review all material covered to prepare for summative assessment. |

<p>| 12-13 | Research for Nutrient Projects | CCR Writing Anchor #7: |
|       |                                 | • Conduct short as well as more sustained research projects based on focused question, demonstrating understanding of the subject under investigation. |
|       |                                 | <strong>Learning Objective:</strong> Use computers to research a vitamin or mineral and following a rubric, create a presentation (PowerPoint or video) to present to the class. |</p>
<table>
<thead>
<tr>
<th>14-16</th>
<th>Present Nutrient Projects</th>
<th>CCR Speaking and Listening #5:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentation.</td>
</tr>
</tbody>
</table>

**Learning Objective:** Use computers to research a vitamin or mineral and following a rubric, create a presentation (PowerPoint or video) to present to the class.

<table>
<thead>
<tr>
<th>17</th>
<th>Hunger Games</th>
<th>Core Idea ETS1 – Engineering Design:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Humanity faces major global challenges today such as the need for supplies of clean water and food.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CTE - Career and Readiness</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• #6 Practice personal health and understand financial literacy.</td>
</tr>
</tbody>
</table>

**Learning Objective:** Create a balanced and delicious, easy to prepare meal, utilizing only food that our local food share acquires through donations.
What these observers did not know is that during the explosion, the star not only emitted huge amounts of light – more light than a billion suns – but also released chemicals in space. Inside the star were most of the first 26 elements in the periodic table, from simple elements, such as helium and carbon, to more complex ones, such as manganese and iron; and giant explosions sprayed them in space. During the explosion, other elements were created as well, and after the explosion, the chemicals in space combined with each other to form ions and molecules. These elements travel in space and ultimately end up in planets like Earth, being part of everything we see around us and ourselves. The carbon in our cells, the oxygen in the air, the silicon in rocks, and just about every element, we are all forged inside ancient stars before being strewn across the universe when the stars exploded.

During the past century, scientists have been studying how chemical elements form in stars and in outer space. Like genealogists – experts who study the origins of people and families – these scientists can track down where most chemical elements came from and how they descended from each other. And, similar to forming a family tree, studying the links between the chemical elements has brought – and keeps bringing – many surprises and interesting discoveries.

Stellar ovens
A young star is composed primarily of hydrogen, the simplest chemical element. This hydrogen ultimately leads to all known elements. First, the two constituents of each hydrogen atom – its proton and electron – are separated. The high pressure inside the star can literally squeeze together two protons, and sometimes, a proton will capture and electron to become a neutron.

When two protons and two neutrons band together, they form the nucleus of helium, which is the second element in the periodic table. Then, when two nuclei of helium fuse with each other, they form the nucleus of another element, beryllium. In turn the fusion of beryllium with helium produces a carbon nucleus; the fusion of carbon and helium nuclei leads to an oxygen nucleus, and so on. This way, through successive fusion reactions, the nuclei of most elements lighter than iron can be formed (Fig. 1). Scientists call this process nucleosynthesis (for “synthesis of nuclei”).

In stars, these fusion reactions cannot form elements heavier than iron. Up until the formation of iron nuclei, these reactions release energy, keeping the star alive. But nuclear reactions that form elements heavier than iron do not release energy; instead, they consume energy. If such reactions happened, they would basically use the star’s energy, which would cause it to collapse.
Not all stars form iron, though. Some stars explode before creating that many elements. In stars less massive than the sun, the reaction converting hydrogen into helium is the only one that takes place. In stars more massive than the sun but less massive than about eight solar masses, further reactions that convert helium to carbon and oxygen take place in successive stages before such stars explode. Only in very massive stars (that are more massive than eight solar masses), the chair reaction continues to produce elements up to iron.

A star is a balancing act between tow huge forces. On the one hand, there is the crushing force of the star’s own gravity trying to squeeze the stellar material into the smallest and tightest ball possible. On the other hand, there is tremendous heat and pressure from the nuclear reactions at the star’s center trying to push all of that material outward.

The iron nucleus is the most stable nucleus in nature, and it resists fusing into any heavier nuclei. When the central core of a very massive star become pure iron nuclei, the core can no longer support the crushing force of gravity resulting from all of the matter above the core, and the core collapses under its own weight.

The collapse of the core happens so fast that it makes enormous shock waves that blow the outer part of the star into space—a supernova. It is during the few seconds of the collapse that the very special conditions of pressure and temperature exist in the supernova that allow for the formation of elements heavier than iron. The newly created elements are ejected into the interstellar dust and gas surrounding the star.

“The amount of elements released through a supernova is truly phenomenal,” says Stan Woosley, professor of astronomy and astrophysics at the University of California at Santa Cruz. “For example, SN1987A, a supernova seen in 1987, ejected 25,000 Earth masses of iron alone.”

Our stellar origins

When a supernova spews its newly made elements into space, the elements become part of an enormous cloud of gas and dust, called an interstellar cloud. The gas is made of 90% hydrogen, 9% helium, and 1% heavier atoms. The dust contains silicates (compounds made of silicon), carbon, iron, water ice, methane (CH₄), ammonia (NH₃) and some organic molecules, such as formaldehyde (H₂CO).

Such clouds are found so often between stars in our galaxy that astronomers think that all stars and planets have formed from them. Except for hydrogen, which appeared when the universe formed through the Big Bang explosion, all of the elements on Earth have been cooked for billions of years in stars and then released in the universe through supernova explosions. The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, and the carbon in our apple pies were all made in the interiors of stars. The gold in jewels, tungsten in light bulbs, and silver in cookware were all produced during stellar explosions. We ourselves are made of “star stuff”.

---

**Finding Chemicals Inside Stars**

To determine which chemical elements are formed inside stars, scientists use a technique known as visible spectroscopy. It is based on a device, called a spectroscope, which spreads visible light into its component colors by passing it through a prism or grating. These colors are called an emission spectrum, and their position and intensity differ according to the chemical element that emits the light. For example, the hydrogen’s emission spectrum consists of four lines: purple, blue, green, and red, located at positions that correspond to their wavelengths. The emission spectrum of helium consists of six lines that are purple, cyan, green, yellow, orange, and red. In other words, atoms and molecules produce their own “fingerprint” or “signature” when the light they emit is spread in a spectroscope.

Astronomers also measure how much light is present at each spectral line. The overall strength or weakness of all the lines of an element depends on the number of atoms of that element. The percentage composition of the atoms in a stellar body can also be determined. For example, by looking at the light emitted by the sun, scientists have been able to determine the relative number of atoms from specific elements and infer their percentage by mass.
### Anticipatory Reading Questions:
Before you read the article, read each claim and in the “Me” box put “T” for true and “F” for false based on your current knowledge. Next, number each paragraph in the article and use CLOSE reading strategies while reading. Then read the article and fill the “Text” box with “T” or “F”. Site which paragraph you found our evidence in. If the statement is false, write a correct statement.

**Where Do Chemical Elements Come From?**

<table>
<thead>
<tr>
<th>Me</th>
<th>Text</th>
<th>Claim</th>
<th>Evidence (paragraph #)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1. The supernova of 1054, which provided enough light to read at night, was described by both Chinese astronomers and the Anasazi in the American Southwest.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. For more than 50 years, Scientists have been studying the links between chemical elements and how they are created.</td>
<td></td>
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<td></td>
<td>3. Elements lighter than iron are formed from successive nuclear fusion reaction, beginning with hydrogen atoms.</td>
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<td>4. All stars form iron in their cores.</td>
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<td></td>
<td>5. The Hydrogen nucleus is the most stable nucleus in nature.</td>
<td></td>
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<td></td>
<td></td>
<td>6. Elements heavier than iron can only be formed in the first few seconds after a supernova’s collapse.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. The type of elements produced by a star depends on the temperature and pressure of its core.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>8. The gas in an interstellar cloud is mostly helium</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>9. All of the elements on Earth, except for hydrogen, were formed in the interior of stars.</td>
<td></td>
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<td></td>
<td></td>
<td>10. Astronomers use spectroscopes to identify elements in stars because each element produces a unique emission spectrum.</td>
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<tr>
<td></td>
<td></td>
<td>11. (Infer) Our sun contains a very small number of gold atoms. (Hint – Is gold’s atomic (Au) greater or less than iron (Fe)?)</td>
<td></td>
</tr>
</tbody>
</table>
Follow up questions: Use your lecture notes and information from Article to complete.

1. What is the energy source (element) that stars use to undergo fusion reactions? _______

2. Write the reaction for the fusion of hydrogen atoms.

3. Define nucleosynthesis and state which elements are made by this process.

4. Elements through iron (Fe) ____________ (release/require) energy when being formed.

5. Elements heavier than iron (Fe) ____________ (release/require) energy when being formed.

6. Fill in the chart below to describe how star size influences which elements are made.

<table>
<thead>
<tr>
<th>What elements are formed by stars less massive than our sun?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What elements are formed by stars having a mass of one to eight suns?</td>
<td></td>
</tr>
<tr>
<td>What elements are formed by stars having a mass greater than eight suns?</td>
<td></td>
</tr>
</tbody>
</table>

7. There are the 2 forces inside a star. Explain how they work.

<table>
<thead>
<tr>
<th>Forces</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravity</td>
<td></td>
</tr>
<tr>
<td>Heat and pressure</td>
<td></td>
</tr>
</tbody>
</table>

8. When certain stars run out of hydrogen and become pure Fe, the star will explode. What is this process called? ____________________________

9. What force from question 7 wins (is greater) when a star explodes? _________________

10. How an interstellar cloud made and what is its chemical composition?

11. What parts of us are made inside stars?
LCTR – Where Do Chemical Elements Come From?
Where do elements come from?

- Chemical Elements come from **stars**
Where do elements come from?

- Stars use *hydrogen* formed during the big bang to undergo *fusion* reactions
  \[ ^2\text{H}_1 + ^3\text{H}_1 \rightarrow ^4\text{He}_2 + ^1\text{n}_0 \]
Where do elements come from?

• Through successive fusion reaction elements up to iron are formed through a process called nucleosynthesis.
Where do elements come from?

– In each of these reactions, energy is **released**.
  - H + H → He
  - He + He → Be
  - Be + He → C
  - C + He → O
  - Up to → Fe
Massive star near the end of its lifetime has an 'onion-like' structure just prior to exploding as a supernova.

Nuclear burning occurs at the boundaries between zones.

Example of nuclear reactions that build neutron-rich isotopes.
Where do elements come from?

• Elements **heavier** than Fe
  – It **requires** energy to create elements heavier than Iron
2 forces in a star

- **Gravity** – Crushing force of the star’s own gravity is **squeezing** star material together
- **Heat and Pressure** – Created from nuclear fusion reactions are trying to **push** all material outward
Supernova

- **Supernova**

  • When the central core of a star becomes pure **Iron** (Fe), it resists fusing into heavier elements and it can no longer resist the force of **gravity** pushing on it.
Supernova

• The core **collapses** under its own weight and creates a **Supernova** (explosion of the star).
Supernova

During this time elements **heavier** than iron are made.

» Elements Fe $\rightarrow$ U are created in less than 1 **second**.
Supernova

• Elements become enormous clouds of gas and dust called an *interstellar* cloud.
BBC Supernova Clip

• [http://www.youtube.com/watch?feature=player_detailpage&v=yC7p_Bey5lU](http://www.youtube.com/watch?feature=player_detailpage&v=yC7p_Bey5lU)
Supernova

— *Interstellar cloud makeup*

- **Gas** = 90% $H$, 9% $He$, 1% heavier elements
- **Dust** = Silicates, $Si$, $C$, $Fe$, $H_2O$, methane ($CH_4$), ammonia ($NH_3$) and *organic* compounds (carbon compounds)
We are made of “Star Stuff”

– Except for hydrogen, all of the elements on Earth have been “cooked” for billions of years in stars and then released in the Universe through Super Nova explosions

• Made inside a star
  – N – DNA
  – Ca – Teeth
  – Fe – Blood

• Made during a stellar explosion
  – Au (gold) – jewelry
  – W (tungsten) – light bulbs
Summary: How elements are made.

The Great Explosion (The Big Bang)

13.7 billion years ago

Hydrogen Atoms and Molecules Appear

370,000 years later

Stars Appear

100 million years later

Nuclear Fusion

Blue and Yellow Stars: Conversion from Hydrogen to Helium

Red and Red-Giant Stars, Blue-White Stars: Conversion from Helium to Carbon, Nitrogen, and Oxygen

Blue-White Stars

Supernova

Ni Cu Zn Ag Au Hg Pb
Where elements come from video clip

- http://www.youtube.com/watch?feature=player_detailpage&v=neMEO8Zrwul
Hyperspace: Star Stuff (Video Notes)

Name ____________________________________________________ Period _____

1. Where did we come from?

2. The Big Bang created a huge cloud of ____________________ gas.

3. The closest we’ve been able to come to the incredible release of energy associated with the violent birth of a star is the ________________________.

4. The amount of hydrogen in a hydrogen bomb is barely enough to fill a party _____________.

5. A star released the energy of ______________________ H-bombs every second.

6. The universe began with _______________________. And, __________________ created the _______________________. And, the __________________ created the elements we need for _______________; _______________ in the air, _______________ in our bones.

7. When a star runs out of hydrogen, it cools and begins to ______________________ under its own weight. It crashes inwards and ______________________. The whole event is over in ________________.

8. They call it a ___________________; an explosion so bright, it outshines entire ________________.

9. The inside of a dying star is made up of ____________________. The outer layer is mostly ____________________. Deeper, there are layers of ______________, ______________, and ______________ and at its heart, a dense core of molten ________________.

10. There’s a bright supernova once every ________________ years or so in a galaxy.

11. Some scientists think that life developed so __________________ that it may have arrived on a ________________________.
Lab – Spectral Analysis
What causes the sound when fireworks explode?

• The explosion inside a firework is from a chemical reaction that creates gases fast.

• The temperatures of the gases are 2000ºC. At those temperatures, the gases expand so fast (faster than the speed of sound) that it creates a sonic boom.
Why do we see fireworks, then hear the sound?

The speed of light and the speed of sound are different.

\[
\text{Speed of light} = 3 \times 10^8 \text{m/s} = 300,000,000 \text{ m/s}
\]

\[
\text{Speed of sound} = 340 \text{ m/s}
\]

Therefore, if you are 100 meters away, you would see the light at 3 millionths of a second and hear the sound 3 seconds later.
How are colors in fireworks formed?

• **Incandescence**

• Metals such as *aluminum, magnesium, and titanium* are heated so much that they *begin to glow*. As they become increasingly hotter, the color they give off changes as follows: *inferred → red → orange → yellow → white.*
How are colors in fireworks formed?

• *Luminescence*

• Metallic salts are added to little “stars” inside the fireworks. When the stars explode, gunpowder creates a lot of heat (*2000°C*), which is absorbed by the metallic salts.
How are colors in fireworks formed?

• Electrons in the salts *absorb the heat* and move from *normal or ground state* to a higher energy level or excited state.

• Immediately these *electrons return to their ground state* and *release the energy* originally absorbed from the heat in the *form of a photon (seen as light)*. The color of the light seen depends on the frequency of the light.
How do scientists identify which element will produce a certain color?

- Energy released by a photon can be calculated by the equation $E = hv$.
  - $E$ = energy of a photon of light given off
  - $h$ = Plank’s constant ($6.63 \times 10^{-34}$ m$^2$kg/sec)
  - $v$ = frequency

This also allows for the calculating of the frequency of light emitted by the photon.

<table>
<thead>
<tr>
<th>Color</th>
<th>Wavelength ($\lambda$)</th>
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<tbody>
<tr>
<td>Red</td>
<td>780-622</td>
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</tr>
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<td>Yellow</td>
<td>577-577</td>
<td>503-520</td>
</tr>
<tr>
<td>Green</td>
<td>577-492</td>
<td>520-610</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
</tbody>
</table>
• If the photon of light given off is viewed with the **naked eye**, a **single color** is seen.

• If the photon of light given off is viewed **through a spectroscope**, you will see a **blend of colors** (just as Bohr did when he studied hydrogen).
• Each metal has its own unique “fingerprint”, resulting in a color associated with the element. This is used to identify the element.

• This is also how scientists can identify which elements make up stars in our universe.
Studying the stars:

- Scientists know what a star is made of by studying the color spectras given off by the elements that make it up.
Hydrogen

• Look at the following elements spectra’s and write down what color pattern you see. Remember, each individual element has it’s own unique spectra that will identify which element is present.
Helium

Red  Orange  Yellow  Green  Blue  Violet

Element 2:
Mercury
Neon

<table>
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<tr>
<th>Red</th>
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Element 4:

![Image of Neon's spectrum]
Water Vapor: Hydrogen and Oxygen

Red | Orange | Yellow | Green | Blue | Violet

Element 5:
Air: Nitrogen, Oxygen other molecules

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Element 6:
Making colored fireworks:

Next you will explore what metallic salts give off specific colors by performing flame tests on the following metallic salts.

**Procedure**

Dip one of the wires into a flask containing a compound. Add a few grains of the solid by dipping the tip of the wet wire in the crystals. Only a few grains are needed! Place the wire into the flame of the burner and note the characteristic color emitted. Record the name of the compound that was tested in the data table below, classified by color emitted. Repeat steps 1 to 3 for all of the metallic ions to be tested.
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![Color Fireworks Diagram](image-url)
Lab – Spectral Analysis

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   Metals such as aluminum, magnesium, and titanium are heated so much that they begin to glow. As they become increasingly hotter, the color they give off changes as follows: inferred \( \rightarrow \) red \( \rightarrow \) orange \( \rightarrow \) yellow \( \rightarrow \) white.

2. Luminescence
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   - Electrons in the salts absorb the heat and move from normal or ground state to a higher energy level or excited state.
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<th>Element 4:</th>
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<tr>
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<table>
<thead>
<tr>
<th>Element 5:</th>
</tr>
</thead>
<tbody>
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</table>

<table>
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Post Lab Questions

1) What causes the atomic spectrum of an element?

2) What piece of equipment is needed to view spectra lines?

3) Why are spectra lines called “fingerprints of an element”?

4) How are metallic salts used in fireworks?

5) When a glass rod is heated, a yellow-orange flame is observed around the point of heating. What does the yellow-orange flame indicate about the composition of the glass?
Activity – Spot the Periodic Table

Name ______________________________________________________________ Period ____

We are going to take a trip outside to see how many elements on the periodic table we can spot. Most elements will be found as compounds (two or more elements combined) and a few will be elements (uncombined). Use your help sheet to guide you through this scavenger hunt.

- **Highlight** any elements that you can spot (either combined or uncombined).
- **Circle** any elements that are found in living things.

1. What state (solid, liquid, or gas) are most of the element found in? _____________________
2. How many elements did you spot? ___________
3. How many of these elements only make up living things? _______
4. There are 92 elements found in nature.
   a. What percent of these elements make up living things? ______% 
   b. What percent of these elements could you spot? ______ %

**Math Hint:** You can find percentage by taking the total you found (X) and divide it by total found in nature (92) then multiply that by 100. \[ \frac{X}{92} \times 100 = \]

**Show your work here:**
### The chemistry of common outdoor compounds

<table>
<thead>
<tr>
<th>Material</th>
<th>Constituent(s)</th>
<th>Chemical make-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricks/tiles - these are made from clays which are baked in a kiln to form bricks/tiles. Clays contain clay minerals and the most common ones are:</td>
<td>Kaolinite - contains: Al, Si, O, H</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Montmorillonite - contains: Na, Ca, Al, Mg, Si, Al, O, H</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Illite - contains: K, Al, Si, O, H</td>
<td></td>
</tr>
<tr>
<td>Cement - cement is usually mixed with sand in mortar or with sand and rock chips in concrete. Major cement constituents include:</td>
<td>Tricalcium silicate - contains: Ca, O, Si</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dicalcium silicate - contains: Ca, O, Si</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tricalcium aluminate - contains: Ca, O, Al</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tetracalcium aluminoferrite - contains: Ca, O, Al, Fe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calcium sulfate (gypsum) CaSO₄</td>
<td></td>
</tr>
<tr>
<td>Bitumen (asphalt or tar)</td>
<td>Long chains of hydrocarbon molecules including: H, C, N, S, O</td>
<td></td>
</tr>
<tr>
<td>Rock - made of minerals (roofing slate is a rock)</td>
<td>The most common minerals are made of the most common elements in the Earth crust: O, Si, Al, Fe, Ca, Na, K, Mg, Ti</td>
<td></td>
</tr>
<tr>
<td>Glass - the main constituents of float glass - the most common form of glass today, are:</td>
<td>Silicon dioxide (silica sand, quartz) SiO₂</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sodium carbonate Na₂CO₃</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calcium carbonate CaCO₃</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Magnesium carbonate MgCO₃</td>
<td></td>
</tr>
<tr>
<td>Plastic - polymers</td>
<td>Plastic polymer chains are made mainly of: C, H, O, Si</td>
<td></td>
</tr>
<tr>
<td>Paint - include a form of glue (resin), a primary pigment, secondary pigments and colorants and a solvent. In dry paint, the solvent evaporated when the paint dried</td>
<td>Resin - compounds mainly of: C, O, H TiO₂</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primary pigment - commonly titanium dioxide</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Simple secondary pigments include: iron oxide, used to give yellows, reds and browns chromium oxide giving green lead oxide giving red Fe₂O₃ Cr₂O₃, Pb₃O₄</td>
<td></td>
</tr>
<tr>
<td>Human body</td>
<td>99% of the mass of the human body is made of just six elements: O, C, H, N, Ca, P</td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td>Plants are formed mainly of the following elements, with trace amounts of around ten others: O, C, H, N, P, S, Si</td>
<td></td>
</tr>
</tbody>
</table>

Can you see any copper, aluminum, gold, silver, platinum or carbon (diamonds) in people’s jewelry or money?
What am I made of?

Sodium (Na) - 0.14%
Sulfur (S) - 0.2%
Oxygen (O) - 61%
Carbon (C) - 23%
Potassium (K) - 0.2%
Iron (Fe) - 0.006%
Hydrogen (H) - 10%
Nitrogen (N) - 2.5%
Calcium (Ca) - 1.4%
Phosphorus (P) - 1.1%
Chlorine (Cl) - 0.353%
Magnesium (Mg) - 0.03%

Introduction

Begin thinking of what you are made of as you make a comparison to the lithosphere.

Element

- Oxygen
- Silicon
- Aluminium
- Iron
- Calcium
- Sodium
- Potassium
- Magnesium
- Titanium
- Hydrogen
- Phosphorus
- Manganese
- Sulfur
- Carbon
- Chlorine
- Nitrogen

Then compare each element on the table to human body makeup. If the percentage is the same, it is the same if it is not.
Activity - The Value in Me

Name ___________________________________________________________ Period __________

**Percent** means “for every 100” or “out of 100.” The (%) symbol is used as a quick way to write a fraction with a denominator of 100. As an example, instead of saying “it rained 14 days out of every 100, we say “it rained 14% of the time.” Percentages can be written as decimals by moving the decimal point two places to the left as shown below. You can find the percent of a number by this two-step process:

**Question:** What is 31% of 6?

1. Change the percent into a decimal. \(31 \div 100 = 0.31\)
2. Multiply the number by the decimal. \((0.31 \times 6 = 1.86)\)

**Practice:** What is 61% of 70?

---

**Mass** in science is given in Kilograms (Kg), not pounds (lb) as we use in the U.S. The mathematical relationship between Kilograms and pounds is \(1 \text{ lb} = 0.45 \text{ Kg}\). Therefore, to find how many Kg you are multiply your weight in pounds by 0.45.

**Practice:** Find your weight in Kilograms. ______________________________ Kg

All living things depend upon minerals derived from the lithosphere (Earth’s crust). We get these minerals from the foods in our diet. This leads us to an interesting question – What are we worth as a collection of elements? To find the value of the elements contained in your body we will apply the concept of percentages learned above. You will change the % of each element into a decimal and multiply it by your weight in Kg. Next you will find the value of that element in you by multiplying the Kg of the element in you by its price per Kg. When you are done, add up the “value of element in me” column and you can find the total value of all elements in your body!

<table>
<thead>
<tr>
<th>Element</th>
<th>% body mass from each element</th>
<th>Kg of element in me</th>
<th>Price per Kg</th>
<th>Value of element in me</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>61%</td>
<td></td>
<td>$5.21</td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>23%</td>
<td></td>
<td>$25.69</td>
<td></td>
</tr>
<tr>
<td>Hydrogen</td>
<td>10%</td>
<td></td>
<td>$254.85</td>
<td></td>
</tr>
<tr>
<td>Nitrogen</td>
<td>2.5%</td>
<td></td>
<td>$2.43</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>1.4%</td>
<td></td>
<td>$218.88</td>
<td></td>
</tr>
<tr>
<td>Phosphorous</td>
<td>1.1%</td>
<td></td>
<td>$31.92</td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>0.2%</td>
<td></td>
<td>$1200.80</td>
<td></td>
</tr>
<tr>
<td>Sulfur</td>
<td>0.2%</td>
<td></td>
<td>$14.29</td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>0.14%</td>
<td></td>
<td>$125.25</td>
<td></td>
</tr>
<tr>
<td>Chlorine</td>
<td>0.13%</td>
<td></td>
<td>$301.31</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.03%</td>
<td></td>
<td>$53.01</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>0.006%</td>
<td></td>
<td>$75.24</td>
<td></td>
</tr>
<tr>
<td><strong>Total Value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lab – The Elements in Me

Name _________________________________________________________ Period _____

Safety:
MUST WEAR GOGGLES
Long hair needs to be tied back.
No messing around with the fire.

Read the PowerPoint on the computer to complete the information for each element. Then complete the lab activity to test the mineral.

The Calcium in Me

- The major role of calcium in the human body is as a component of _______________.
- The mass of calcium in the body is ___ kg in a 70 kg person and is mainly found as an _____________ in the bone.
- Calcium is found in our bodies as a ____________________.
- Elemental calcium is too ________________ with water.
- Calcium is a ___________________ that is slowly ________________ into and out of the bones and is needed by _____________ who are growing.
- ____________________ is a disease that you can get if not enough calcium is in the bones.

Activity – Calcium in the bones

1. Remove a small bone from the solution of HCl with tweezers, rinse it off and dry it. Then compare it with an untreated bone. (Pass both bones around our group) Record your observation below

<table>
<thead>
<tr>
<th>Treated bone</th>
<th>Untreated bone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Detecting calcium with flame tests
   a. Dip the flame test wire in HCl and hold it in a blue Bunsen burner flame until any color from the wire dies away.
   b. Now dip the wire into HCl, and then into a sample of calcium salt. What color does it give to the flame now?
   c. Clean the wire again as before, and when clean repeat the test using a sample of powdered limestone. Recorded the color given to the flame. Is the color the same?
3. Is there calcium in bones?
   a. Dip the wire into the solution that the bone has been places in and carry out the flame test. Does this give a calcium flame test color? Recorded color in table

<table>
<thead>
<tr>
<th>Claim: There is calcium in bones.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item tested</td>
</tr>
<tr>
<td>Calcium Salt</td>
</tr>
<tr>
<td>Lime Stone</td>
</tr>
<tr>
<td>HCl with bone in it</td>
</tr>
</tbody>
</table>

**Reasoning:** Does the bone contain calcium (Answer using your evidence found)?

---

**The Iron in me**

- Iron is added to many ________________ like breakfast cereal.
- We need iron for ________________ in the blood.
- Some ________________ sources of iron are better than others.
- Iron in a common element in the ________________ crust and ________________; therefore it is not surprising that it is found in the human body.
- The role of iron in the human body is central to the process of ________________. In the human body is if found as the ion ________.
- People with not enough iron in the body can get ________________.

**Activity – The Iron in Me**

1. Measure out about 50 grams of cereal into a large beaker.
2. Put it in a moral and pestle to crush it, then return to the beaker.
3. Add about 500 mL of water.
4. Use a magnetic stirrer to stir the mixture for a few minutes.
5. Remove the stirrer bar using tweezers and look at it closely
6. What do you see?

<table>
<thead>
<tr>
<th>Claim: There is Iron in Breakfast Cereal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence (Observations)</td>
</tr>
</tbody>
</table>

**Reasoning:** Explain your evidence to support or disprove the claim

---

**The Carbon in me**
• The carbon in our bodies comes from the carbon that we ___________________. (fats, proteins, carbohydrates)
• We are made from ____________________ compounds (compounds made of ___________________, ___________________, and ___________________).
• Minerals like calcium are _________________________.
• When we burn foods that are high in carbon content, ____________________(black powder) is formed.
• The chemical reaction for this process is: ___________________________________________
• Our own bodies would also produce carbon if burnt (mainly due to the fat content of our bodies) – but it is best to try it with food instead.
• **Spontaneous Human Combustion** – clothing may act as a ____________ and the body ________ melts and vaporizes like a candle. Only the extremities (_____________ and ____________) are left.

**Activity – The Carbon in me**

**Lab Safety** – Use goggles. Make sure that the test tube opening is not pointing at anyone’s face.

1. Get a potato chip with a mass between 0.3-0.4 grams. Record it’s mass _________ grams.
2. Hold a potato chip (with high fat content) with tongs. Place the burning chip under a test tube half-full of cold water and light it in a Bunsen burner flame.
3. Wait until the food has burnt out.
4. How much soot has been deposited onto the test tube? What is the mass of the remaining “Black Soot” chip? _______ grams.
5. What is the difference in mass between the original chip and the burnt chip? Explain any differences in evidence section. (Remember The Law of Conservation of Mass: Mass cannot be created nor destroyed).

<table>
<thead>
<tr>
<th><strong>Claim:</strong> Carbon is found in living things</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evidence:</strong> (Observations)</td>
</tr>
<tr>
<td><strong>Reasoning:</strong> Explain your evidence to support or disprove the claim</td>
</tr>
</tbody>
</table>

**The Oxygen in me**
• The most _____________________ element in the human body is oxygen, most of which is combined with hydrogen as ___________________.
• Human life depends on ____________________, for which we need to draw ___________ from the gases in our ___________________________.
• Water intake comes from both ________________ liquids and from eating such things as _______________ and _________________.
• The gases in our atmosphere are ____________________, __________________________, and ________________________________
• The average person breathes in about ______________ liters of air each day when resting. When exercising, the air intake could be about ______________ liters of air every minute.

**Activity – Simulation of Oxygen in the air**

1. Fill the test tube provided full (level) of water then pour the water into a graduated cylinder to measure the volume of the water in the test tube. ________ mL (Record this volume in your data table as “Original Volume”).
2. Pour this water into the plastic weighing boat.
3. Place penny with candle in plastic weighing boat.
4. Light the candle and quickly put the test tube (upside down) over the burning candle so that the mouth of the test tube is under water.
5. As the flame burns and oxygen is used, the water will rise into the test tube to fill the space left by the oxygen.
6. When the candle burns out, mark the level of the water on the test tube with the marker.
7. Fill the test tube to the mark and measure its volume by pouring the water into a graduated cylinder to measure the volume of the water in the test tube. ________ mL (Record this volume in your data table as “volume of air left in the test tube”.
8. To figure the volume of the oxygen used, subtract the volume from the original volume from the volume of air left in the test tube. This is the amount of oxygen used by the burning candle.
9. Calculate Percent Oxygen in the air = $\frac{\text{Volume of oxygen used by candle}}{\text{Original amount of oxygen in test tube}} \times 100$
10. Record the percent oxygen in the air found from other groups and find the class average.

**Data Table**

<table>
<thead>
<tr>
<th>Description</th>
<th>mL</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original volume of oxygen in test tube</td>
<td></td>
<td>Found by filling test tube with water and recording its volume.</td>
</tr>
<tr>
<td>Volume of air left in the test tube</td>
<td></td>
<td>Found by filling test tube with water to the mark.</td>
</tr>
<tr>
<td>Volume of oxygen used by candle</td>
<td></td>
<td>Found by subtracting the original volume of oxygen from volume of air left in test tube</td>
</tr>
<tr>
<td>Percent Oxygen in the air</td>
<td></td>
<td>$\frac{\text{Volume of oxygen used by candle}}{\text{Original amount of oxygen in test tube}} \times 100$</td>
</tr>
<tr>
<td>Percent oxygen in air (other)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Claim: 21% of Earth’s Atmosphere is Oxygen gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidence: Class average – Percent O₂ in air.</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Reasoning: Explain your evidence to support or disprove the claim</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Questions (Calcium)

- We have a lot of Calcium inside us – Why?
- Calcium metal is a very reactive metal; therefore calcium needs to be in a compound in our body – Where is it found?
- Draw a calcium trail in nature using the following:
  - Rocks containing calcium are weathered
  - Calcium is incorporated into the soil
  - Calcium is absorbed through the roots of plants
  - Grass is eaten by the cows
  - Cows produce milk
  - Cheese is made from milk
  - We eat the cheese – and the calcium from it is cycled into our bones.

Questions (Iron)
• Where is most Iron found in the human body?

• What is it’s role, what does it do?

• Would you expect iron to be present as an element or a compound of iron in cereal?

Questions (Carbon)

• Where do carbon compounds that make up our bodies come from?

• Are our bodies’ mainly organic or inorganic compounds?

• What is spontaneous human combustion?

Questions (Oxygen)

• Where is most of the oxygen found in our body?

• How much air does the average person breath each day?

• What is the most abundant gas in our atmosphere?

• The human body needs oxygen for what process?
Lab Activity – The Calcium in Me
Calcium

• The major role of Calcium in the human body is as a component of bones.
Amount of Calcium in the Body

• The mass of Calcium in the body is 1 Kg in a 70 Kg person and is mainly found as an element in the bone.
Calcium compound

- Calcium is found in our body as a compound
The element calcium

- Elemental calcium is too reactive with water
Video: Calcium reacting with water

- [http://www.youtube.com/watch?feature=player_detailpage&v=8CikXayvzJ0](http://www.youtube.com/watch?feature=player_detailpage&v=8CikXayvzJ0)
Calcium is cycled in the body

- Calcium is a mineral that is slowly cycled into and out of the bones and is needed by children who are growing.
Calcium

- Osteoporosis is a disease that you can get if not enough calcium is in the bones.
Activity – The Calcium in me

Lab Safety: You must have goggles over your eyes. Be careful of open flame.
Calcium in a bone

• Remove the small bone from the solution of HCl with tweezers, rinse it off and dry it. Then compare it with an untreated bond.
• Pass the treated and untreated bones around your group.
Detecting calcium with flame tests

• Dip the flame test wire in hydrochloric acid and touch the tip of the wire into the bottom corner of a strong blue Bunsen flame, and hold it there until any color from the wire in the flame dies away.
Calcium Salt Flame Test

• Now dip the wire into acid, and then into a sample of a calcium salt. What color does it give to the flame now?
Limestone Flame test

• Clean the wire again as before, and when clean repeat the test using a sample of powdered limestone. Is the color given to the flame the same?
Dissolved bone flame test

• Now using this flame testing method to discover if there is calcium in bones. Dip the wire into the solution that the bone has been placed in and carry out the flame test. Does this give a calcium color?
• Where might the calcium in our bones have come from?
Lab – The Iron in Me
Iron

- Iron is added to many foods like breakfast cereal
Red Blood Cells

- We need iron for hemoglobin in the blood
Food Sources of Iron

Some iron food sources are better than others
Iron in the Earth

- Iron is a common element in the Earth’s crust and stars; therefore it is not surprising that it is found in the human body.
Iron is used to carry oxygen

- The role of iron in the human body is central to the process of respiration. In the Human body is it found as the ion $\text{Fe}^{2+}$. 

![Diagram of oxygen transport](image)
Too little Iron in the Human Body

- People with not enough iron in the body can get anemia

Symptoms of Anemia

- Central
  - Fatigue
  - Dizziness
  - Fainting

- Blood vessels
  - Low blood pressure

- Heart
  - Palpitations
  - Rapid heart rate
  - Chest pain
  - Angina
  - Heart attack

- Spleen
  - Enlargement

- Skin
  - Paleness
  - Coldness
  - Yellowing

- Respiratory
  - Shortness of breath

- Muscular
  - Weakness

- Intestinal
  - Changed stool color

Red = In severe anemia
Lab – The Iron in Me
Activity – The Iron in Me

• Measure out about 50 grams of crushed cereal into a beaker.
• Add about 500 mL of water
• Use a magnetic stirrer to stir the mixture for a few minutes.
• Remove the stirrer bar using tweezers and look at it closely
• What do you see?
Oxygen
Oxygen

• The most abundant element in the human body is oxygen, most of which is combined with hydrogen as water.

THE HUMAN BODY

BLOOD
83% Water

KIDNEYS
83% Water

LIVER
86% Water

MUSCLES
76% Water

BONES
22% Water

FAT
20% Water

SKIN
70% Water

CONNECTIVE TISSUE
60% Water

BRAIN
74.5% Water

THESE FOUR ELEMENTS MAKE UP 96.5% OF YOUR BODY WEIGHT.

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>% OF TOTAL BODY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>65.0</td>
</tr>
<tr>
<td>Carbon</td>
<td>18.6</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>9.7</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>3.2</td>
</tr>
<tr>
<td>Calcium</td>
<td>1.8</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>1.0</td>
</tr>
<tr>
<td>Potassium</td>
<td>0.4</td>
</tr>
<tr>
<td>Sodium</td>
<td>0.2</td>
</tr>
<tr>
<td>Chlorine</td>
<td>0.2</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.1</td>
</tr>
<tr>
<td>Sulfur</td>
<td>0.05</td>
</tr>
<tr>
<td>Iron</td>
<td>0.03</td>
</tr>
<tr>
<td>Iodine</td>
<td>0.03</td>
</tr>
</tbody>
</table>
• Human life depends on respiration, for which we need to draw air from the gases in our atmosphere.
Water intake comes from both drinking liquids and from eating such things as fruits and vegetables.
• The gases in our atmosphere are nitrogen, oxygen, and carbon dioxide.
• The average person breathes in about 14,500 liters of air each day when resting. When exercising, the air intake could be about 30-40 liters of air every minute.
Activity – The oxygen in me

• Problem: When you breathe deeply, are you breathing in oxygen? How much of the air that you breathe is made up of oxygen?
Safety:

• MUST WEAR GOGGLES
• Long hair needs to be tied back.
• No messing around with the fire.
• Note – The lab is a *simulation* on the amount of oxygen our air contains. The actual chemistry behind this lab is a bit more complex.
• Procedure:
• Fill the test tube provided full (level) of water then pour the water into a graduated cylinder to measure the volume of the water in the test tube. Record this volume in the cart below as “Original Volume”.
• Pour this water into the Petri dish.
• Place penny with candle in Petri dish.
• Light the candle and quickly put the upside-down test tube over the burning candle so that the mouth of the test tube is under water.
• As the flame burns and oxygen is used, the water will rise into the test tube to fill the space left by the oxygen.
• When the candle burns out, mark the level of the water on the test tube with the marker.
• To figure the volume of the oxygen used, fill the test tube to the mark (this is the amount of air in the upside-down test tube), find the volume and subtract the volume from the original volume to find the oxygen volume (volume of oxygen burned and replace by water).

• Repeat for 2 more trials, and record this data in the chart below.
The Carbon in Me
Carbon

• The carbon in our bodies comes from the carbon that we eat (fats, proteins, carbohydrates).
• We are made from organic compounds (compounds made of carbon, hydrogen, and oxygen). Minerals like calcium are inorganic.

<table>
<thead>
<tr>
<th>TABLE 3.1 Inorganic Versus Organic Molecules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inorganic Molecules</strong></td>
</tr>
<tr>
<td>Usually contain positive and negative ions</td>
</tr>
<tr>
<td>Usually ionic bonding</td>
</tr>
<tr>
<td>Always contain a small number of atoms</td>
</tr>
<tr>
<td>Often associated with nonliving matter</td>
</tr>
<tr>
<td><strong>Organic Molecules</strong></td>
</tr>
<tr>
<td>Always contain carbon and hydrogen</td>
</tr>
<tr>
<td>Always covalent bonding</td>
</tr>
<tr>
<td>Often quite large, with many atoms</td>
</tr>
<tr>
<td>Usually associated with living organisms</td>
</tr>
</tbody>
</table>
• When we burn foods that are high in carbon content, soot (black powder) is formed.
• Our own bodies would also produce carbon if burnt (mainly due to the fat content of our bodies)—but it is best to try it with food instead!
• Spontaneous Human Combustion – clothing may act as a wick and the body fat melts and vaporizes like a candle. Only the extremities (hands and feet) are left.
Activity – The Carbon in me

- Lab Safety – Use goggles. Make sure that the test tube opening is not pointing at anyone’s face.
- Hold a potato chip (with high fat content) with tongs. Light it in a Bunsen burner flame and place the burning chip under a test tube half-full of cold water.
- Watch for condensation forming on the tube and dripping onto the food sample – it might put out the flame.
- Wait until the food has burnt out.
- How much soot has been deposited onto the test tube?
LCTR - Minerals
Minerals

- Of the 100 known elements, 32 are believed to be essential to support human life. These 32 elements are called **minerals**.
Minerals

- Minerals are divided into 2 groups (both considered essential)
  - Major minerals (macrominerals) - 7 of these
    - Greater than 100 mg/kg per body mass needed by body
– Trace minerals (microminerals) – 11 of these
  • Less than 100 mg/kg per body mass needed by body
• Functions in the body
  – Part of the body’s **structure** (bones, teeth)
  – Help **enzymes** do their job
  – Maintain **health** of heart and organs (thyroid gland)

**WHY ARE MINERALS IMPORTANT?**

- Bone development
  - Ca, P, Mg, Mn, Cu

- Muscle development
  - P, S, Zn, Se

- Milk production
  - Ca, P, Mg, Zn

- Skin & claw health
  - Zn, Cu and Mn

- Hair coat
  - Cu, Zn, Se

- Fertility
  - P, Cu, Zn, Se, Mn

- Appetite
  - Mg, K, Zn, Co

- Nervous system
  - Mg, P, Cu

- Fetal development
  - Cu, Zn, Mn, Se

- Disease resistance
  - Cu, Zn, Mn, Se
The human body is one of the most complex structures in nature, yet it is made up of those same basic minerals and elements that are our natural resources.

Elements comprising the human body

- Oxygen 61%
- Carbon 23%
- Sulfur 0.20%
- Hydrogen 10%
- Nitrogen 2.6%
- Calcium 1.4%
- Phosphorus 1.1%
- Potassium 0.20%
- Sodium 0.14%
- Chlorine 0.12%
- Silicon 0.026%
- Magnesium 0.027%
- Iron 0.006%
- Zinc 0.0033%
- Fluoride 0.0037%
- Other 0.2607%

Other elements:
- Copper
- Cobalt
- Iodine
- Chromium
- Nickel
- Vanadium
- Germanium
- Arsenic
- Boron
- Tin
- Selenium
- Rubidium
- Manganese
- Molybdenum
- And more

Good health depends on supplying your body with these necessary nutrients.

Each of these elements fulfills a critical function in your life. Without them, a healthy body could not exist.
Many of these minerals are beneficial in low doses but become toxic at higher doses (arsenic)
## Macrominerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium (Ca)</td>
<td>Most abundant mineral in body, needed for teeth and bone health</td>
<td>Milk, dairy, canned fish</td>
<td>Rickets in children, osteoporosis in adults</td>
</tr>
</tbody>
</table>

Food sources of calcium include dairy products, green leafy vegetables and salmon and sardines.
# Macrominerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (Cl)</td>
<td>Helps clean waste matter to purify the blood</td>
<td>Table <strong>salt</strong>, meat, salt-processed foods</td>
<td>Heat cramps, hair and teeth loss</td>
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</table>
# Macrominerals

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</tr>
</thead>
<tbody>
<tr>
<td>Magnesium (Mg)</td>
<td>Co-enzymes used in bodies, biochemical reaction for energy</td>
<td>Seafood, cereal grains, nuts, dark <strong>green</strong> vegetables, cocoa</td>
<td><strong>Heart</strong> spasms, anxiety, disorientation</td>
</tr>
</tbody>
</table>
# Macrominerals

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<tr>
<th>Mineral</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus (P)</td>
<td>Helps form <strong>bones</strong> and teeth, needed for protein synthesis</td>
<td><strong>Meat</strong>, dairy, nuts, seeds, beans</td>
<td>Blood cell <strong>disorders</strong>, gastrointestinal tract and kidney dysfunction</td>
</tr>
</tbody>
</table>

**Essential for**

- Strong bones
- Teeth
- Energy from food
# Macrominerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium (K)</td>
<td>Builds proteins, is an electrolyte that is needed for electrical activity of the heart</td>
<td>Orange juice, bananas, dried fruits, potatoes</td>
<td>Poor nerve function, irregular heartbeat, sudden death during fasting</td>
</tr>
</tbody>
</table>
## Macrominerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (Na)</td>
<td>Controls <strong>blood</strong> pressure, electrolyte needed for muscle and nerve function</td>
<td>Table <strong>salt</strong>, meat, salt-processed food</td>
<td>Headache, weakness, <strong>thirst</strong>, poor memory, appetite loss</td>
</tr>
</tbody>
</table>
# Macrominerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sulfur (S)</strong></td>
<td>Protects joints, skin, hair, and nails. Use to make <strong>collagen</strong> in skin and tissues</td>
<td><strong>Protein</strong> (meat, eggs, legumes)</td>
<td>Conditions related to deficiencies in sulfur-containing essential amino acids</td>
</tr>
</tbody>
</table>
# Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium (Cr)</td>
<td>Improves bodies glucose utilization</td>
<td>Animal and plant tissue, liver</td>
<td>Loss of insulin efficiency with age</td>
</tr>
</tbody>
</table>

![Image of food sources and supplement bottle]

- Animal products
- Plant tissue
- Liver

*Swanson Chromium Picolinate*
## Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt (Co)</td>
<td></td>
<td>Animal protein, liver</td>
<td>Conditions related to deficiencies in cobalt-containing vitamin B₁₂</td>
</tr>
</tbody>
</table>
## Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (Cu)</td>
<td>Makes up vitamin $B_{12}$, need for the production of red blood cells</td>
<td>Egg Yolk, whole grains. Liver, kidney</td>
<td>Anemia in malnourished children</td>
</tr>
</tbody>
</table>
## Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorine (F)</td>
<td>Makes up bone and teeth</td>
<td>Seafood, fluoridated water</td>
<td>Dental decay</td>
</tr>
<tr>
<td></td>
<td>enamel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Image of teeth and seafood]
## Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodine (I)</td>
<td>Supports <strong>thyroid</strong> hormones and the thyroid gland</td>
<td>Seafood, iodized <strong>salt</strong></td>
<td>Goiter</td>
</tr>
</tbody>
</table>
# Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron (Fe)</td>
<td>Needed to transport $O_2$ in the body</td>
<td>Meat, <strong>green</strong> leafy vegetables, whole grains, liver</td>
<td>Anemia; <strong>tiredness</strong> number 1 deficiency in kids and women</td>
</tr>
</tbody>
</table>
# Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese (Mn)</td>
<td>Helps body form connective tissue, needed for brain and nerve function</td>
<td>Whole grains. Legumes, nuts, tea, leafy vegetables, liver</td>
<td>Infertility, bone growth problems, weakness, seizures</td>
</tr>
</tbody>
</table>

![Manganese bottle and illustration of the human body](image-url)
**Microminerals**

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molybdenum (Mo)</td>
<td>Helps break down <strong>toxins</strong> and regulated cell functions</td>
<td>Whole grains, <strong>legumes</strong>, leafy vegetables, liver, kidney</td>
<td>Weight loss, <strong>dermatitis</strong>, headache, nausea, disorientation</td>
</tr>
</tbody>
</table>
# Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selenium (Se)</td>
<td>Helps thyroid gland, antioxidant</td>
<td>Meat, liver, organ meats, grains, vegetables</td>
<td>Muscle weakness, Keshan disease (heart-muscle disease)</td>
</tr>
</tbody>
</table>
## Microminerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc (Zn)</td>
<td>Required for bodies enzymes to function; protein synthesis, wound healing</td>
<td>Shellfish, meat, wheat <strong>germ</strong>, legumes, liver</td>
<td>Anemia, growth retardation</td>
</tr>
<tr>
<td>Symbol</td>
<td>Element</td>
<td>Atomic #</td>
<td>Human Body (%)</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>----------</td>
<td>----------------</td>
</tr>
<tr>
<td>O</td>
<td>Oxygen</td>
<td>8</td>
<td>65.0</td>
</tr>
<tr>
<td>C</td>
<td>Carbon</td>
<td>6</td>
<td>18.5</td>
</tr>
<tr>
<td>H</td>
<td>Hydrogen</td>
<td>1</td>
<td>9.5</td>
</tr>
<tr>
<td>N</td>
<td>Nitrogen</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>Ca</td>
<td>Calcium</td>
<td>20</td>
<td>1.5</td>
</tr>
<tr>
<td>P</td>
<td>Phosphorous</td>
<td>15</td>
<td>1.0</td>
</tr>
<tr>
<td>K</td>
<td>Potassium</td>
<td>19</td>
<td>0.4</td>
</tr>
<tr>
<td>S</td>
<td>Sulfur</td>
<td>16</td>
<td>0.3</td>
</tr>
<tr>
<td>Na</td>
<td>Sodium</td>
<td>11</td>
<td>0.2</td>
</tr>
<tr>
<td>Cl</td>
<td>Chlorine</td>
<td>17</td>
<td>0.2</td>
</tr>
<tr>
<td>Mg</td>
<td>Magnesium</td>
<td>12</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Trace elements (less than 0.01%): boron (B), chromium (Cr), cobalt (Co), copper (Cu), fluorine (F), iodine (I), iron (Fe), manganese (Mn), molybdenum (Mo), selenium (Se), silicon (Si), tin (Sn), vanadium (V), and zinc (Zn).

Source: Data from Campbell, Biology, Third Edition, Benjamin Cummings.
Manganese

Essential for:
A trace element required for life, helps activate enzymes in the body.
Elements Found in the Human Body

<table>
<thead>
<tr>
<th>Common Elements</th>
<th>Trace Elements</th>
<th>Remaining Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Be</td>
<td></td>
</tr>
<tr>
<td>Li</td>
<td>Mg</td>
<td>Al, Si, P, S, Cl, Ar</td>
</tr>
<tr>
<td>Na</td>
<td>K</td>
<td>Sc, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe</td>
</tr>
<tr>
<td>Rb</td>
<td>Sr</td>
<td></td>
</tr>
<tr>
<td>Cs</td>
<td>Ba</td>
<td></td>
</tr>
<tr>
<td>Fr</td>
<td>Ra</td>
<td></td>
</tr>
<tr>
<td>Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu</td>
<td>Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr</td>
<td></td>
</tr>
</tbody>
</table>
Elements in the Body

Oxygen
Symbol: O
Abundance in Body: 85%
Uses: Respiration and water

Carbon
Symbol: C
Abundance in Body: 18%
Uses: Organic molecules, carbon dioxide

Hydrogen
Symbol: H
Abundance in Body: 10%
Uses: Water, organic molecules, energy

Nitrogen
Symbol: N
Abundance in Body: 3%
Uses: DNA, proteins, other organic compounds

Calcium
Symbol: Ca
Abundance in Body: 1.5%
Uses: Bones, teeth, muscle function

Potassium
Symbol: K
Abundance in Body: 0.4%
Uses: Electrolyte, muscle contraction

Sulfur
Symbol: S
Abundance in Body: 0.3%
Uses: Amino acids, proteins, cellular respiration

Sodium
Symbol: Na
Abundance in Body: 0.15%
Uses: Electrolyte, fluid regulation

Magnesium
Symbol: Mg
Abundance in Body: 0.05%
Uses: Bones, biochemical reactions

Phosphorus
Symbol: P
Abundance in Body: 1%
Uses: Bones, energy

All other Elements
Abundance in Body: < 1%
Uses: Hemoglobin, enzymes
Some trace elements have no known function.

96% of body mass consists of 4 elements.
50% to 75% of body mass is water.
All organic compounds have carbon and hydrogen.
LCTR notes – Minerals

Of the 100 known elements, _______ are believed to be essential to support human life. These 32 elements are called _____________________________.

- Minerals are divided into _______ groups (both considered essential)
  - Major minerals (_________________________) - _______ of these
    - ________________ than 100 mg/kg per body mass needed by body
  - Trace minerals (_________________) – _______ of these
    - ________________ than 100 mg/kg per body mass needed by body

- Functions in the body
  - Part of the body’s ________________ (bones, teeth)
  - Help ________________ do their job
  - Maintain ________________ of heart and organs (thyroid gland)

- Many of these minerals are beneficial in _______ doses but become ________________ at higher doses (arsenic)
<table>
<thead>
<tr>
<th>Mineral</th>
<th>Function in Body</th>
<th>Food Sources</th>
<th>Deficiency condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macrominerals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>Most ___________ mineral in body, needed for ___________ and bone health</td>
<td>Milk, ___________, canned fish</td>
<td>___________ in children, osteoporosis in adults</td>
</tr>
<tr>
<td>Chlorine (Cl)</td>
<td>Helps clean ___________ matter to purify the blood</td>
<td>Table __________, meat, salt-processed foods</td>
<td>Heat cramps, hair and teeth loss</td>
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<tr>
<td>Magnesium (Mg)</td>
<td>Co-enzymes used in bodies biochemical reaction for ___________</td>
<td>Seafood, cereal grains, nuts, dark ____________ vegetables, cocoa</td>
<td>___________ spasms, anxiety, disorientation</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>Helps form ___________ and teeth, needed for protein synthesis</td>
<td>____________, dairy, nuts, seeds, beans</td>
<td>Blood cell ___________, gastrointestinal tract and kidney dysfunction</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>Builds proteins, is an electrolyte that is needed for electrical activity of the ___________</td>
<td>Orange juice, ____________, dried fruits, potatoes</td>
<td>Poor ___________ function, irregular heartbeat, sudden death during fasting</td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>Controls ___________ pressure, electrolyte needed for muscle and nerve function</td>
<td>Table __________, meat, salt-processed food</td>
<td>Headache, weakness, ___________, poor memory, appetite loss</td>
</tr>
<tr>
<td>Sulfur (S)</td>
<td>Protects joints, skin, hair, and nails. Use to make ___________ in skin and tissues</td>
<td>____________ (meat, eggs, legumes)</td>
<td>Conditions related to deficiencies in sulfur-containing essential amino acids</td>
</tr>
<tr>
<td><strong>Trace Minerals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>Improves bodies ___________ utilization</td>
<td>Animal and plant ____________, liver</td>
<td>Loss of ___________ efficiency with age</td>
</tr>
<tr>
<td>Cobalt (Co)</td>
<td></td>
<td>Animal protein, liver</td>
<td>Conditions related to deficiencies in cobalt-containing vitamin B₁₂</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>Makes up vitamin ___________, need for the production of ___________ blood cells</td>
<td>Egg ____________, whole grains. Liver, kidney</td>
<td>___________ in malnourished children</td>
</tr>
<tr>
<td>Fluorine (F)</td>
<td>Makes up bone and teeth ___________</td>
<td>____________, fluoridated water</td>
<td>___________ decay</td>
</tr>
<tr>
<td>Iodine (I)</td>
<td>Supports ____________ hormones and the thyroid gland</td>
<td>Seafood, iodized ___________</td>
<td>Goiter</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>Needed to transport ___________ in the body</td>
<td>Meat, ____________ leafy vegetables, whole grains, liver</td>
<td>Anemia; ___________ number 1 deficiency in kids and women</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>Helps body form connective tissue, needed for ___________ and nerve function</td>
<td>Whole grains. Legumes, nuts, tea, leafy vegetables, liver</td>
<td>Infertility, bone ___________ problems, weakness, seizures</td>
</tr>
<tr>
<td>Element</td>
<td>Function and Deficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molybdenum (Mo)</td>
<td>Helps break down _______ and regulated cell functions, Whole grains, ________, leafy vegetables, liver, kidney, Weight loss, ____________, headache, nausea, disorientation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>Helps thyroid gland, ____________, Meat, liver, organ meats, grains, ____________, Muscle weakness, Keshan disease (heart-muscle disease)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>Required for bodies ___________ to function; protein synthesis, wound healing, Shellfish, meat, wheat ________, legumes, liver, Anemia, __________retardation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Elements Found in the Human Body

![Elements in the Body](image)

- **Common Elements**
- **Trace Elements**
- **Remaining Elements**

---

437
Nutrient Research Project

Due Date: _____________________________

You will sign up for a nutrient found in food and present it to the class by PowerPoint or Video. Follow the grading rubric for what needs to be in your project. You may choose to work alone or in a group of two.

Below is a list of the choices for your project

<table>
<thead>
<tr>
<th>Calcium</th>
<th>fluorine</th>
<th>Vitamin B5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine</td>
<td>iodine</td>
<td>Vitamin B6</td>
</tr>
<tr>
<td>Magnesium</td>
<td>iron</td>
<td>Vitamin B7</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>manganese</td>
<td>Vitamin B9</td>
</tr>
<tr>
<td>Potassium</td>
<td>molybdenum</td>
<td>Vitamin B12</td>
</tr>
<tr>
<td>Sodium</td>
<td>selenium</td>
<td>Vitamin C</td>
</tr>
<tr>
<td>sulfur</td>
<td>zinc</td>
<td>Vitamin A</td>
</tr>
<tr>
<td>chromium</td>
<td>Vitamin B1</td>
<td>Vitamin D</td>
</tr>
<tr>
<td>cobalt</td>
<td>Vitamin B2</td>
<td>Vitamin E</td>
</tr>
<tr>
<td>copper</td>
<td>Vitamin B3</td>
<td>Vitamin K</td>
</tr>
</tbody>
</table>

Nutrient Research Project – Rubric Grade sheet

Name _____________________________________________________  Period _________

<table>
<thead>
<tr>
<th>Points</th>
<th>Possible points</th>
<th>Information Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name of nutrient: common and scientific (look for active ingredient in supplements for minerals)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Functions of nutrient; daily requirement</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Does it need a cofactor for absorption in the body?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fat/water soluble; molecular picture;</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Deficiencies; Examples with pictures</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Overdose; What does body do with it?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Foods it is in; more appetizing ideas</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 interesting facts</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Pictures with each slide</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Organization</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>creativity</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Topic and content literacy</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Level and difficulty of understanding</td>
<td></td>
</tr>
<tr>
<td>34 total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discuss with your group if you think these fallacies are true or false and the reason for your choice.

<table>
<thead>
<tr>
<th>FALLACIES</th>
<th>FACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If you eat a lot of fast foods or sweets, taking supplements will make up for the missing nutrients in your diet.</td>
<td></td>
</tr>
<tr>
<td>2. If you miss a meal or eat poorly for a day or two, you need to take water-soluble vitamins since they are not stored in the body and must be replaced quickly.</td>
<td></td>
</tr>
<tr>
<td>3. If you are under a lot of stress, you should take a special stress vitamin.</td>
<td></td>
</tr>
<tr>
<td>4. Women need supplements more than men because women eat less food and have a harder time getting enough of the necessary nutrients.</td>
<td></td>
</tr>
<tr>
<td>5. Vitamin and mineral supplements will improve athletic performance.</td>
<td></td>
</tr>
<tr>
<td>6. Vitamin and mineral supplements must be safe because they are regulated by the government.</td>
<td></td>
</tr>
<tr>
<td>7. Vitamin C has been demonstrated to prevent or cure the common cold.</td>
<td></td>
</tr>
<tr>
<td>8. In truth, no one really needs to take vitamin and mineral supplements.</td>
<td></td>
</tr>
</tbody>
</table>
Vitamin Matching Game

On this page there is a list of vitamins and pictures of food. Draw a line from the vitamins to the foods that contain them. Keep in mind that some foods can have more than one vitamin. Good luck! 

Vitamin A
Vitamin D
Vitamin E
Vitamin K
Thiamin
Riboflavin
Niacin
Vitamin B6
Folate
Vitamin B12
Vitamin C
Put a check in the box under the vitamin if that food contains it. Highlight the box that food is considered to be a high source for that vitamin. (Use the Internet to research)

<table>
<thead>
<tr>
<th></th>
<th>Vitamin A</th>
<th>Thiamine</th>
<th>Riboflavin</th>
<th>Niacin</th>
<th>Vitamin C</th>
<th>Iron</th>
<th>Vitamin E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomato</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asparagus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mushrooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakfast cereal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans/legumes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strawberries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watermelon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peppers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the data you have collected, what food would you consider being “Superfoods” or those containing the highest amount of nutrition? List them below.
LCTR - Vitamins
Vitamins

- You take a vitamin tablet in the morning. Someone says eat your fruit and vegetables because they have vitamins. What is so important about vitamins?
Vitamins

• While they do not provide energy like protein from meat and sugar from breads, they do help convert this energy into the energy your body uses.

• Since our bodies can’t make vitamins we need to get them from the food we eat.
Vitamins

• **Vitamins** – **biomolecules** needed for growth, reproduction, health, and life.

Classifications based on solubility

• **Water soluble**
  – Polar functional groups
  – Pass directly into the **blood** stream
  – Not **stored** in the body
  – Must be **ingested** daily
  – Note: some water soluble vitamins (B and C) are **destroyed** by heat in cooking
Water Soluble Vitamins

What makes these vitamins chemically polar?

- Vitamin B₁
- Vitamin B₂
- Vitamin B₆
- Vitamin B₁₂
- Nicotine amide
- Nicotine acid
- Ascorbic glucoside
- Erythorbic acid

447
Classifications based on solubility

- **Fat soluble**
  - Non-polar functional groups
  - Absorbed into the body from the intestine
  - Stored in body fat, therefore do not need to be eaten daily
  - Can become toxic if too much is consumed
Fat Soluble Vitamins

What makes these vitamins non-polar?

Lipid Soluble Vitamins

- **vitamin A**
  - C$_{20}$H$_{30}$O
  - part of the visual pigment
- **vitamin D$_2$**
  - C$_{28}$H$_{44}$O
  - calcium metabolism & bone growth
- **vitamin E**
  - C$_{29}$H$_{50}$O$_2$
  - an antioxidant
- **vitamin K$_1$**
  - C$_{31}$H$_{46}$O$_2$
  - a blood clotting factor
## Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>B₁ (Thiamine)</td>
<td>helps convert the food we eat to the energy we need</td>
<td>spinach, tomato juice, watermelon, sunflower seeds, ham</td>
<td>weakness, tingling in feet and hands, poor coordination</td>
</tr>
</tbody>
</table>

**Vitamin B₁ (Thiamine)** helps the body convert food into energy, and aids the function of the heart and cardiovascular system and the brain and nervous system.

RDA: 1.5 mg

Water-soluble

Vitamin B1 (Thiamine) is found in fortified breads and cereals, fish, lean meats and milk.
# Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_2$ (Riboflavin)</td>
<td>helps convert the food we eat to the energy we need</td>
<td>milk, cheese, liver, <strong>broccoli</strong>, asparagus, spinach</td>
<td><strong>eye</strong> disorders, cracks at corners of <strong>mouth</strong>, swollen tongue</td>
</tr>
</tbody>
</table>

**Riboflavin (vitamin B2)** works with other B vitamins to promote healthy growth and tissue repair, and helps release energy from carbohydrates.

- Healthy skin
- RDA: 1.7 mg
- Water-soluble
- Healthy red blood cell production

**Food sources of Riboflavin (vitamin B2):**
- Cereal, nuts, milk, eggs, green leafy vegetables and lean meat
# Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_3$ (niacin)</td>
<td>helps our body use the fat and sugar we eat for energy, keeps our skin healthy</td>
<td>mushrooms, tuna, green beans, broccoli, spinach, breakfast cereals</td>
<td>diarrheam skin problems, mental disorientation</td>
</tr>
</tbody>
</table>

Food sources of Niacin (vitamin B3) include dairy, poultry, fish, lean meat, nuts and eggs.
# Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_5$ (<strong>pantothenic acid</strong>)</td>
<td>Helps convert fats and <strong>carbohydrates</strong> into energy</td>
<td><strong>Foods</strong> — liver, kidneys, yeast, <strong>egg yolk</strong>, broccoli, whole grains, yogurt, <strong>legumes</strong>, avocados, sweet potatoes</td>
<td><strong>Anemia</strong>, insomnia</td>
</tr>
</tbody>
</table>

Liver, yeast, and salmon have high concentrations of pantothenic acid, but most other foods, including vegetables, dairy, eggs, grains, and meat, also provide some pantothenic acid.
# Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
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<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_6$ (pyridoxine)</td>
<td>helps make red blood cells, helps your body use the fat and protein we eat for energy</td>
<td>spinach, broccoli, tomato juice, banana, watermelon, chicken breast</td>
<td>headache, convulsions, vomiting, flaky skin, sore tongue</td>
</tr>
</tbody>
</table>

**Vitamin B6 (pyridoxine)** includes beans, legumes, nuts, eggs, meats, fish, breads, and cereals.

Vitamin B6 (pyridoxine) is important for maintaining healthy brain function, the formation of red blood cells, the breakdown of protein, and the synthesis of antibodies in support of the immune system.

Adult RDA: 2 mg

Water-soluble
## Water Soluble Vitamins

<table>
<thead>
<tr>
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<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_7$ (<em>biotin</em>)</td>
<td>Helps support kidney function, nervous system, and metabolism</td>
<td>kidneys, liver, egg yolk, yeast, nuts</td>
<td>dermatitis</td>
</tr>
</tbody>
</table>
# Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_9$ <em>(Folic acid)</em></td>
<td>helps make new cells, helps prevent heart disease</td>
<td>asparagus, <em>broccoli</em>, corn flakes, beans, tomato juice</td>
<td>diarrhea, mental disorders, poor growth</td>
</tr>
</tbody>
</table>

*Food sources of folate include beans and legumes, citrus fruits and juices, whole grains, dark green leafy vegetables, poultry, pork, shellfish and liver.*
# Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_{12}$</td>
<td>helps make <strong>red</strong> blood cells, helps our body use the fat and protein we eat for energy.</td>
<td>meat, fish, poultry, milk, cheese, <strong>eggs</strong></td>
<td><strong>anemia</strong>, poor nerve function</td>
</tr>
</tbody>
</table>

**Vitamin B12**

Food sources of vitamin B12:

- Eggs, meat, poultry, shellfish, milk and milk products

- Vitamin B12 is important for metabolism, the formation of red blood cells, and the maintenance of the central nervous system, which includes the brain and spinal cord.
# Water Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Vitamin C</em></td>
<td>protects cells from <strong>damage</strong>, helps keep bones and <strong>skin</strong> healthy, may help prevent cancer and heart disease</td>
<td>organs, strawberries, peppers, kiwi, <strong>broccoli</strong>, spinach</td>
<td>bleeding gums, <strong>tiredness</strong>, weakness, sore muscles</td>
</tr>
</tbody>
</table>

*Citrus fruits, green peppers, strawberries, tomatoes, broccoli and sweet and white potatoes are all excellent food sources of vitamin C (ascorbic acid)*

Vitamin C promotes a healthy immune system, helps wounds heal, maintains blood vessels and connective tissue and aids in the absorption of iron

RDA: 60 mg

*ADAM*
James Lind, a surgeon in the Royal Navy, conducted clinical tests that proved that citrus fruits and their juices would cure and prevent scurvy, the disease which killed a million seamen between 1600 and 1800. In this painting he is shown aboard HMS Salisbury in 1747. Lind published his paper, A Treatise on the Scurvy was published in 1751. He later became Chief Surgeon of the Royal Naval Hospital and published many more papers on how to safeguard the health of sailors.

Image from A History of Medicine in Pictures, published by Parke, Davis & Co. in 1960; Artist: Robert A.Thom
# Fat Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A (retinol)</td>
<td>Helps with <strong>eye</strong> site, keeps skin healthy, and helps with growth of body organs (like bones)</td>
<td>liver, fish, milk, butter, <strong>eggs</strong>, and carrots</td>
<td>night blindness, poor <strong>growth</strong>, and dry skin</td>
</tr>
</tbody>
</table>

---

**Vitamin A**
- The benefits of vitamin A:
  - Maintains health of specialized tissues such as the retina
  - Aids in growth and health of skin and mucous membranes
  - Promotes normal development of teeth, soft and skeletal tissue

**Adult RDA:**
- 3000 IU (900 mcg) for men
- 2330 IU (700 mcg) for women

**Fat-soluble**

[Diagram showing sources of vitamin A and beta-carotene:]
- Vitamin A comes from animal sources such as eggs, meat and dairy products
- Beta-carotene, a precursor of vitamin A, comes from green, leafy vegetables and intensely colored fruits and vegetables

---

**Image:**
- Illustration of vitamin A benefits and dietary sources.
# Fat Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vitamin D</strong></td>
<td>helps <strong>bones</strong> grow</td>
<td>liver, <strong>egg yolks</strong>,</td>
<td><strong>rickets</strong> (deformed</td>
</tr>
<tr>
<td><em>(calciferol)</em></td>
<td>strong</td>
<td>milk, butter</td>
<td>bones), weak bones</td>
</tr>
</tbody>
</table>

- **Vitamin D (calciferol)** is made in the skin by the sun.

A deficiency of vitamin D or an inability to utilize vitamin D may lead to a condition called rickets, a weakening and softening of the bones brought on by extreme calcium loss.

The body itself makes vitamin D when it is exposed to the sun.

Cheese, butter, margarine, fortified milk, fish, and fortified cereals are food sources of vitamin D.
# Fat Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vitamin E</strong></td>
<td>protects <strong>lungs</strong> against pollution damage, helps keep heart healthy, may help protect against <strong>cancer</strong></td>
<td>sweet potatoes, peanut butter, sunflower seeds, <strong>spinach</strong>, nuts</td>
<td><strong>nerve</strong> destruction, red blood cell destruction</td>
</tr>
</tbody>
</table>

**Vitamin E** *(tocopherol)*—called the anti-aging vitamin

The benefits of vitamin E:
- Protects cell membranes and tissues from damage by oxidation
- Aids in the formation of red blood cells and the use of vitamin K
- Promotes function of a healthy circulatory system

Adult RDA: 10 mg α-TE

Fat-soluble

Vitamin E is found in corn, nuts, olives, green, leafy vegetables, vegetable oils and wheat germ, but food alone cannot provide a beneficial amount of vitamin E, and supplements may be helpful.
## Fat Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Foods</th>
<th>Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin K</td>
<td>helps make blood clot,</td>
<td>liver, cabbage, lettuce,</td>
<td>hemorrhage</td>
</tr>
<tr>
<td>menaquinone)</td>
<td>helps keep bones healthy</td>
<td>spinach, milk, meat, eggs</td>
<td></td>
</tr>
<tr>
<td>- made by bacteria in our intestines</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Food sources of vitamin K include cabbage, cauliflower, spinach and other green, leafy vegetables, as well as cereals.

Vitamin K benefits blood clotting.

RDA: Not established
Fat-soluble
Elements that make up the Human Body

• https://www.youtube.com/watch?feature=player_detailpage&v=FRTF4UMhTDc
• https://www.youtube.com/watch?feature=player_detailpage&v=wF1tXAoNemk
LCTR notes – ABC’s of Vitamins

You take a vitamin tablet in the morning. Someone says eat your fruit and vegetables because they have vitamins. What is so important about vitamins? While they do not provide energy like protein from meat and sugar from breads, they do help ______________ this ____________ into the energy your body uses.

Since our bodies can’t ____________ vitamins we need to get them from the __________ we eat.

Vitamins – ________________ needed for growth, reproduction, health, and life.

Classifications based on solubility

- **Water soluble**
  - ____________ functional groups
  - Pass directly into the ______________ stream
  - Not ____________ in the body
  - Must be ______________ daily
  - Note: some water soluble vitamins (B and C) are ____________ by heat in cooking

What makes these vitamins chemically Polar?

- Vitamin B₁
- Vitamin B₂
- Vitamin B₆
- Vitamin B₁₂
- Ascorbic glucoside
- Nicotine amide
- Nicotine acid
- Erythorbic acid
- **Fat soluble**
  - __________ functional groups
  - Absorbed into the body from the __________
  - Stored in body __________, therefore do not need to be eaten daily
  - Can become __________ if too much is consumed

**Lipid Soluble Vitamins**

- Vitamin A
  - $C_{20}H_{30}O$
  - Part of the visual pigment

- Vitamin D2
  - $C_{28}H_{44}O$
  - Calcium metabolism & bone growth

- Vitamin E
  - $C_{29}H_{50}O_2$
  - An antioxidant

- Vitamin K1
  - $C_{31}H_{46}O_2$
  - A blood clotting factor

**Water Soluble Vitamins**

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Function</th>
<th>Food sources</th>
<th>Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_1$</td>
<td>important</td>
<td>helps convert the food we eat to the energy we need</td>
<td>tingling in feet and hands, poor coordination</td>
</tr>
<tr>
<td>$B_2$</td>
<td>named for its yellow color (flavus means yellow in Latin)</td>
<td>helps convert the food we eat to the energy we need</td>
<td>disorders, cracks at corners of tongue, swollen tongue</td>
</tr>
<tr>
<td>$B_3$</td>
<td></td>
<td>helps our body use the food we eat for energy, keeps our body healthy</td>
<td>diarrhean problems, disorientation</td>
</tr>
<tr>
<td>$B_5$</td>
<td>(acid)</td>
<td>Helps convert fats and cholesterol into energy</td>
<td>insomnia</td>
</tr>
<tr>
<td>$B_6$</td>
<td></td>
<td>helps make blood cells, helps your body use the fat and protein we eat for energy</td>
<td>convulsions, vomiting, flaky skin, sore tongue</td>
</tr>
<tr>
<td>Vitamin</td>
<td>Description</td>
<td>Food Sources</td>
<td>Function</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>$B_7$ (__________)</td>
<td>Helps support function, nervous system, and metabolism</td>
<td>kidneys, liver, ________, yeast, nuts</td>
<td>dermatitis</td>
</tr>
<tr>
<td>$B_9$ (__________ acid)</td>
<td>Helps make new cells, helps prevent ________ disease</td>
<td>asparagus, ________, corn flakes, beans, tomato juice</td>
<td>diarrhea, mental disorders, poor ________</td>
</tr>
<tr>
<td>$B_{12}$ (_____________)</td>
<td>Helps make ________ blood cells, helps our body use the fat and protein we eat for energy.</td>
<td>meat, fish, poultry, milk, cheese, ________</td>
<td>________, poor nerve function</td>
</tr>
<tr>
<td>Vitamin C (__________) – almost all animals make vitamin C in their bodies (only humans, guinea pigs, some bats, and some fish don’t)</td>
<td>Protects cells from ________, helps keep bones and ________ healthy, may help prevent cancer and heart disease</td>
<td>organs, strawberries, peppers, kiwi, Brussels sprouts, ________, spinach</td>
<td>bleeding gums, ________, weakness, sore muscles</td>
</tr>
</tbody>
</table>

**Fat Soluble Vitamins**

<table>
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<tr>
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<th>Description</th>
<th>Food Sources</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A (__________) – discovered in 1913</td>
<td>Helps with ________ site, keeps skin healthy, and helps with growth of body organs (like bones)</td>
<td>liver, fish, milk, butter, ________, and carrots</td>
<td>night blindness, poor ________, and dry skin</td>
</tr>
<tr>
<td>Vitamin D (_____________) – made in the skin by the sun</td>
<td>Helps ________ grow strong</td>
<td>liver, ________, milk, butter</td>
<td>________ (deformed bones), weak bones</td>
</tr>
<tr>
<td>Vitamin E (_____________) – called the anti-aging vitamin</td>
<td>Protects ________ against pollution damage, helps keep heart healthy, may help protect against ________</td>
<td>sweet potatoes, peanut butter, sunflower seeds, ________, nuts</td>
<td>________ destruction, red blood cell destruction</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>Helps make blood ________, helps keep bones healthy</td>
<td>liver, cabbage, lettuce, ________, milk, meat, ________</td>
<td>hemorrhage</td>
</tr>
</tbody>
</table>
Enhancing learning and teaching

Online Experimentation

Global Experiment Chemistry Week 2013

The Global Experiment is the most engaging way to take part in Chemistry Week. Test your fruit and vegetables for vitamin C using simple kitchen equipment and household items.

Analyse the results from all Global Experiment participants from around the world.

Tweet about your Global Experiment experience and share your images using Aglabsexperiment.

Download the Global Experiment instructions and certificate
Submit your experiment data

Global Experiment Results Chart

Select Criteria: Fruit or Vegetable Tested

<table>
<thead>
<tr>
<th>Fruit or Vegetable Tested</th>
<th>Average Vitamin C (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>0.42</td>
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<tr>
<td>Orange</td>
<td>0.64</td>
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<tr>
<td>Broccoli</td>
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<tr>
<td>Peas</td>
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<tr>
<td>Cabbage</td>
<td>0.80</td>
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<tr>
<td>Red Pepper</td>
<td>0.23</td>
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</table>

Global Experiment Map

Pacific High School

No. of Participants: 5
Age Group: 3-12
First or Regular Testing: Yes
Country of Origin: USA
Race or Ethnic: White
Sex: Male
Other: 00

Other High Schools

<table>
<thead>
<tr>
<th>School</th>
<th>No. of Participants</th>
<th>Age Group</th>
<th>First or Regular Testing</th>
<th>Country of Origin</th>
<th>Race or Ethnic</th>
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<td>Canada</td>
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Other Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>No. of Participants</th>
<th>Age Group</th>
<th>First or Regular Testing</th>
<th>Country of Origin</th>
<th>Race or Ethnic</th>
<th>Sex</th>
<th>Other</th>
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</thead>
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<tr>
<td>John</td>
<td>5</td>
<td>1-5</td>
<td>Yes</td>
<td>USA</td>
<td>White</td>
<td>Male</td>
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</table>
Lab – Measuring the Vitamin C content in food

Name _____________________________________________ Date ______

Background

Although most mammals can synthesize vitamin C, or ascorbic acid (C₆H₈O₆), from sugars, humans must ingest considerable quantities of this substance. The National Academy of Sciences recommends the consumption of 60 mg of ascorbic acid per day. Vitamin C deficiency, which typically causes abnormalities in bones and teeth, was first characterized in sailors in the eighteenth century (commonly known as scurvy). These abnormalities were eliminated by compelling sailors to eat limes, a source of vitamin C. British sailors were nicknamed “limeys” because of their lime eating ways. The chemical structure of vitamin C was determined in 1933 and it was called ascorbic acid in recognition of its anti-scurvy properties. Many vegetables also contain large quantities of vitamin C, but ascorbic acid is commonly destroyed by many cooking processes, and hence citrus fruits are regarded as the most reliable source of vitamin C. Vitamin C acts as an antioxidant in the body to prevent oxidation of body cells. It is thus a reducing agent. The chemical structure of vitamin C is shown above.

To find out how much vitamin C is in foods we allow it to react with iodine. We can show that iodine is present in a solution by using starch – this produces a characteristic purple/black color. It is possible to measure the amount of vitamin C in a liquid by counting the number of drops of iodine required to react with all the vitamin C present. It is also possible to calibrate your tincture of iodine using a known amount of vitamin C dissolved in a known amount of water.

Iodine is widely used as an antiseptic, but care must be taken when using it for this experiment. It is for external use only and may stain skin, clothes and surfaces.

Purpose

Many fruits and vegetables contain vitamin C. Some of these we eat raw, others cooked and some are squeezed into juice as a drink. In these experiments we will extract vitamin C from food and test how much is present.

Fruits and Vegetables to be tested:

<table>
<thead>
<tr>
<th>Broccoli</th>
<th>Potato</th>
<th>Red pepper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>Kiwi</td>
<td>Orange</td>
</tr>
<tr>
<td>Pink grapefruit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Preparation

- **Grated**: broccoli, apple, potato, red pepper
- **Juiced and grated**: orange, kiwi, pink grapefruit
Part 1 – Calibrate your iodine solution

You need to know how much of your iodine solution is required to oxidize a given amount of vitamin C. This is known as calibration and can be done using a soluble vitamin C tablet, where the weight of vitamin C is shown on the label.

Starch and Iodine combine to form a complex resulting in a deep purple/black color. This gives a clear endpoint for the reaction.

Materials

- Standard vitamin C solution (1000mg/1000mL)
- Starch solution indicator
- Iodine tincture with dropper
- Distilled water
- 250 mL beaker (two)
- 10 mL graduated Cylinder
- 100 mL graduated cylinder
- Food sample to be tested

Procedure

1. Record the mass of vitamin C tablet used to make the standard vitamin C solution.
2. Place 10 mL of the standard vitamin C solution into a 250 mL beaker. Record this amount into your data table.
3. Dilute the standard vitamin c solution by adding 100 mL of distilled water.
4. Add 5 ml of starch solution to your beaker and stir.
5. Carefully add the iodine (drop-by-drop) into the beaker and count the number of drops. Stir the solution gently after each drop. Stop adding drops when the solution turns a deep purple/black color. Stir the solution for a further 30 seconds to ensure the color change remains. Record the total number of Drops required in your data table.
6. Calculate the mass of vitamin C that reacts with one drop of iodine.
7. Repeat the above procedure two more times and record you data.
8. Calculate the average mass of vitamin C that reacts with one drop of iodine.

<table>
<thead>
<tr>
<th>Volume (10 mL) of standard vitamin C solution added to beaker</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drops of Iodine added</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculated: mg of vitamin C in (10 mL) of standard solution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculated: mg vitamin C/drops of iodine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average mg vitamin C/drops of iodine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: One drop of iodine reacts with ____________ mg of vitamin C.

Calculation Help:

Milligrams vitamin C in (10 mL of solution): \( \frac{X \text{ mg Vit C}}{10 \text{ mL std solution}} = \frac{1000 \text{ mg Vit C}}{1000 \text{ mL std solution}} \)

Milligrams vitamin C per drops of iodine: \( \frac{X \text{ mg Vitamin C}}{\# \text{ drops iodine added}} \)
Part 2 – Testing your foods for vitamin C

Your food sample _____________________________________________________

1. Cut approximately 10 grams of your food and **record the mass in the data table**.
2. Chop, grate, or juice the fruit or vegetable into small pieces and add to a 250 mL beaker.
3. Add 100 mL of water to your prepared sample.
4. Gently stir the pulp and water mixture for 1 min.
5. Allow the pulp to settle. Decant off the liquid into a clean 250 mL beaker.
6. Add 5 ml of starch solution to the liquid and stir.
7. Carefully add iodine to the mixture drop by drop. Count the number of drops as you add them and stir the solution gently after each drop. Stop when the solution turns a deep purple/black color. Stir the solution for a further 30 seconds to ensure the color change is permanent. Record the total number of drops of iodine added.
8. Repeat the experiment two more times and **record the data in table**.
9. Average your results.
10. Calculate the mass of vitamin C in milligrams per gram of food
11. Post your data on the class data sheet.

| Food sample tested: __________________ | Mass of food sample in grams | Drops of iodine added for color change | Calculate: \[
\frac{\text{Drops iodine}}{\text{Grams of food}} \]
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Drops iodine/grams of food</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5 Starch/fruit/water mixture

Figure 6 The end point is a sustained purple/black colour
WS – Review for Exam An Elemental Journey

Name ________________________________ Period ______

1. What element do stars use for fuel in Fusion reactions?
2. Elements up to which element can be made inside stars?
3. Elements beyond what element are made in supernova?
4. What is the explosion of a star called?
5. How do scientists know what a star is made of from viewing the light emitted from them? Why these lines are called fingerprints of the element?
6. What is the most abundant element in the human body?
7. What is the most abundant element in the Earth’s Atmosphere?
8. What is the most abundant element in the universe?

Match the following elements with what statement best describes their uses (can be used more than once).

A. Calcium  B. Iron  C. Carbon  D. Oxygen

9. _____ Anemia
10. _____ Spontaneous human combustion
11. _____ respiration
12. _____ organic compounds
13. _____ bones
14. _____ Hemoglobin in the blood
15. _____ water
16. _____ core of stars
17. _____ Osteoporosis

18. Why are vitamins and minerals essential to life?
19. Can all vitamins be produced by our bodies?
20. What are the two groups that vitamins can be divided into?
21. What happens to your body if you are deficient in Vitamin A?
22. What is the function of folic acid?
23. Children with vitamin D deficiencies can get weak bones, a disease known as ___________
24. Which vitamin is made by bacteria in our intestines?
25. Is it more dangerous to overdose on fat or water soluble vitamins? Why?
26. What disease is associated with a deficiency in vitamin C?
27. Which vitamins are known to help convert food into energy?
Exam – An Elemental Journey

Name ___________________________________________________ Period ________

1. Stars use what element as fuel for fusion reactions?
   a. Helium  c. Carbon
   b. Hydrogen d. Oxygen

2. Fusion can make all elements up to Iron (Fe)
   a. True  b. false

3. In fusion reactions, energy is
   a. Released  b. Absorbed

4. When a star collapses and then explodes, element (heavier/lighter) than iron are made
   a. Heavier  b. Lighter

5. The explosion of a star is called a
   a. Superstar explosion  c. Supernova
   b. Super gravity d. Super stellar

6. Scientists can identify what elements make up the universe from viewing the ____________ created while viewing light through a spectroscope.
   a. Spectral lines  c. Star lines
   b. Visual lines d. Element lines

7. The most abundant element in the human body is
   a. Carbon  c. Nitrogen
   b. Hydrogen d. Oxygen

8. The most abundant element in the Earth’s atmosphere is
   a. Carbon  c. Nitrogen
   b. Hydrogen d. Oxygen

9. The most abundant element in the universe is
   a. Carbon  c. Nitrogen
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Match the following elements with what statement best describes their uses (can be used more than once).

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11. _____ Spontaneous human combustion  
12. _____ respiration  
13. _____ organic compounds  
14. _____ bones  
15. _____ Hemoglobin in the blood  
16. _____ water  
17. _____ core of stars  
18. _____ Osteoporosis

19. Vitamins and minerals are found in
   a. Only fast food  
   b. Only fruits and vegetables  
   c. Nearly all foods on the food pyramid  
   d. Only breakfast cereal

20. Vitamins are considered essential to life because
   a. They give Coach Daw something to talk  
   b. You can buy them in stores  
   c. They regulate the body chemistry and body functions  
   d. Someone on TV told you so

21. All vitamins can be produced by our bodies
   a. True  
   b. False

22. Vitamins are divided into two groups
   a. Fat and lipid soluble  
   b. Polar and water soluble  
   c. Fat and water soluble  
   d. Nonpolar and fat soluble

23. A deficiency of Vitamin A (found in carrots) in the body many result in
   a. Stomach obstruction  
   b. Rapid breakdown of cells  
   c. Short fingers  
   d. Night vision blindness

24. The function of folic acid is to prevent
   a. Neural tube defects  
   b. Vision problems  
   c. Green toe nails  
   d. Bad breath

25. A deficiency of vitamin D in growing children will result in the malformation of skeletal tissues called
   a. Muscular dystrophy  
   b. Osteoporosis  
   c. Arthritis  
   d. Rickets
26. Which vitamin is made by bacteria in the intestine?
   a. Vitamin C       c. Vitamin K
   b. Vitamin B       d. Vitamin A

27. The possibility of toxicity is greater with fat-soluble vitamins than with water-soluble vitamins because:
   a. All food are high in fat soluble vitamins
   b. The body can store them in fat tissues
   c. They are found in the fat in fried fast food
   d. You can excrete them in urine

28. It is important to include water-soluble vitamins in the daily diet because:
   a. They increase energy production
   b. They are not stored in any amount in the body
   c. Food sources are so low in their content
   d. The amount you need to take of them is so great

29. Vitamin C deficiency is associated with the disease known as
   a. Loaferisim
   b. Senioritis
   c. Sailoritis
   d. Scurvy

Match the following vitamins and minerals with their function

31. ____Vitamin C   a. strong bones....from the sun
32. ____Vitamin A   b. for good vision
33. ____Vitamin D   c. prevents scurvy

34. What vitamins are known to help convert food into energy
Hunger Games
Culinary Competition

FOOD SHARE
Ventura County’s Food Bank
A Member of FEEDING AMERICA
Feed America

- [https://www.youtube.com/watch?v=LYj-09p3CYE](https://www.youtube.com/watch?v=LYj-09p3CYE)
Hungry at School

- https://www.youtube.com/watch?v=v84IQvV6NsM
Ventura County Food Insecurity

**Ventura**

**Child Food Insecurity Rate**

- 22.2% of the county's children
- Number of food insecure children: 40,550

**Estimated Program Eligibility Among Food Insecure Children**

- **Charitable Response**: 48%
  - Income eligible for federal nutrition programs (above 185% of the federal poverty level)
- **Free/Reduced Price School Lunch, School Breakfast, Summer Food, WIC, SNAP**: 52%
  - Income eligible for federal nutrition programs (below 185% of the federal poverty level)

**Average Cost of a Meal**: $2.79

*National average cost of a meal is $2.52*
Food banks in Ventura County
Latino Hunger Facts

- Latino households are more than twice as likely to be food insecure as non-Hispanic households.
- Nearly 1 in 3 (29%) of Hispanic children in the U.S. live in families served by the Feeding America network.
- Hispanic adults and children are a greater risk of obesity and diabetes than other groups.
- Among children born in 2000, Hispanic boys have a 45.4% lifetime risk of developing diabetes and Hispanic girls have a 52.5% lifetime risk.
Student Prompt

What challenges does our community face in terms of eating healthy at the poverty line?

Some student Responses

- No time to make food
- No kitchen to make food in (live in a garage)
- Do not know how to use the food they are given from the food pantry (People return peanut butter)
- Not educated
- Many of our parents work and our high school students are the ones cooking for their siblings
- No money
  - Cheap food is unhealthy food
Feeding America Network

- Food share and other networks in our community are partnered with the Feeding America network.
- National Hunger Awareness Month is September
- https://www.youtube.com/watch?v=l9hvyUm91n8&list=PL601E4D238AC8B774
Our Project

This project's goal is to help raise awareness of the challenges that our community faces in regards to hunger and nutrition. We have many food banks, food shares and community kitchens that offer foods to the community for families that are struggling. However, there are still many challenges that these families face even with these organizations.
• Our challenge is to help these families know what to do with the foods they receive and how to prepare nutritious meals while living on a food pantry and food stamp budget.

• The recipes will be developed by our students so that the meals will reflect the culture of our community.
Putting these recipes in the hands of our students will also help empower them to have ideas on how to eat meals over the summer when school is out.
The Hunger Games

Pacifica High School and the Culinary Arts Academy are teaming up with Ventura County Food Bank’s Food Share Program to create a culinary competition in which teams will go head to head to create a balanced and delicious, easy to prepare meal, utilizing only food that our local food share acquires through donations. They will engineer recipes from the ground up and compete in front of a panel of judges at Pacifica High School to see which team can transform everyday items into extraordinary cuisine.
• Every single recipe will be made available to the Food Share, and the winners will be awarded. Here is how the competition will go down:

• We will break the competition groups into 2 categories
  ◦ Dinner
  ◦ Non-cooked food
• Each category will have its own market basket picked by us. The students will need to create a meal that utilizes only ingredients out of this basket.

• The competition will be in groups of up to five and no less than three students
Each group will be graded on 4 criteria:

- **Recipe development**
  - Ease of reproduction
  - Utilization of various products
- **USDA “food plate” guidelines**
  - Does it follow the USDA ratios for a balanced and nutritious meal
- **Cooking Procedure**
  - Taste/flavor
  - Appearance
  - Creativity
- **Nutritional Analysis: Vitamins and minerals**
Important Dates:

- Sign-ups will take place **October 21 and end October 25**
  - To sign up you must list:
    - The names of the students in your group
    - Your team name
    - Your desired category (cooked or non-cooked dinner)
- Recipe due **November 1st**
  - Needs to have USDA “food plate” breakdown attached
  - Needs to have what vitamins and minerals are highest in your dish.
- Actual competition to take place **November 12 and November 13.**
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    - Appearance
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    - Needs to have what vitamins and minerals are highest in your dish.
  - Actual competition to take place **November 12 and November 13.**
Basket list items to create your meal

**Fresh fruits and Vegetables**
- Apples
- Bananas
- Pears
- Persimmons
- Onions
- Avocados
- Peppers
- Bok choy
- Brussels sprouts
- Cabbage
- Kale
- Spinach
- Assorted greens
- Lemons

**Canned Vegetables**
- Tomatoes
- Peas
- Green beans
- Corn
- Sliced carrots
- Cranberry sauce
- Mixed fruit

**Proteins**
- Pinto beans
- Garbanzo Beans
- Kidney beans
- Peanut butter
- Canned chicken
- Canned tuna
- Canned ham
- Peanuts
- Almonds

**Starches**
- Rice
- Spaghetti pasta
- Canned potatoes
- Instant mashed potatoes
- Top Ramen Soup

**Free Pantry Items**
- Dry spices
- Milk
- Eggs
- Oils
- Fresh Garlic
- Flour
- Sugar
- Margarine
- Vinegars
District: Pleasant Valley Unified School District
School: Camarillo Heights
Participant(s): Jodi Atkinson

Lesson Plan Title: Coasting into Engineering
Lesson Plan Grade Levels: 7, 8, 5, 6, 3, 10, 12, 2, 11, 9, 4
Lesson Plan Subject Areas: Science (AMGEN Category), Mathematics (AMGEN Category)
COASTING THROUGH ENGINEERING

STEM (Science, Technology, Engineering, and Math) schools are becoming the next generation of learning. Teaching Science Technology and Math were not a problem. When it came to the engineering component I found myself challenged. I soon realized that it was more about my lack of knowledge and confidence in the engineering field that made it seem overwhelming. The time to inspire student’s interest levels for engineering is in the elementary grades not by waiting until they are in high school or later. Planting the seed and love of engineering at an early age will provide us with higher level thinkers and problem solvers for the future.

The purpose of this unit is to build awareness and the ability to work through the design process to solve problems. It develops confidence, perseverance and collaboration while encouraging the use of the design process to solve problems in all areas, integrating it into math, science, language arts, and art. It gives all students (from below grade level to advanced learners, English language learners, even autistic and special needs) the opportunity to work together with everyone having a voice sharing ideas, working through problems, realizing they may not have one complete right answer but can possibly share some pieces to come up with a better answer. The engineering design process gives them another tool to help them in their learning.

This unit starts out working through some simple problems using the design process, Ask, Imagine, Plan, and Improve. We begin using this process on very simple daily tasks such as passing out papers, what will make the best doorstep, even the best way to walk down the hall. This encourages them to use these problem solving skills in concrete real settings like the class or playground, realizing its importance in all areas not just when we are doing a special project.

The next step is to put our skills to work while integrating our science unit “Objects in motion” This unit helps the students with vocabulary like slope, force, friction, speed, and gravity. It also includes nonfiction reading which is a focus for common core. After building background and prior knowledge in the classroom it is time to put our refined engineering skills to the test. With a piece of rubber pipe, cup and marble students become Roller Coaster Engineers

Ask

- How can I build a roller coaster = get a marble down the tube, through a loop and into a cup

Imagine

- Using what we have learned from reading and previous experiments where we tried to roll various objects down different surfaces, what type of speed, how big of loop

Plan

- On My Design each student draws a diagram of their own design using these parameters: piece of pipe, land in cup, 1 loop
Create

- In groups each person has the chance to build and tests their coaster out

Improve

- Students take turns trying each other’s ideas out, letting everyone find out first hand that there are no right answers only better ideas
- After each person has had a chance to try out their design teams meet and use question wheels “What Worked”, “What didn’t work”, “What changes would make it better” These wheels help keep the discussion rolling, and keeps discussions focused.

Make it Better

- During this phase students go from My Design to Our Design choosing what worked best and what is most beneficial from all that they have seen and worked with. This gives students that are not necessarily the best readers or writers a chance to be successful.

These engineering design process skills are cyclical, students can move back and forth as they see fit. These skills are able to be used effectively all across the curriculum. Everyone has strengths and struggles teaching this process helps students learn to work together to take advantage of these. Using them in this exciting way allows students to connect meaning to them making them more assessable and part of their learning process. The more students use these skills in different areas the stronger they become.

Writing: diagrams, lists, questions

Math: measure, time distance

Reading: Comprehension strategies, reading informational text, predicting using their pre reading stems (I’m Thinking, I’m Noticing, and I’m Wondering), and vocabulary skills (predict, define, sketch)

Technology: watching videos, I Robot demonstration
After they have been working on their coaster we have a demonstration from the high school physics class. They brought in some of the coasters they built. Although these are on a much higher level many of the basics are still there, force, gravity, speed even a loop! It is a great way to show this is an opportunity for all grade levels.
The final project is graded with a rubric in both completion of task and also ability to work through process.

This unit addresses many of the second grade common core standards including. Reading for informational text 1,3,5,7 Speaking and Listening 1,3,6 Writing 8 Language 4 Math 1,6 Science 1,2,6,8

The best thing about this unit is it has no ending the whole purpose is to empower students to continue to be to be engineers in all they do.
My Design

- Start
- Hill
- Ramp
- Landing

Let it go down the table instead of on the table and instead pushing it down it could make the loop and it needs a prop and speed it needs a hill.
### Design Process Rubric

<table>
<thead>
<tr>
<th>Step</th>
<th>Unsatisfactory (No Evidence)</th>
<th>Partially Proficient (Some Evidence)</th>
<th>Proficient (Good Evidence)</th>
<th>Excels (Excellent Evidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID the problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Brainstorm Ideas</td>
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</tr>
<tr>
<td>Label Design/List Materials</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Follow/Create Plan</td>
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<td></td>
</tr>
<tr>
<td>Evaluate how to Improve</td>
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</table>
STEM (Science, Technology, Engineering, and Math) schools are becoming the next generation of learning. Teaching Science Technology and Math were not a problem. When it came to the engineering component I found myself challenged. I soon realized that it was more about my lack of knowledge and confidence in the engineering field that made it seem overwhelming. The time to inspire student’s interest levels for engineering is in the elementary grades not by waiting until they are in high school or later. Planting the seed and love of engineering at an early age will provide us with higher level thinkers and problem solvers for the future.

The purpose of this unit is to build awareness and the ability to work through the design process to solve problems. It develops confidence, perseverance and collaboration while encouraging the use of the design process to solve problems in all areas, integrating it into math, science, language arts, and art. It gives all students (from below grade level to advanced learners, English language learners, even autistic and special needs) the opportunity to work together with everyone having a voice sharing ideas, working through problems realizing they may not have one complete right answer but can possibly share some pieces to come up with a better answer. The engineering design process gives them another tool to help them in their learning.

This unit starts out working through some simple problems using the design process, Ask, Imagine, Plan, and Improve. We begin using this process on very simple daily tasks such as passing out papers, what will make the best doorstop, even the best way to walk down the hall. This encourages them to use these problem solving skills in concrete real settings like the class or playground, realizing its importance in all areas not just when we are doing a special project.

The next step is to put our skills to work while integrating our science unit “Objects in motion” This unit helps the students with vocabulary like slope, force, friction, speed, and gravity. It also includes nonfiction reading which is a focus for common core. After building background and prior knowledge in the classroom it is time to put our refined engineering skills to the test. With a piece of rubber pipe, cup and marble students become Roller Coaster Engineers

Ask

- How can I build a roller coaster =get a marble down the tube, through a loop and into a cup

Imagine

- Using what we have learned from reading and previous experiments where we tried to roll various objects down different surfaces, what type of speed, how big of loop

Plan

- On My Design each student draws a diagram of their own design using these parameters: piece of pipe, land in cup, 1 loop

Create

- In groups each person has the chance to build and tests their coaster out
**Improve**

- Students take turns trying each other’s ideas out, letting everyone find out first hand that there are no right answers only better ideas
- After each person has had a chance to try out their design teams meet and use question wheels “What Worked”, “What didn’t work”, “What changes would make it better” These wheels help keep the discussion rolling, and keeps discussions focused.

**Make it Better**

- During this phase students go from My Design to Our Design choosing what worked best and what is most beneficial from all that they have seen and worked with. This gives students that are not necessarily the best readers or writers a chance to be successful.
These engineering design process skills are cyclical, students can move back and forth as they see fit. These skills are able to be used effectively all across the curriculum. Everyone has strengths and struggles teaching this process helps students learn to work together to take advantage of these. Using them in this exciting way allows students to connect meaning to them making them more assessable and part of their learning process. The more students use these skills in different areas the stronger they become.

Writing: diagrams, lists, questions

Math: measure, time distance

Reading: Comprehension strategies, reading informational text, predicting using their pre reading stems (I’m Thinking, I’m Noticing, and I’m Wondering), and vocabulary skills (predict, define, sketch)

Technology: watching videos, I Robot demonstration
After they have been working on their coaster we have a demonstration from the high school physics class. They brought in some of the coasters they built. Although these are on a much higher level many of the basics are still there, force, gravity, speed even a loop! It is a great way to show this is an opportunity for all grade levels.

The final project is graded with a rubric in both completion of task and also ability to work through process

This unit addresses many of the second grade common core standards including. Reading  for informational text 1,3,5,7  Speaking and Listening 1,3,6 Writing 8 Language 4 Math 1,6 Science 1,2,6,8

The best thing about this unit is it has no ending the whole purpose is to empower students to continue to be to be engineers in all they do.
## Design Process Rubric

<table>
<thead>
<tr>
<th></th>
<th>Unsatisfactory No Evidence</th>
<th>Partially Proficient Some evidence</th>
<th>Proficient Good Evidence</th>
<th>Excls Excellent Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID the problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Brainstorm Ideas</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Label Design/List Materials</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Follow/Create Plan</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Evaluate how to Improve</td>
<td></td>
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</tbody>
</table>
let it go down the table insted on the table and insted pushing it down it codit make the loop and it needs froc and speed it needs a hill.
My Design

Start

Hill

Landing

Ramp
# Lesson Plan

**District:** Ventura Unified School District  
**School:** ATLAS  
**Participant(s):** Therese Palmisano, Coralyn Strickland, Tracie Fickenscher

| Lesson Plan Title: | STEMming on Weather  
| Lesson Plan Grade Levels: | 3, 5, 2, 4  
| Lesson Plan Subject Areas: | Language Arts/Reading (SAGE Category), Science (AMGEN Category) |
This unit combines the NGSS Science standards for third and fourth grade, infusing STEM activities, Visual Thinking and Common Core practices to allow students to work in collaborative, multi-grade level teams to create structures that can support the life of a seedling during a drought.

Using Common Core strategies that incorporate fiction and nonfiction reading, the teacher will engage students in both grade levels using books about weather. Students will participate in daily VTS strategies utilizing pictures of different weather types to provoke prior knowledge as well as continue discussion about weather learned the previous session.

Throughout the unit, third grade students will be discovering the scientific tools that are used to collect weather data. Students will be creating hands-on versions of these tools, learning through discovery how they work and how to make improve them. Eventually, a digital weather station containing tools they have studied will be set up outside the classroom. Students will collect and digitally record data from the weather station readings daily. Informational text will be infused to help support discovery and allow students to show evidence that explains why collecting weather data is important. Students will create a visual representation of the weather tools using the Discovery Techbook Board Builder. Students will present their completed boards while explaining the functions and uses of the data collecting weather tools to fourth grade teammates.

Fourth grade students will be discovering the causes of weathering and how our earth is constantly changing. They will create topographical maps that show hills and valleys in California. Half the students will create maps that reflect topographical information from thousands of years ago. Half will create maps that reflect current topographical features. Using informational text and observing current weather patterns to support thinking, students will make predictions of what the surface of our earth will look like in 1000 years. Students will also have a digital weather station set up outside their classroom. They will also collect data and compare digitally the readings they find on their side of the campus to the readings the 3rd grade find on the opposite side of campus. Using the Discovery Techbooks, students will use the Board Builder to show understanding and present their findings about the way the earth, climate and topography may change in the future.

All students will come together to share understanding about how the earth is constantly changing and why collecting information about weather is important. The collaborative groups will make a prediction about types of structures that might be needed to support life under their predicted climates and topographical circumstances. Student groups will combine to create a
powerpoint to present to other student groups about what types of structures may make life in the future possible. Students will highlight issues such as lack of water, topographical changes and predictions about future weather patterns.

As a final project, students will work in their collaborative groups to create a structure to withstand a current issue in California (drought). Students will be given materials, (plastic wrap, popsicle sticks, string, small open container, a young seedling and 2 ml. of water) to create a structure that will help support the seedlings’ life during a drought. Students will not be allowed to add extra water to their plant during the first two weeks to simulate drought conditions. Students will take notes and save pictures to a Science Journal saved in Evernote. Plants will be placed on a windowsill in afternoon sun. Students will chart and graph the growth of their plant over the next two weeks noting any changes. At the two-week mark, students will be allowed to reevaluate their structures. They will list what they think was working and what needed modification. Students will share their thoughts not only with their classmates, but also with the rest of the group. Students will again collaborate and modify their designs to support their seedling’s life. Students will be allowed to add up to 4 ml. of water at the reevaluation time. Students will again collect data over the next two weeks. Upon final evaluation, students will create presentations of their choice presenting their structure and data compiled evaluating the structures success. Use of digital media will be encouraged.

As a final wrap up to the project, students will connect with a scientist at the University of Houston via Skype. Students will show their designs to this scientist asking for feedback as to the viability of their structure surviving in space. Showing understanding about major concepts of the unit, students will ask informed questions of the scientist to compare how possible changes in the earth’s surface and weather patterns compares to the environment of space. Students will ask for design ideas and possible enhancements that may increase their structures viability.

Formative assessments will be used to determine student understanding throughout the unit. Using VTS on a daily basis, teachers will check for the correct use of scientific vocabulary and encourage critical thinking. Students will be given rubrics to assess understanding for the “Boards” created in the Discovery Techbooks. Rubrics will also be used to grade the learning on collaborative group structures and concurrent modifications. A final rubric in the form of a self-evaluation will be used to grade their overall project participation.

This is an extremely engaging and motivating unit for all students. Students enjoy working with the digital tools used throughout. Collaborative groups between grade levels allow students to act as mentors, leaders and teachers as well as support struggling learners and challenging
GATE students. Creating and evaluating the structures, provides a project based learning environment where students learn through exploration and discovery and are assessed daily. Students will finish the unit with a clear understanding of weather data collection, prediction of weather patterns, changes of the earth’s surface and how to monitor, evaluate and improve engineering designs to create solutions to common problems of this world. Through teacher monitoring and collaborative grouping, students at all levels will feel encouraged, supported and successful.
Assignment and Planning Stages
You are a scientist in charge of saving our society. We are in the middle of a severe drought and the plants around are seriously being threatened. Your team's job is to create a structure to help the plants of our community survive!
You will have access to:
• plastic wrap
• plastic cups
• Popsicle sticks
• string
• tape
• plastic base
• water (keep track of how much water you add please)
You will be given one seedling that you must keep alive for an entire month without adding extra water.

Name of group members: Charisse, Bridget, Julian, Adam, Emiliano.

Write a brief description of your team's plan:
Our project uses plastic wrap, tape, sticks, one seedling, Plastic bags, 150 ml water.

Why do you think this will work: We added water at the beginning so it would be able to grow and have left over water.

How much water did you start with?: the initial time we used 150 ml water.

Observations:
Our plant has grown another plant. It is 26 cm. 1/21/14

1/28/14 Cherry is now 27 cm and Scorch is about 36 cm. All the sticks are moldy. Scorch is 15 inches & 38 cm. Cherry is 10.5 inches & 25 & a half inches. We have 50 ml water.

1/31/14 We have taken out all the sticks and added 50 ml water.

Picture of completed structure: our pic with our plants Cherry and Scorch as little seedlings.
Standards Addressed

3rd Grade:
3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.
3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answer.
RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)
W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-ESS3-1)
W.3.7 Conduct short research projects that build knowledge about a topic. (3-ESS3-1)
W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and use them to support understanding. (3-ESS3-1)

4th Grade:
4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth’s features.
4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Student predictions about what California will look like in 1000 years
Tools Used to Collect Data for Weather

Anemometer:
This tool measures wind speed. Wind speed typically is higher during a storm!

Barometer:
This tool measures the air pressure. High pressure creates clear, sunny skies. Low pressure creates stormy, overcast skies. Air pressure likes to move from high to low.

Thermometer:
This tool is used to measure temperature. Warm air can hold more water vapor than cool air.

<table>
<thead>
<tr>
<th>Weather Data-Verona (9/2004)</th>
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<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>3/14</td>
</tr>
<tr>
<td>3/7</td>
</tr>
<tr>
<td>3/4</td>
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</tbody>
</table>
Weather forecasting is important because it lets us know what to wear in the morning. We will also know if we need to be aware of really dangerous situations.

Thermometers let us know how hot it feels outside. Tracking the temperature helps us to find weather patterns.
<table>
<thead>
<tr>
<th>Date</th>
<th>Temperature</th>
<th>Humidity</th>
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<th>Wind Direction</th>
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<td>64°F</td>
<td>41%</td>
<td>77</td>
<td>3-7 mph</td>
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<tr>
<td>1/10/14</td>
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<td>3-12 mph</td>
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<tr>
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<td>68</td>
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<tr>
<td>1/12/14</td>
<td>76°F</td>
<td>43%</td>
<td>51</td>
<td>8-36 mph</td>
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<td>School:</td>
<td>Ventura Charter School</td>
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<tr>
<td>Participant(s):</td>
<td>Jessica Murphy, Ashley Johnson, Terri Hooson</td>
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<table>
<thead>
<tr>
<th>Lesson Plan Title:</th>
<th>How Does Your Body Survive</th>
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<tbody>
<tr>
<td>Lesson Plan Grade Levels:</td>
<td>7, 8, 5, 6, 3, 4</td>
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<tr>
<td>Lesson Plan Subject Areas:</td>
<td>Mathematics (AMGEN Category), Language Arts/Reading (SAGE Category), Science (AMGEN Category), Physical Education, Health, Visual Arts</td>
</tr>
</tbody>
</table>
“Take care of your body. It’s the only place you have to live.”
~Jim Rohn

“How Does Your Body Survive?”
Grades 3/4

♫ The hip bone’s connected to the backbone. The backbone’s connected to the shoulder bone…♫ After our anatomy project, students walked away with much more than a cute song. They learned the complexities of each body system and how to keep them healthy. Students left the year with an appreciation and respect for their bodies; true lifelong learning took place in our classroom.

To study the human body and ways to keep it healthy we traveled through the different systems and explored each body systems’ characteristics, components, and functions to answer our project’s driving question, “How does your body survive?”

Using thinking routines from Making Thinking Visible, students synthesized and applied information, questioned scientific claims, and interpreted results from experiments. Both independently and in crews, students read several non-fiction articles on each body system, watched videos, engaged in discussions and experiments, wrote informational summaries, and spoke with guest experts to learn about the human body. At the end of each body system, students reviewed information during a quiz game and were assessed by a cumulative test including labeling diagrams.

During our study of the skeletal system we uncovered its purposes. Children mastered the names for each bone and learned the different types of joints. We dissected owl pellets and compared animal and human skeletons. We sketched a human skull and made x-ray art, based on real x-rays. Finally, students watched an inspirational film called, Emmanuel’s Gift, a documentary about a disabled orphan who overcame poverty and prejudice after he rode a bicycle with one leg across Ghana. Students were moved and understood how loss of a bone can affect someone’s life and ability to move, yet not overtake their spirit.

Next, we explored the muscular system. Students learned about voluntary and involuntary muscles. We studied the names of major muscles in the body. We studied muscle fibers by dissecting fibrous stew and comparing it to yarn fibers under microscopes. Using play dough students made three types of muscle. We learned the difference between fast and slow twitch muscle. We discussed muscle soreness and stress by performing a “muscle stress test,” using a clothes pin to stress our thumb muscles. We compared our data at the end of a week’s worth of testing, generalizing how muscle fatigue happened and when performance was best. After this, we discussed muscle recovery and had a massage therapist visit to teach us ways to massage our own tired hand muscles.

“How does your body survive?”
During our study of the circulatory system, students learned about blood types and which were compatible for transfusions. We used microscopes to examine real blood cells. Students created 3-D art labeling parts of the circulatory system and wrote an informative summary to accompany the art. Finally, a nurse taught students about the components of the heart.

During our study of the respiratory system, a retired heart surgeon visited our classroom, bringing preserved human hearts, brains, and other organs for the students to hold and touch with gloves. Students saw healthy lungs and lungs ravaged by smoking. Children created a 3-D model of the lungs representing the different parts of the pulmonary system and calculated how many cubic inches of air is in our lungs.

Next, we explored the digestive system. We learned each part of the digestive system starting with the teeth. We discussed dental care as well as the exact names for each tooth. Students especially loved our hands-on activity where each member of the crew engaged in a leg of the digestive system relay. First, “teeth” (a meat tenderizer) crushed crackers and mashed potatoes. This emptied into a “stomach” (ziplock) which added enzymes. Next a “small intestine” (knee sock) soaked up nutrients. Finally, the “large intestine” (tube) pushed out the waste. Students worked as a team to act out all four parts of the system in a hilarious dramatic play.

During our study of the nervous system, students learned how our body sends messages for balance, coordination, senses, and reflexes. Students met seeing-eye dogs and wore partially blocked or completely blocked sunglasses to demonstrate cataracts and blindness. They created an eyeball and its nerves from play dough and learned how signals are sent from the eye to the brain. Students even took a quiz to uncover their right and left brain tendencies to learn more about their individual learning styles.

During our study of the immune system students learned about cells and used microscopes to examine their cheek cells. Students studied fungi, bacteria, and viruses that affect the body, wrote a summary, and used play dough to represent what each looks like under a microscope. We then created a life-size paper microbial person to represent how the inside and outside of our body is affected by bacteria.

Throughout the project, students kept track of all of their articles, notes, and visible thinking skill routines in a three-ring binder that essentially became their personalized textbook. Using this textbook, students synthesized their knowledge of the body and created a life size paper human representing all body systems! Finally students generated questions they still had about the human body, chose one to research, wrote an informative paper and presented their findings to the class.

For our culminating project, our Anatomy Museum, students dressed as doctors in scrubs and white lab coats to teach our school community about how our bodies survive. Students became an expert in one of the body systems. Using their personal textbook, crews of four worked together to create a tri-fold display (listing the purpose, “How does your body survive?”

530
components, common ailments, and ways to keep their system healthy). Each crew made a model of their system, performed an experiment, and used a technology component to provide more interactive visuals to draw an audience in. Our entire school community visited the “Anatomy Museum”, where each crew presented for ten minutes, tailoring their presentations to engage learners of all ages from kindergarteners to adults.

After this yearlong study, our new song sounds like:

♫
The patella is connected to the femur. The femur is connected to the pelvis (forming a ball and socket joint.) The joint is connect by the posterior ligament …♫

“How does your body survive?”
### Photographic Evidence

<table>
<thead>
<tr>
<th>Skeletal System - How do our bones and muscles work?</th>
<th>Skeletal System – Dissecting owl pellets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscular System – clay models of muscles</td>
<td>Muscular System – identifying which muscles activate</td>
</tr>
<tr>
<td>Respiratory System 3D Art</td>
<td>Respiratory System- Students learn about the relationship between the rising and falling of the diaphragm and the lungs inflating and deflating.</td>
</tr>
</tbody>
</table>
Circulatory System – examining blood

Nervous/Skeletal System - Chiropractor visiting our class

Nervous System – How do our senses send us signals?

Digestive System
Nervous System - Retired Doctor shows students real organs and discusses which ones are normal looking and which have been damaged from poor life style decisions.

Students taking notes during doctor’s presentation.

Student holding a brain

Some students got right in and explored the organs. Others weren’t quite ready.

Model with all systems

Classroom Bulletin Board
Culmination Event
Supporting Documents for “How Does Your Body Survive?”

Content Standards

3rd Grade Common Core Standards

Reading

CCSS.ELA-Literacy.RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.

CCSS.ELA-Literacy.RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

CCSS.ELA-Literacy.RI.3.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.

CCSS.ELA-Literacy.RI.3.5 Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.

CCSS.ELA-Literacy.RI.3.6 Distinguish their own point of view from that of the author of a text.

CCSS.ELA-Literacy.RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

CCSS.ELA-Literacy.RI.3.8 Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence).

CCSS.ELA-Literacy.RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic.

Writing

CCSS.ELA-Literacy.W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.3.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

CCSS.ELA-Literacy.W.3.7 Conduct short research projects that build knowledge about a topic.

CCSS.ELA-Literacy.W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
Speaking

CCSS.ELA-Literacy.SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others’ ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Mathematics

CCSS.Math.Content.3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).\(^1\) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.\(^2\)

Science – CA Content Standards

Life Sciences

3. Adaptations in physical structure or behavior may improve an organism’s chance for survival. As a basis for understanding this concept:
   a. Students know plants and animals have structures that serve different functions in growth, survival, and reproduction.
   b. Students know examples of diverse life forms in different environments, such as oceans, deserts, tundra, forests, grasslands, and wetlands.
   c. Students know living things cause changes in the environment in which they live: some of these changes are detrimental to the organism or other organisms, and some are beneficial.
   d. Students know when the environment changes, some plants and animals survive and reproduce; others die or move to new locations.
   e. Students know that some kinds of organisms that once lived on Earth have completely disappeared and that some of those resembled others that are alive today.

Investigation and Experimentation

5. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
   a. Repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.
   b. Differentiate evidence from opinion and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.
   c. Use numerical data in describing and comparing objects, events, and measurements.
   d. Predict the outcome of a simple investigation and compare the result with the prediction.
   e. Collect data in an investigation and analyze those data to develop a logical conclusion.
4th Grade Common Core Standards

Reading

CCSS.ELA-Literacy.RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-Literacy.RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-Literacy.RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

CCSS.ELA-Literacy.RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

CCSS.ELA-Literacy.RI.4.5 Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

CCSS.ELA-Literacy.RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

CCSS.ELA-Literacy.RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

CCSS.ELA-Literacy.RI.4.8 Explain how an author uses reasons and evidence to support particular points in a text.

CCSS.ELA-Literacy.RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

Writing

CCSS.ELA-Literacy.W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.4.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

CCSS.ELA-Literacy.W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.

Mathematics

CCSS.Math.Content.4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple
fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Speaking

CCSS.ELA-Literacy.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others’ ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.4.4 Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

California Content Standards

Visual Arts

2.2 Use the conventions of facial and figure proportions in a figure study.

2.5 Use accurate proportions to create an expressive portrait or a figure drawing or painting.

5.3 Construct diagrams, maps, graphs, timelines, and illustrations to communicate ideas or tell a story about a historical event.

Science

Investigation and Experimentation

5. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

a. Repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.

b. Differentiate evidence from opinion and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.

c. Use numerical data in describing and comparing objects, events, and measurements.

d. Predict the outcome of a simple investigation and compare the result with the prediction.

e. Collect data in an investigation and analyze those data to develop a logical conclusion.
<table>
<thead>
<tr>
<th>CONTENT:</th>
<th>Unsatisfactory</th>
<th>Limited</th>
<th>Proficient</th>
<th>Distinguished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction Paragraph</td>
<td>Introduction is incomplete, ineffective or missing</td>
<td>Unclear; not creative</td>
<td>Research questions is clear; provides direction for report; a hook is included</td>
<td>Research question is clearly focused; subject is significant; a hook is included</td>
</tr>
<tr>
<td>Support or Evidence -</td>
<td>Vague, missing, or inaccurate; research not evident</td>
<td>Lacking in relevance; research not on topic</td>
<td>Sufficient and accurate; answers question</td>
<td>Detailed; accurate; convincing; answers question</td>
</tr>
<tr>
<td>middle paragraph(s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conclusion Paragraph</td>
<td>Absent, incomplete, or unfocused</td>
<td>Summarizes previously stated information</td>
<td>Purposeful and perceptive</td>
<td>Extends; connects; comments on topics</td>
</tr>
<tr>
<td>ORGANIZATION:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topic Sentences in EACH</td>
<td>Absent</td>
<td>Provides bland restatement of research question; narrow or inaccurate</td>
<td>Clearly stated and related to research question</td>
<td>Clearly related to research question; varies sentence structures</td>
</tr>
<tr>
<td>Paragraph Paragraph</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paragraph Order</td>
<td>Random</td>
<td>Ineffective or inconsistent</td>
<td>Demonstrates a clear plan</td>
<td>Contributes to an effective presentation</td>
</tr>
<tr>
<td>Transitions</td>
<td>Absent</td>
<td>Mechanical</td>
<td>Clear and helpful</td>
<td>Effective and varied</td>
</tr>
<tr>
<td>MECHANICS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentence Structure</td>
<td>Repetitious; fragments and run-ons are frequent</td>
<td>Variety is present; some errors are evident</td>
<td>Complete and correct</td>
<td>Complete; varied; interesting</td>
</tr>
<tr>
<td>Punctuation/Spelling</td>
<td>Effect meaning</td>
<td>Careless or distracting</td>
<td>Present but do not interfere with the meaning</td>
<td>Error-Free</td>
</tr>
</tbody>
</table>

Overall Score: __________

Comments: ____________________________________________________________
The Immune System

By: Student A

Have you ever wondered what fights off viruses such as a cold or the stomach bug? Well, the answer is your immune system! Your immune system is constantly at work protecting you from disease, infections, bacteria, and viruses. The immune system is composed of various types of cells. Ok, it’s composed of cells, but what types of cells make up the immune system and how do they help the body survive? It is important to know that there are two categories of cells, Lymphocytes and Granulocytes. Some types of Lymphocytes are:

- B cells – make antibodies
- Helper T cells – help B cells make antibodies
- Killer cells – contain viral infections while cytotoxic cells T cells are being made
- Cytotoxic T cells – toxic to other cells (infected with viruses)
- Memory cells – stores memory of specific viruses

Lymphocytes have adaptive immunity - they have to be taught how to do things. Other cells have to teach them which cells are good and which cells are infected with viruses.

The immune system cells are necessary for survival. First, to help the body, cells get rid of bacteria. For example, if you cut yourself, lots of bacteria will get in. The Granulocytes will eat the bacteria and display the bacteria’s antigens on themselves to show the other cells that there are bacteria in the body. Also, immune system cells fight disease. Cytotoxic T cells will kill cells with the disease. Lastly, immune system cells fight viruses. Also, you can get vaccinations for viruses such as the flu. Vaccinations are like training. They train the body to fight that disease. Things in the immune system can go wrong though. For example, the autoimmune disease called Multiple Sclerosis happens when a person’s immune system attacks their nerve axons. Scientists still don’t know why this happens.

About 400,000 Americans and 2 million people worldwide are affected by Multiple Sclerosis (MS). Beth Ulibarri suffers from MS. It started last May when she would go on a run. “I would experience a tingling sensation throughout my lower legs. I described it as a feeling like something was tickling my legs from the inside....” She said. She was diagnosed with MS. Even though MS is a serious and sometimes fatal disease, it doesn’t stop her from being athletic and being herself. Now you know how amazing your immune system is, and how it can help or hurt survival. Next time you’re recovering from a cold, think about your immune system and how hard it’s working to protect your body.
<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format</td>
<td>Mind map has a consistent format (branch, bubbles, circles, boxes) and is connected in an innovative clear way.</td>
<td>Mind map has a consistent format (branch, bubbles, circles, boxes) and is connected.</td>
<td>Mind map does not use a consistent format to connect ideas.</td>
<td>Mind map does not consistently follow any format or is chaotic and difficult to understand.</td>
</tr>
<tr>
<td>Color</td>
<td>The mind map uses a different color for each branch. The mind map is brightly colored in ways that enhance the overall appearance.</td>
<td>The mind map uses a different color for each branch. The mind map is brightly colored.</td>
<td>The mind map is not completely colored.</td>
<td>The mind map is not colored.</td>
</tr>
<tr>
<td>Content</td>
<td>The mind map includes the MAJOR points of the material covered in class and material you researched independently.</td>
<td>The mind map includes the MAJOR points of the material.</td>
<td>The mind map misses most major points of the material.</td>
<td>The mind map presents no major points.</td>
</tr>
<tr>
<td>Words</td>
<td>The mind map presents 1 word or a title/name per branch.</td>
<td>The mind map presents no more than 2 words or a title/name per branch.</td>
<td>The mind map presents multiple words or names on many branches.</td>
<td>The mind map presents sentences on most branches</td>
</tr>
<tr>
<td>Radiance</td>
<td>The mind map radiates from the main question or topic of the page. Ideas branch out from other ideas in a logical and organized manner. Some are connected to other ideas showing further connections.</td>
<td>The mind map radiates from the main question or topic of the page. Ideas branch out from other ideas in a logical and organized manner.</td>
<td>The mind map radiates from a central point. Few ideas branch out of other ideas; most branches are a single line extending from the center. OR: The mind map does not radiate from a central point.</td>
<td>The mind map radiates from a central point. No ideas branch out of other ideas; all branches are a single line extending from the center. OR: The mind map does not radiate from a central point.</td>
</tr>
<tr>
<td>Illustrations</td>
<td>The mind map includes at least 10 relevant words/concepts. The illustrations make the mind map memorable.</td>
<td>The mind map includes at least 6 relevant illustrations. The illustrations make the mind map memorable.</td>
<td>The mind map includes at least relevant 2 illustrations. The illustrations do not make the mind map memorable.</td>
<td>The mind map includes less than 2 no relevant illustrations or the illustrations do not make the mind map memorable.</td>
</tr>
<tr>
<td>Neatness</td>
<td>The mind map has been revised and created as your best work showing neatness, order, and is clearly readable.</td>
<td>The mind map is very neat and orderly. The mind map is readable.</td>
<td>The mind map is not very neat and orderly. The mind map is readable.</td>
<td>The mind map is not readable. (This may affect other portions of the grade).</td>
</tr>
</tbody>
</table>

Comments: ____________________________________________________________
**Skeletal System Assessment**

1. How many bones are in your body as a baby? ________________
2. How many bones in your body as an adult? ________________
3. Why does the number of bones change? ________________________________
   ___________________________________________________________________
4. What is the longest bone in the body? ________________
5. Where are the smallest bones in the body? ________________
6. What are the purposes of the skeleton?
   • ___________________________
   • ___________________________
   • ___________________________
   • ___________________________
   • ___________________________
7. How are animal bones and human bones similar? ________________________________
   ___________________________________________________________________
8. How are animal bones and human bones different? ________________________________
   ___________________________________________________________________
9. How has our skull changed as a result of evolution? ________________________________
   ___________________________________________________________________
10. What is an example of a moveable joint? ________________________________
11. Name three ways to take care of your bones:
    • ___________________________
    • ___________________________
    • ___________________________

(A body can still survive without ________ because ________.)

_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

12. Tug – Of – War

Would it be better for your body to lose a rib bone or a leg bone? Explain your thinking

It would be better to lose __________________ because ____________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

13. Use the thinking strategy “I used to think...Now I know.....” to show how your thinking about the skeletal system has changed.

I used to think ________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Now I know ________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

14. Label bones on the skeleton.

15. Label joints on the skeleton.
See, Think, Wonder

Topic/Activity: ______________________________

<table>
<thead>
<tr>
<th>See</th>
<th>Think</th>
<th>Wonder</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do you see? (Observations)</td>
<td>What does this make you think? (Hypotheses)</td>
<td>What questions does this bring up? (Questions)</td>
</tr>
</tbody>
</table>

Reflection

<table>
<thead>
<tr>
<th>Final Thoughts</th>
<th>Diagram with labels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
District: Ventura Unified School District
School: DeAnza Academy of Arts
Participant(s): Amanda Lynch-Thorpe, Alex Wulff, Maria Geib, Brian Hubert

Lesson Plan Title: "That's My River"
Lesson Plan Grade Levels: 7, 8, 5, 6, 9, 4
Lesson Plan Subject Areas: Language Arts/Reading (SAGE Category), Science (AMGEN Category)
“That’s My River” Project:

How many students were even aware that we have a River less than one mile from our school? Not just any river, but a resource that we get 30% of our drinking water? After this weeklong investigation, students not only knew more about the river, but realized it was their river. Two classes of Middle School Students participated in this multidisciplinary project over one week of school in the Spring. Our guiding question was “How can we protect and preserve our natural resources?”. We used the local river, art from the Santa Barbara Museum of Art, field exploration and much more to answer our guiding question.

Using original art titled, “Mirror Lake, Yosemite Lake” by Albert Bierstadt (1864) as the launching of this unit, students used the Virtual Thinking Strategies of Lesson One by Harvard to begin questioning and observing what they saw. Next, a science lesson on how cloud formation, rain, snow and the river are all connected using the “connection game”. A short article about John Muir using AVID critical reading skills and annotation solidified the connection between the art and our river. These activities set the stage for exciting hands-on experience less than a mile from our school.

Next students, teachers and volunteers went to the River on a field exploration. Students were placed in groups of five and each group rotated to a different location of the river. The five centers were led by teachers and experts from the River Community. One center enabled students to take pictures of the beauty and gore of the river. These pictures included the natural surroundings of the river as well as graffiti and left over supplies from an illegal homeless encampment. These pictures were later used for a culminating activity.

The second center was a lesson on the flora of the river. Students were able to use their senses to explore the native and invasive species that are growing near the river. A third center was led by and expert from the City Conservation. Students learned about the Arunda, an invasive species that is
choking the native plants. Students were able to help cut down some as part of a removal process. Students were encouraged to come back another time to continue the removal as part of their community service hours needed to promote to the next grade.

The fourth rotation was an art center where students sketched a scene from the landscape they were experiencing. This was led by Master Art Teacher and Santa Barbara Museum Education Expert Joni Chancer. These sketches by the students were later used for wood block symbols and a three piece landscapes. The fifth center had students exploring the underwater flora and fauna at the river bottom. Back in the classroom students created their own aquaponics in small groups using fish and fresh water systems. The creation of an aquaponics included students having a rich understanding of the nitrogen cycle of ammonia and nitrate to nitrate. Fish waster was converted into plant food by bacteria. Plants removed the food to clean the water. Students gained a deep understanding of the process after the creation of the aquaponics.

After returning from the field trip students also created a Wood Block symbol from their river sketch. This wood block became their heading of a letter to the local newspapers persuading the community to take better care of “our River”. The letters included information about the River, what they saw, and a persuasive argument to take better care of it. Several of the letters were even published in the local newspaper paper!

With the help of an artist from the Santa Barbara Museum of Art students created a three part landscape using the sketch from the river. Each students three part landscape included the sky, the rivers surface and under the river. Students mixed their own paint and created beautiful treasures that were presented at a parent reception at the Santa Barbara Museum of Art. Focusing on the figurative language standards, students also created a poem based on their three piece landscape art that was placed along side the art.
Final steps in this exploration had students using their netbooks to create a PhotoStory of all aspects of the unit. Students then presented their PhotoStory to their families and others. The final product was exceptional. Students and teachers had a valuable and rich look at our river and will hopefully have a positive impact on how we take care of one of our most important natural resources because it really is “their River”.
Blog to show the lesson can be found at this link:

http://datab9.blogspot.com/2013/04/published.html

http://datab9.blogspot.com/2013/03/vts-ventura-river-project.html

http://datab9.blogspot.com/2013/04/student-work.html