Rules and Guidelines

10.10.2019
Ventura County Office of Education

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Science Fair Rules and Guidelines

Ventura County Office of Education (VCOE) programs are open to all students and educators without regard to race, sex, religion, physical abilities, economic status, or sexual orientation. VCOE does not discriminate against, or limit participation by, physically challenged Students. VCOE staff will strive to accommodate Students with special needs.

This rule book takes effect at the beginning of the 2019-20 academic year and supersedes all previous versions.

PLEASE READ THIS!
Before choosing to participate, students, educators and parents should read the Science Fair Rule Book carefully. It contains rules that you must follow to compete in the Science Fair. The most up to date, as well as additional information about registration, necessary forms dates and deadlines is available at:
www.vcoe.org/ScienceFair.
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Dates and Deadlines

Feb. 6th, 2020: Online Competition Registration Deadline (www.vcoe.org/ScienceFair)

Feb. 7th, 2020: All Paperwork completed and to VCOE

Mar. 26th, 2020: Set-up Day

Mar. 27th, 2020: Judging Day

Mar. 30th, 2020: Awards Ceremony

April 2020: State Science Fair
What is the Science Fair

With categories from Animal Sciences to Physics, the science fair is designed to promote, encourage, showcase and reward the achievements of our students in the various fields of science.

By developing skills in science, technology, engineering and mathematics, students are laying the groundwork for their future success.

Spreading the excitement of science is a cooperative education effort. Without the help and support of our sponsors, volunteers, parents, and teachers, this worthwhile event would not be such a great success. On behalf of my office and the Science Fair, I thank you for your participation and hard work, and look forward to a fun, successful, and educational event.

The Science Fair brings together students, teachers, and scientists from around the county to: Develop in students an awareness of the importance of science in their lives and to cultivate students’ interest in science; Support students’ acquisition of scientific knowledge and research skills; Extend and reinforce the Science Content Standards for California Public Schools; Recognize and reward outstanding achievement in science; and Motivate students to undertake and complete scientific inquiries in their special areas of interest.

Each year thousands of Ventura County student’s, in grades 6-12, complete science research projects at their schools, and more than 500 of those students earn the right to compete at the Ventura County Science Fair. Approximately 50 of our top students are invited to the State Science Fair to compete with their peers from across California where many of our past students have placed in the top three for their category and some have been awarded Project of the Year. Approximately 150 science, engineering, and industry professionals from throughout Ventura County volunteer their time to serve as judges for the Science Fair.

ABOUT THE SCIENCE FAIR

Do you ask yourself, 'Why' and 'How'? Do you drive adults crazy asking questions they can't seem to answer? Do you like to take things apart to see how they work? Want to learn how to get the answers you seek?
Participating in science fair you will learn the scientific and engineering processes used to answer the questions you have and solve the problems that you are interested in. You will use mathematics, biology, physics, chemistry, etc... and have so much fun doing it, you won’t even realize you’re learning! Best of all, you get to choose the question or problem that you want to work on.

I invite you to become part of a program that will provide you with the tools and processes to look at the world in a completely different way. I invite you to have a lot of fun while learning something amazing about the world and yourself.

REGISTERING A PROJECT

Students may submit an application to register a project for the Ventura County Regional competition and will be responsible for providing all forms and documents as outlined below:

The Following must be completed no later than 4:00 PM, Thursday, Feb. 6th, 2020

- Complete the Science Fair Project Application Online

The Following must be completed and delivered to the Ventura County Office of Education no later than 4:00 PM, Friday, Feb. 7th, 2020

- Voluntary Informed Consent, Liability Release, Acknowledgement and Assumption of Potential Risk, Permission & Request for Participation Form
- Payment ($15 per Student)

Deliver to:
Ventura County Office of Education
C/O Science Fair
5189 Verdugo Way
Camarillo, CA 93012

The Online Science Fair Project Application as well as the Voluntary Informed Consent, Liability Release, Acknowledgement and Assumption of Potential Risk, Permission & Request for Participation Form may be found at: [www.vcoe.org/Competitions/Science-Fair/Educator-Student-Parent](http://www.vcoe.org/Competitions/Science-Fair/Educator-Student-Parent).

**SPACE IS LIMITED:**
PROJECTS WILL BE ACCEPTED ON A FIRST COME FIRST SERVED BASIS BY DIVISION AND CATEGORY. PROJECTS THAT DO NOT MEET THE DEADLINES MAY LOSE THEIR ELIGIBILITY AND THEIR SPOT WILL BE GIVEN TO A PROJECT ON THE WAITING LIST THAT HAS MET THE DEADLINES.
Program Overview

In 1954, two Ventura County students entered projects in the California State Fair in Los Angeles, which had started two years earlier. Since there was no Ventura County Science Fair at the time, Frank Aldon Nowak, a Santa Paula High School senior, was forced to enter his project, "Amateur Astronomy," directly to the state competition. Likewise, for Oxnard High School sophomore Lloyd Raymond Taylor, whose project was titled, "Progress in Radio and Communications."

The following year, 1955, the Ventura County Science Fair was established, and by 1957, the VCSF was sending eight young budding scientists, mostly from Ventura and Oxnard, to the state contest. Project titles from that year included, "Crystal Structure," "Human Blood," "Our Mineral Oil Friend," and "How Would You Describe This Leaf?"

Ventura County has sent many young students on to both State and National Competitions where they have secured 1st, 2nd and 3rd place in many of the categories.

The Ventura County Science Fair brings together students, teachers, and scientists from around the county to:
- Develop in students an awareness of the importance of science in their lives and to cultivate students’ interest in science.
- Support students’ acquisition of scientific knowledge and research skills.
- Extend and reinforce the Science Content Standards for California Public Schools.
- Recognize and reward outstanding achievement in science.
- Motivate students to undertake and complete scientific inquiries in their special areas of interest.

REGION

VCOE Student competitions are organized by a Regional Coordinator and recognized as such by the state affiliate office; usually designated by a geographical name (e.g., Ventura County). The VCOE region serves public and private schools and districts served by the Ventura County Office of Education. For the most part VCOE’s region follows geographic boundaries except for the Las Virgenes Unified School District which borders both Los Angeles and Ventura Counties and has the right to receive services from either VCOE and/or LACOE.
PARTICIPANTS

Each year thousands of Ventura County student’s, in grades 6-12, complete science research projects at their schools, and more than 500 of those students earn the right to compete at the Ventura County Science Fair.

Approximately 50 of our top students are invited to the State Science Fair to compete with their peers from across California where many of our past students have placed in the top three for their category and some have been awarded Project of the Year.

JUDGES

Approximately 150 science, engineering, and industry professionals from throughout Ventura County volunteer their time to serve as judges for the Ventura County Regional Science Fair.

REWARDS FOR PARTICIPATION

The most important rewards are the skills and new knowledge that you will acquire as you move through the Science Fair. At each level of competition, outstanding achievement also may be recognized through certificates, medals, trophies, scholarships, or monetary awards.

IMPORTANT NOTICE FOR STUDENTS

The Science Fair is held at a public venue. You are solely responsible for the security and safety of personal items and artifacts. The Science Fair program officials and sponsors will not be responsible for the loss of, or damage to, equipment, or personal belongings.
Rules, Policies and Guidelines

SPACE IS LIMITED:
PROJECTS WILL BE ACCEPTED ON A FIRST COME FIRST SERVED BASIS. PROJECTS THAT DO NOT MEET THE DEADLINES MAY BE DENIED AND THEIR SPOT GIVEN TO A PROJECT ON THE WAITING LIST THAT HAS MET THE DEADLINES.

PROJECT SET UP, REMOVAL AND INVITATION ONLY AWARDS

Set Up: All projects must be delivered and set up between 2:00 PM and 7:00 PM on Thursday; March 26th. Science Fair Staff will not admit projects outside of this scheduled set up time. Projects may be delivered and set up by a parent, teacher, or other designated person if the entrant is unable to do so personally.

Removal: Projects must be removed from the exhibit area between 6:30 PM and 8:00 PM on Friday, March 27th. The Science Fair is not responsible for projects left after this time.

SCIENCE FAIR POLICIES

The relationship of science fairs at the school, county, and state level
Local science fairs for grades 6-12 will be used to select the best-qualified projects to participate in the Ventura County Science Fair. If a school does not have a science fair, projects screened by teachers may be submitted.

Science Fair Awards
Based upon merit, awards will be given for first, second, third and honorable mention in each of the categories for the Middle School (grades 6-8), and High School divisions (grades 9-12).

Only students in grades 6 - 12 will be able to participate in the California State Science Fair.

Staff reserves the right to split categories with large numbers of projects into smaller sections and to group categories with few projects into a combined judging group. The decisions of the Staff are final.

In addition to the Science Fair Awards, Special Awards are often given by companies, businesses and agencies from within our county. These awards are judged and presented separately from the Official Ventura County Science Fair Awards. Often these awards are monetary; however, plaques, subscriptions, memberships, tours, and gift certificates have also been awarded in the past.
Experimental and Testing Regulations
Projects submitted to the Ventura County Science Fair must be authorized and supervised by an adult Advisor and must be in compliance with Local, State and Federal Education Codes, Laws and Regulations including but not limited to The Code of Federal Regulations 45 CFR 46 § 46.102 and the California Department of Education Science Safety Handbook:

The display of live or preserved animals is not permitted. Projects may not display photographs of procedures detrimental to the health and well being of vertebrate animals. Photographs of surgical procedures may not be exhibited.

Student researchers must adhere to all local, state and federal: codes, laws and regulations governing controlled substances, human subjects, tissue sample sources, and humane treatment of live vertebrate animals. For further research and information, the following resources are suggested:

California Department of Education: Education Code
§ https://www.cde.ca.gov/re/lr/cl/
§ Legal Office: 916-319-0860
State of California: California Law
§ http://www.leginfo.ca.gov/
§ State of California Information: 916-657-9900
§ https://www.govinfo.gov/help/cfr
§ Code of Federal Regulations: 888-293-6498

Safety Regulations
Fire regulations prohibit the hanging of charts, cloth, or paper decorations from the table below the exhibit. The following rules for 110-volt operations must be observed: All wiring, switches, and metal parts that carry high voltage must be located out of reach of observers and must be designed with an adequate overload safety factor. High voltage equipment must be properly insulated and shielded with a grounded metal box or cage to make accidental contact impossible. ELECTRICITY WILL NOT BE PROVIDED. If electricity is required, the applicant must provide their own battery powered solution.

All project displays must adhere to all local, state and federal laws for public safety. Lasers must be appropriately shielded.

No hazardous materials may be exhibited at the project display. This includes but is not limited to over the counter pharmaceuticals (aspirin, antacids, cold medicines, etc.), acids, hazardous microbes, carcinogenic materials, and unsealed foodstuffs that may attract pests. For these items, the substitution of illustrations or photographs is encouraged. Materials in violation of this rule will be removed without notice to the participant before judging.

Staff reserves the right to reject any project deemed unsafe or unsuitable for display. Failure to comply with all policies and regulations will result in denial of application.
Student Participation In the Science Fair
The fair is open to students in grades 6-12. You may begin the Project Application process by completing the On-Line Application at www.vcoe.org/ScienceFair.

Students may enter an Individual or a Team Project. Students may not enter both, each student may enter only one project in the Fair. Projects entered into the Fair under an individual’s name but discovered by the judging panel to have been prepared by a team of more than one student will be disqualified.

Team Projects will be accepted and judged. A Team Project is one in which two to three students have participated and are named on the project as its authors. Participants in a team project may not submit an individual project. These projects will be placed in the appropriate category and will compete against individual projects in that category.

Parents and advisors may not be near displays during judging times but are invited to view during Public Viewing hours.

If the number of entries in a given category is too small, Staff reserves the right to group these entries in a related category.

Project Display
All projects must fit within the listed space limitations. This includes elements of the project that may extend or protrude.

Project Display Area: 36” wide x 15” deep x 5 feet tall. A Standard Elmer’s Tri-Fold Display Board (48” X 36”) fits in this space.

The project display board shall be sturdy and self-supporting, using durable materials, such as heavy self-supporting cardboard (pre-made displays), plywood, pegboard, masonite, celotex, or metal. Absolutely no tag board or construction paper will be accepted as a project display board.

Project may be assembled at the exhibit area, but it may not be built there. The applicant must furnish all materials.

The Official Placeholder will be placed at each project’s location by Staff and must not be removed. The student must place the Research Project Report with the display (preferably attached).

Computers and all equipment are students’ responsibilities; they may be brought in and removed the day of judging. IMPORTANT: LOSS OR DAMAGE --- Valuable equipment, such as computers, may be part of the display only if the student entrant accepts full responsibility. It is advised that the laboratory notebook and computer equipment be on display only during the actual judging period. ELECTRICITY WILL NOT BE PROVIDED.

Post student information on the back upper right hand of your display, no student information should appear on the front of your display. Student information will include: Name of student; name of school; name of teacher; grade level, and project category.
Do not display any local or school awards with your project.

Staff is not responsible for any losses incurred. All items of the project must be identified with the student’s name and school.

Displays must adhere to these guidelines. These guidelines will be rigidly enforced. Projects not meeting these requirements will not be judged, nor permitted for display:

**Project Presentation**
Each student should come prepared to answer questions from the judges about their project. Be advised that the abstract sheet is the first thing the judge’s read. Please be sure that it is neat, typed or printed (in ink), legible, and informative.

It is the hope of Staff that all invited award recipients will be present at the Awards Ceremony. If the project is removed prior to the official project teardown time, then Staff reserves the right to disqualify the student or team.

**Criteria and Standards for Judging**
Scientific Research Projects should demonstrate the Scientific Method. Students should design projects that produce quantitative data through experimentation, followed by an analysis of that data. The Scientific Method may be described differently in different sources, but the underlying approach has these steps:

1. State the problem.
2. Research the topic.
3. Form a hypothesis.
4. Test the hypothesis.
5. Collect and record observations.
6. Summarize your observations and data into charts, tables, and graphs.
7. Form a conclusion.
8. Communicate the findings.

Engineering projects which involve designing and developing a device or process with specific objectives should demonstrate the Engineering Goals. Engineering Goals involve repeated testing and refining as the final goal is approached. A good engineering project should

1. Identify the potential user’s needs and state the objective(s) clearly.
2. Research what has already been done.
3. Prepare preliminary designs and a materials list considering costs, manufacturing and user requirements.
5. Analyze the performance and compare it with the original objectives.
6. Improve design or construction and retest as necessary.
7. Document the results of each step and compile into a report.
The following numerical guidelines should be taken as indications of the importance of each criterion. Always remember, the project is being judged as a whole. Written and oral communication describing the project should clearly demonstrate the depth and breadth of the students’ understanding of the topic and his or her conclusions, based on sound scientific investigation.

30%: Research: Originality of the problem, content, logical presentation, support of hypothesis and bibliography.

30%: Experimental or Engineering Procedure: Procedure and materials, illustrations, data collection, data analysis and conclusion.

15%: Oral Response: Expressed knowledge of subject and background information. Stated value of the project. Demonstrates understanding of scientific or technical procedure. Overall quality of responses and ability to answer questions effectively.


10%: Completeness and Overall Quality: Written and oral communication describing the project. Clearly demonstrates the depth and breadth of the students understanding of the topic and his or her conclusions based on sound scientific investigation.

SCIENCE FAIR PROJECT CATEGORIES

Your assigned category should be determined by the specific focus of your study, not the tools used to perform the study.

Please read the category definitions carefully. These definitions may be different from those used in your school fair. Read your project description. What your project is about defines the category, in which your project belongs, not the methods that were used. For example, if you used bacteria to study the effectiveness of different antibiotics, the bacteria were a tool to learn about antibiotics, so the project belongs in Human Biology. However, if the specific effect of the antibiotic drug on the bacteria was studied, the project belongs in Microbiology.

Your project may be placed into a category which is different from the one to which it was assigned at your school Fair. This is not unusual and is done to assure that similar projects are placed together with each other in the same category. Proper category selection optimizes your project’s likelihood of recognition through Fair awards.
Life Sciences:
Animal Behavioral and Social Sciences: Animal behavior, social and community relationships—psychology, sociology, linguistics (ie. Dolphin communication), learning, perception, etc.

Human Behavioral and Social Sciences: Human behavior, social and community relationships—psychology, sociology, anthropology, archaeology, ethnology, linguistics, learning, perception, urban problems, reading problems, public opinion surveys, educational testing, etc.

Biochemistry: Chemistry of life processes—molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, hormones, etc.

Botany: Study of plant life—agriculture, agronomy, horticulture, forestry, plant taxonomy, plant physiology, plant pathology, plant genetics, hydroponics, algae, etc.

Human Biology: Study of diseases and health of humans— genetics, physiology, dentistry, pharmacology, pathology, ophthalmology, nutrition, dermatology, allergies, speech and hearing, etc.

Microbiology: Biology of microorganisms—bacteriology, virology, protozoology, fungi, bacterial genetics, yeast, etc.

Product Science (Biological) (Junior Division Only): Comparison and testing of commercial off-the-shelf products for quality and/or effectiveness for intended use in real-world consumer-oriented applications. This category is reserved for experimental methods involving biological sciences and processes.

Zoology: Study of animals—animal genetics, ornithology, ichthyology, herpetology, entomology, animal ecology, paleontology, cellular physiology, circadian rhythms, animal husbandry, cytology, histology, animal physiology, invertebrate neurophysiology, studies of invertebrates, etc.

Physical Sciences:
Chemistry: Study of nature and composition of matter and laws governing it—physical chemistry, organic chemistry (other than biochemistry), inorganic chemistry, materials, plastics, fuels, pesticides, metallurgy, soil chemistry, etc.

Earth, Space and Environmental Sciences: Study of earth and celestial bodies with regard to geology, mineralogy, physiography, oceanography, meteorology, climatology, astronomy, speleology, seismology, geography, study of pollution (air, water, and land) sources and their control; ecology etc.

Engineering: Technology; projects that directly apply scientific principles to manufacturing and practical uses—civil, mechanical, aeronautical, chemical, electrical, photographic, sound, automotive, marine, heating and refrigerating, transportation, environmental engineering, etc.

Mathematics, Computer Science and Electronics: Development of formal logical systems, numerical and algebraic computations, and their applications, semiconductors, development of hardware and/or software for communications, graphics, simulations, and information theory...

Product Science (Physical) (Junior Division Only): Comparison and testing of commercial off-the-shelf products for quality and/or effectiveness for intended use in real-world consumer-oriented applications. This category is reserved for experimental methods involving non-biological, physical sciences and processes.

Physics: Theories, principles, and laws governing energy and the effect of energy on matter—solid state, optics, acoustics, particle, nuclear, atomic, plasma, superconductivity, fluid and gas dynamics, thermodynamics, semiconductors, magnetism, quantum mechanics, biophysics, etc.
The Scientific Method is the logical way in which a scientist goes about trying to solve a problem. A student needs to understand the scientific method, and the words that are used to describe the process. The actual descriptions of the steps of the scientific method will vary from source to source, but the underlying process remains the same. The steps of the scientific method are as follows:

1. State the problem.
2. Observation and research.
3. Form a hypothesis.
4. Test the hypothesis.
5. Collect and record observations.
6. Summarize your observations and data into charts, tables, and graphs.
7. Form a conclusion.
8. Communicate the experiment.

Let's review a real-life example of how you might use the scientific method:

1. State the problem: "Grass won't grow in that area of my lawn!"; Suppose you notice an area in your front lawn where the grass is not growing correctly. The rest of your lawn has thick, green grass, but this one area has very sparse grass. This, then, is your problem.

2. Observation and research: "The sparse area is surrounded by several evergreen trees, which drop needles and block much of the sunlight. The soil appears just as rich as the soil in other areas, but the pH is lower. All areas seem to be getting similar amounts of water. The temperature in the shaded area is lower than the areas that are not shaded."; You would then go outside and look at that area. What makes that area different from the areas where the lawn is growing nicely? Does one area get more or less sun? What is the soil like? Compare as many likely factors that you can think of.

3. Form a hypothesis: "If the pH of the soil was higher, then my grass would grow properly."; Based on the information that you gathered, and your knowledge of Biology, you are ready to form a hypothesis. Remember, a hypothesis is an educated guess. It is only your background knowledge in this subject that separates a true hypothesis from what would merely be a guess. Now, considering the observations you made, you might decide that pH of the soil in the sparse area is the problem. You form a hypothesis and put it in what is called "if . . . then" format.

4. Test the hypothesis: "I took 200 small pots and used them to grow 200 samples of grass. I split the 200 pots into 5 groups of 40, and I adjusted the pH of the soil with calcium oxide (lime) until the five groups had pH readings of; 3, 5, 7, 9, and 11 respectively. In all of the samples I used the same amount and type of soil and the same type and number of grass seeds. Each sample was kept in the same room with identical conditions as far as light, temperature and water."; Now you want to design an experiment that can be used to test your hypothesis. It is important that your experiment be controlled, that you keep all conditions between groups the same, except for that condition which you are testing. It is also important that you conduct your experiment on several different samples, so that your results may prove conclusive.
5. Record your observations: “I counted the number of seeds which sprouted and recorded the numbers in my journal. I took pictures of each sample weekly to determine density of growth. I began measuring weekly growth after the third week and observed the density of growth in each pot…”; If you conduct your experiment carefully, you will probably find differences between the groups of grass that you grew. If you don’t see anything that leads you to believe that the higher pH would cause growth problems in your lawn, then you may reject your original hypothesis and form a new one, maybe one that is based on the difference in sunlight. If your experiment supports your hypothesis, then you may be on to something, but more testing would be required before you could say for sure.

6. Summarize your observations and data into charts, tables, and graphs: “By arranging my measurements into tables, it was easy to make graphs. The graphs agreed with what my photos and observations proved.”; Utilizing your research, observations, measurements, photos and graphs, you can now write what you found out.

7. Form your conclusion: “Based on my experiment, I was able to determine that … showed the most density and … showed the least density supporting/rejecting my hypothesis.”

8. Communicate your results: Write a report that includes all you did.

In real life, by the time you were done with the above experiment, it may be winter and you would no longer be worried about your lawn. It is not a realistic way of solving this problem, when it would be much easier to ask a gardener about the problem or read more about lawn care. Although the experiment may not carry over realistically, the scientific method does. You would still want to change only one thing at a time, when trying to improve the grass in that area. The lesson is that all problems should be approached in a logical manner.

*© Copyright 2001 Fordham Preparatory School, All Rights Reserved. Gregory L. Curran information observed in any rounds with any teams still competing.

ENGINEERING GOALS

Engineering projects which involve designing and developing a device or process with specific objectives should demonstrate the Engineering Goals. Engineering is the discipline, art and profession of acquiring and applying technical, scientific and mathematical knowledge to design and implement materials, structures, machines, devices, systems, and processes that safely realize a desired objective or inventions. The American Engineers’ Council for Professional Development has defined engineering as follows:

“[T]he creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property.”

Some of the Steps that are involved in Engineering Goals are as follows:

1. Identify the potential user’s needs and state the objective(s) clearly
2. Research, what has already been done?
3. Prepare preliminary designs and a materials list considering costs, manufacturing and user requirements.
5. Analyze the performance and compare it to the original objectives.
6. Improve design or construction and retest as necessary.
7. Document the results of each step and compile into a report.

Let's review a real-life example of how you might use Engineering goals:
Producing clean water is an important aspect of disease prevention in many countries. We'll use this as an example of how the engineering goals might be applied to a project. The following steps should be recorded in a project notebook as well as written up in the final report.

1. Identify the potential user’s needs and state the objective(s) clearly: Poor people in under-developed countries need an inexpensive, reliable source of clean water that is powered by locally available fuel. The objectives are to provide a system: which costs less than $100; requires cleaning once a month or less often; uses a readily available, non-polluting fuel; produces at least 5 liters of clean water each day.
2. Research, what has already been done: There are several different approaches including mechanical filtering, activated charcoal, ultraviolet light and distillation. You compare these methods and conclude that the last method seems safest but requires more energy than the others.
3. Prepare preliminary designs: Your research shows that burning any fuel will cause an unacceptable amount of air pollution, so you design a distillation system that uses a solar collector that is large enough to provide a liter of clean water for every hour of full sun. Your design includes a list of materials and quantities, with their costs; details of construction with diagrams and instructions for operating and maintaining the system.
4. Build and test a prototype: Once your system is operational, make careful measurements of the amount of water produced under different weather conditions and use a water testing kit to check for impurities. Take photographs to document the construction.
5. Analyze the performance and compare it to the original objectives: It's likely that your prototype did not perform as you expected. Perhaps the solar collector had to be repositioned to follow the sun or needed to be larger. Maybe maintaining a steady water flow was difficult. Make careful notes of your conclusions.
6. Improve design or construction and retest as necessary: Use your conclusions from step 5 to guide the necessary changes and continue to observe and measure the system's performance.
7. Document the results of each step and compile into a report: Organize your research, design details, photographs, measurements and observations, improvements and final performance assessment into a project report.

Engineering projects may involve actual construction, like our example, or writing a computer program or designing a more efficient procedure. The success of the project usually depends on how well the objectives were described at the start. Try to make them quantitative, "...costs less than $100," and easily measured, "... 5 liters ...".
**RULES AND GUIDELINES**

**PLAN THE STEPS OF YOUR PROJECT**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Planned Date Of Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) <strong>Pick your topic (S &amp; E):</strong> Ideas can come from a hobby, local or world events, family activities or special needs. Pick a question or problem that is not too broad and that can be answered through scientific investigation. Think in advance of how you would make measurements or what you would do to answer the question(s).</td>
<td>(1 week) ________</td>
</tr>
<tr>
<td>2) <strong>Research your topic (S &amp; E):</strong> Go to the library or internet to learn more about your topic. Look for unexplained or unexpected results. Also, talk to professionals in the field.</td>
<td>(2 weeks) ________</td>
</tr>
<tr>
<td>3) <strong>Focus (S &amp; E):</strong> organize your information and write a testable hypothesis or engineering objectives.</td>
<td>(1 day) ________</td>
</tr>
<tr>
<td>4) <strong>Plan your experiment (S):</strong> Give careful thought to your procedure. Plan to change only one independent variable and measure the effect on the dependent variable. Make a note of the experiment constants that do not change. Some experiments need a control which is treated exactly like the experiment, but the independent variable does not change. Make sure that you include sufficient numbers in both control (if applicable) and experimental groups for you to calculate averages and other statistics. Make measurements using <strong>metric units</strong>.</td>
<td>(1 week) ________</td>
</tr>
<tr>
<td>5) <strong>Make a preliminary design (E):</strong> Plan the steps you will take to achieve your objectives. Draw up a materials list; find sources for the materials you will need, consider the cost, time for construction and user requirements</td>
<td>(1 week) ________</td>
</tr>
<tr>
<td>6) <strong>Consult with your Advisor and get approval (S &amp; E):</strong> You must discuss your project planning with an Advisor and obtain their approval. You and your Advisor should consider safety, cost and the feasibility of your project</td>
<td>(1 day) ________</td>
</tr>
</tbody>
</table>
| 7) **Complete the online Project Application for the Ventura County Science Fair** | **Deadline: 4:00 PM, February 6th, 2020**  
[www.vcoe.org/ScienceFair](http://www.vcoe.org/ScienceFair) |
| 8) **All required documentation completed and turned in to:**  
Ventura County Office of Education: Science Fair  
5189 Verdugo Way  
Camarillo, CA 93012 | **Deadline: 4:00 PM, February 7th, 2020** |
| 9) **Conduct your experiment (S):** During experimentation, keep detailed notes of each and every experiment, measurement and observation in a log book. Use data tables or charts to record your quantitative data. | (Estimate how long this will take) ________ |
| 10) **Build and test a prototype (E):** Keep an engineering log describing the progress of your work. There should be an entry in the log describing what you are trying to do and what was accomplished each time you work on the prototype. Measurements and other data should be organized in tables. | (Estimate how long this will take) ________ |
| 11) **Analyze your results (S):** Organize your data into tables, calculate averages from repeated trials, draw graphs to show the relationship between your dependent variable (on the y-axis) and independent variable (on the x-axis). Describe the patterns that your graphs show and discuss whether your hypothesis is supported. | (1 week) ________ |
| 12) **Make adjustments and retest your prototype (E):** make improvements so that your design performs more closely to the stated objectives. Continue to keep a log of your work. | (1 week) ________ |
| 13) **Draw conclusions (S):** Discuss whether your results matched what you expected. Consider whether you have sufficient data; if there are experimental errors or improvements to be made. Think of practical applications of this project in the real world. | (1 week) ________ |
| 14) **Review your design and construction process (E):** Identify the most and least successful parts of your approach, any improvements needed and the practical applications. | (1 week) ________ |
| 15) **Compile your report and create a display board (S & E):** Use the next section as a guide to presenting your work for the Science Fair. | (1 week) ________ |

**VENTURA COUNTY SCIENCE FAIR PROJECT SET-UP:**  
**2:00 PM-7:00 PM March 26th, 2020**
PRESENTING YOUR WORK FOR THE SCIENCE FAIR

1) **Project Data Book:** Conducting your experiment or completing an engineering project may take several days or weeks. A project data book containing accurate and detailed notes will show consistency and thoroughness to the judges and will help you when writing your report. Be sure the quantitative data recorded is accurate and that units are included in the data tables. Make sure you date each entry.

2) **Report:** A good report includes the following sections.
   a) **Title Page and Table of Contents:** The report should have numbered pages
   b) **Abstract:** This is a maximum of 250 words on one page. It should include the a) purpose of the project, b) procedures to be used, c) data, and conclusions. It also may include any possible applications. The following page gives an example of an appropriately written Abstract.

   The main purpose for writing a science project abstract is to give both you and the reader a very brief summary and overview of your project. If written well, the abstract can tie your project together and, most importantly; it will give your project a sense of continuity and clarity.

   You should keep a couple main points in mind as you write it:
   1. The abstract should definitely NOT be longer than one page.
   2. Summarize everything; do not burden the reader with too much content.

   The following is a suggested outline for writing the abstract:
   - **Label Clearly:** On the top of your Abstract it should clearly state the title of your project. Below the title, note the division (grades 6 - 8 are Junior; grades 9 - 12 are Senior), list the student name(s), school and teacher.
   - **Theme and Purpose (Objectives):** This short introductory paragraph should give a little background and describe the purpose (or objectives) of your project. Try to capture the interest of the reader.
   - **Methodology:** Describe your procedure making the independent and dependent variables clear. Or: Give an overview of what was done to achieve the engineering objectives.
   - **Results:** Explain the relationships that your data supported. Or: Describe the successes and shortcomings of your design
   - **Conclusions:** Relate your findings to the purpose of the project. Were the results what you expected? Or: Explain how you would change your engineering design or process to improve the outcome.
   - **Further work:** Note any questions that have arisen from your project. Only include questions that can be used as a starting point for future projects. This is an important section as tells the reader that you recognize the limits of your study and know how to find more complete answers.
   - **On the project display board,** a copy of the Abstract should be placed just below the Title of your project as well as included in the report.
Sample Abstract

Effects of Marine Engine Exhaust Water on Algae
Division: Junior
Student(s): Mary E. Jones
Advisor: Mr. Bill Smith
School: Hometown High School, Hometown, PA

This project in its present form is the result of bioassay experimentation on the effects of two-cycle marine engine exhaust water on certain green algae. The initial idea was to determine the toxicity of outboard engine lubricant. Some success with lubricants eventually led to the formulation of “synthetic” exhaust water which, in turn, led to the use of actual two-cycle engine exhaust water as the test substance.

Toxicity was determined by means of the standard bottle or “batch” bioassay technique. *Scenedesmus quadricauda* and *Ankistrodesmus* sp. were used as the test organisms. Toxicity was measured in terms of a decrease in the maximum standing crop. The effective concentration - 50% (EC50) for *Scenedesmus quadricauda* was found to be 3.75% exhaust water; for *Ankistrodesmus* sp. 3.1% exhaust water using the bottle technique.

Anomalies in growth curves raised the suspicion that evaporation was affecting the results; therefore, a flow-through...

c) **Research**: This includes an explanation of what prompted your research; the information that you collected before designing your experiment or engineering project; your hypothesis, or engineering goals.

d) **Materials and Procedure**: Describe in detail the methodology you used to collect data, make observations or create your prototype. Your report should be detailed enough so that someone would be able to repeat the work from the information in your paper. Include photographs or careful drawings of original equipment.

e) **Results**: For an experimental project, the results include data tables, statistics and graphs. For an engineering project, a compare the engineering goals with the actual performance.

f) **Discussion**: For an experimental project, compare your results with theoretical values and/or expected results. Include a discussion of possible errors. Did the data vary between repeated observations? Were your results affected by uncontrolled events? How would you improve or extend the project?

For an engineering project, discuss the more and less successful aspects of the project. What improvements could be made to the design process or the finished prototype?

g) **Conclusions**: Briefly summarize your results. State your findings in relationships of one variable with the other. Support those statements with examples of data. Be specific, do not generalize. Never introduce anything in the conclusion that has not already been discussed. Also mention practical applications.

h) **Acknowledgments**: You should always credit those who have assisted you, including individuals, businesses and educational or research institutions.

i) **References/Bibliography**: Your reference list should include any documentation that is not your own (i.e. books, journal articles, websites, etc.). See an appropriate reference in your discipline for format. For instance, **APA style**:

   
   
   iii. **This is MLA Format**. Bibliography is alphabetical and not numbered. First line is at the margin and the second line of same reference is indented.
   
   
   
   
   vii. **Online website** – Planning for College and Academic Planning. The College Board. 7 June 2000


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Your report should look something like this:

3) **Display Board:** Most displays or boards have three sections and are made to stand on a table. Your display should make it easy for interested spectators and judges to understand your study and its results. It should be eye-catching, neat and organized. This is the first thing that the judges will see so you will want to convince them that your study is worth a closer look.

**Helpful hints for display:**

a) **Current Year:** Make sure the board reflects the current year’s work only.

b) **Good Title:** Your title should simply and accurately describe the nature of your project. A good title will make the casual observer want to know more.

c) **Take Photographs:** Many projects involve elements that may not be safely exhibited at the Fair but are an important part of the project. You might want to take photographs of important parts/phases of your experiment to use in your display.

d) **Be Organized:** Make sure your display follows a sequence and is logically presented and easy to read. A glance should permit anyone (particularly the judges) to locate quickly the title, abstract, procedure, results and conclusions. The hypothesis or engineering goals should be clear.

e) **Eye-Catching:** Make your display stand out with neat, colorful headings, charts and graphs. Pay special attention to the labeling of graphs, charts, diagrams, photographs, and tables to ensure that each has a title and appropriate label describing what is being demonstrated. Anyone should be able to understand the visuals without further explanation.

f) **Correctly Presented and Well-Constructed:** Be sure to adhere to the size limitations and safety rules when preparing your display. Display all required forms for your project. Make sure your display is sturdy, light but strong.

**Please Note:** The judges are judging your research, not the display. So, don’t spend an excessive amount of time or money on the board. You are being judged on the science not the show!
Creating Your Display: Projects must fit within a 36” wide X 15” deep Display Area.

Sample Layout

Use this label to post your student information on the back upper right hand of your display. Student information will include: Name of student; name of school; name of teacher; grade level, and project category.

Student Name(s): ____________________________________________
______________________________________________________________
School: ______________________________________________________
Teacher Name: _______________________________________________
Grade Level: ___________ Project Category: ________________
4) **Meeting the Judges:** This is an informal Q & A, students do not need to prepare a speech. The judges are interested in

1) what the student did in the current year;
2) the detail and accuracy of the topic research
3) whether the experimental or engineering procedures were well planned
4) how well a student followed the scientific method or engineering methodologies;
5) how well the student can discuss his / her project

Judges look for thorough research and a well-planned experiment or engineering project. They look at how significant a project is in its field and how much of it is the students own design. Initially, judges read your abstract, display board and report, but the oral responses are very important. Judges want students to answer questions and speak freely and confidently about their work.

Start the interview off right by greeting the judges and introducing yourself. Neat appearance, good manners and enthusiasm for what you are doing will impress the judges.

Judges questions may include: How did you come up with this idea? What was your role? What didn’t you do? What further plans do you have to continue research? What are the practical applications of your project?

The judges want to know that you: understand the basic science; have correctly measured and analyzed the data and you know the possible sources of error in your project.

The judges want to encourage your interest in science and engineering so relax, smile and enjoy your chance to learn from them.
Student Participation Agreement Information

Students and coaches are required to comply with the competition rules as stated in this rule book. Failure to adhere to these policies could result in the disqualification of the participant and/or his/her team at the discretion of the Regional Coordinator.

The standard of conduct for coaches, students, parents, and teachers shall be no less than the expected standard of conduct for any off-campus activity. Appropriate conduct of Students is the sole responsibility of the team coach. The coach has the legal responsibility of chaperone for his/her team Students at all times. Students shall be under the supervision of the coach, or another adult designated by the coach, during all excursions, activities and facilities. In addition, the following rules will be enforced.

The standard of conduct for coaches, students, parents, and teachers are required to comply with the competition rules. Failure to adhere to these rules may result in the disqualification of the participant and/or an entire team.

**DRESS CODE**

As representatives of Science Fair, Students are expected to present a positive appearance and dress appropriately during all Science Fair associated events. A participant could be excused from competition or from receiving recognition during the awards ceremony if inappropriately dressed.

If violations of the dress code are observed by the Regional Coordinator, the Student will be given the opportunity to comply with dress standards. Failure to comply with dress standards may result in disqualification. The decision of the Regional Coordinator is final.

**FINANCIAL LIABILITY**

Financial liability for all damage incurred by action of participant/Student shall be the sole responsibility of that Student and his/her parents.
Voluntary Informed Consent, Liability Release, Acknowledgment and Assumption of Potential Risk, Permission & Request for Participation

Agree to conduct ourselves in a responsible and respectful manner, follow the rules of competition as outlined in the Ventura County Regional Science Fair rules and guidelines and conduct experiments in accordance with the following guidelines:

The experimental procedure proposed and/or used in this science fair project is authorized and supervised by the herein named Adviser and complies with Local, State and Federal Education Codes, Laws and Regulations including but not limited to The Code of Federal Regulations 45 CFR 46 § 46.102 and the California Department of Education: Science Safety Handbook: The Regional Coordinator reserves the right to reject any project that does not comply with all Local, State and Federal Education Codes, Laws and Regulations.

Affirm that this project is the result of the student(s) own work and research. The project application and student information is correct, with special attention given to the Division and Category Codes selected.

Understand that any special assistance needed at the competition must be requested in writing no later than February 7th, 2020.

Agree that violation of the Science Fair rules and guidelines, in any form, is neither acceptable nor tolerated. Any act of cheating will be promptly brought to the Regional Coordinator for review, evaluation and imposition of possible sanctions. It is within the Regional Coordinator’s discretion to disqualify not only the person caught cheating, but he/she may also disqualify the entire team in order to protect the integrity of the competition.

Expressly grant authority and indicate consent to the release of educational information about or relative to the participation of the Student in Science Fair activities.

Such information shall include, but not be limited to, the release of photographs, test results, the reproduction of sound, motion picture or videotape recordings, etc. Consent is likewise given to the use of such information by an institute of higher learning, recognized educational study group or educator for the purposes of study comparison and the furtherance of knowledge in the field of education. The Ventura County Regional Science Fair shall have the right to reproduce, use, display and disseminate in such manner as they see fit, without obligation of any kind to any person, the results from Competition Day activities.

In addition to the above the student and parent/guardian agree to the following: I authorize my son/daughter, named herein, to participate in the indicated student competition events or activities. I understand and acknowledge that certain extracurricular events or activities, such as these, have associated potential risk of serious injury and/or illness to the individuals who participate in such extracurricular events or activities.
The Science Fair poses some inherent risk of a participant being seriously injured during travel or while competing. These injuries could include, but are not limited to, the following:

1. Animal bites
2. Lacerations, abrasions, and avulsions
3. Sprains and strains
4. Fractured bones
5. Thermal burns
6. Chemical exposures and burns
7. Infectious disease
8. Electric shock
9. Unconsciousness
10. Paralysis
11. Disfigurement
12. Head injuries
13. Loss of eyesight
14. Death

I understand and acknowledge that participation in the Science Fair is completely elective and voluntary and as such is not required by the Ventura County Office of Education, the School or District for completion of graduation requirements.

I understand that all participants are to abide by and accept all rules and requirements governing conduct and safety in the student competition events or activities. To the extent permitted by the Education Code, any participant determined to be in violation of behavior standards may be removed from student competition events or activities.

I understand and acknowledge that in order to participate in these activities, I and my son/daughter agree to assume liability and responsibility for any and all potential risks that may be associated with participation in student competition events or activities.

I agree to, and do hereby release and hold the Ventura County Office of Education, School, District, and Program Organizers and Sponsors and their respective governing boards, officers, agents, employees and/or volunteers harmless for any and all claims; demands; causes of action; liability; damages; expenses; or loss of any sort, including bodily injury or death; because of or arising out of acts or omissions with respect to student competition events or activities.

I acknowledge that I have carefully read this VOLUNTARY INFORMED CONSENT, LIABILITY RELEASE, ACKNOWLEDGMENT AND ASSUMPTION OF POTENTIAL RISK, PERMISSION & REQUEST FOR PARTICIPATION form and that I understand and agree to its terms.

I agree that in the event of illness or injury, I hereby consent to whatever transportation, x-ray, examination, anesthetic, medical, dental, or surgical diagnosis or treatment and hospital care from a licensed physician as deemed necessary for the safety and welfare of my child or ward. It is understood that the resulting expenses will be the responsibility of the child or ward’s parent(s)/guardian(s).