PRIVATE SCHOOLS UNIFIED SCIENCE DISTRICT
Serving Riverside, Inyo, Mono,
and San Bernardino Counties
Home-educated students

PRESENTS

The Thirteenth Annual

Science & Engineering Fair

Registration Deadline February 21st, 2004	Postcard Deadline February 21st, 2004

2003 - 2004

Student's Guide to Participation Regulations and Information Packet

Nuevo Community Church Annex
29734 Nuevo Road
Nuevo, California
February 27-28, 2004

Fair Website
http://psusd.unpatented.com

Revised 12-03

Dear Home Educated Student,

Thank you for your commitment to participate in the 13th Annual Private Schools Unified Science District Science Fair. Through the science project you are given the opportunity to explore the unknown and to make exciting discoveries. Science Fairs are a wonderful way for all of us to recognize you for your accomplishments and contribute to a higher level of participation in regional fairs.

Seven of our 4-12th grade winners will compete for cash prizes and awards at the Inland Science and Engineering Fair on April 20-21st, 2004. In order for you to advance to the county finals, it will be extremely important to read and adhere to all rules and regulations provided in this manual. Take note that some requirements are exclusively for 6-12 grades.

Remember to choose a topic, state the problem in the form of a question on the enclosed 3X5 postcard and complete the additional information. The postcard must be returned by Saturday, February 21st, 2004. This information is used to prepare the program.

A collections division is included in the Fair. It is a good way to interest your child in the sciences. Each display will receive an award for participation, and this year, "Best of Show" will be awarded for a collection display. Return the 3X5 postcard by February 21st, 2004, with the title of your collection. See page 4 for further details. We encourage you to visit www.usc.edu/cssf where you'll find a multitude of good information such as "How to choose a project", as well as, Internet mentoring between students and professional scientists selected by CSSF.

Again, thank you for your involvement in this great day of discovery. The rewards are wonderful as you stretch your mind, take pride in your work, experience the hands-on use of the 'Scientific Method', and share the results with others. All students will receive an award for participation.

Irene Miles ((909)928-0446, e-mail: simirah@gte.net) or Charlotte Creighton ((909) 928-2390, e-mail: charlotte@creightonfamily.org) are available for any questions you may have concerning your subject or project regulations. Winning projects may have to be adapted to meet further regional or state requirements.

In His Service,

The 2004 Science Fair Committee

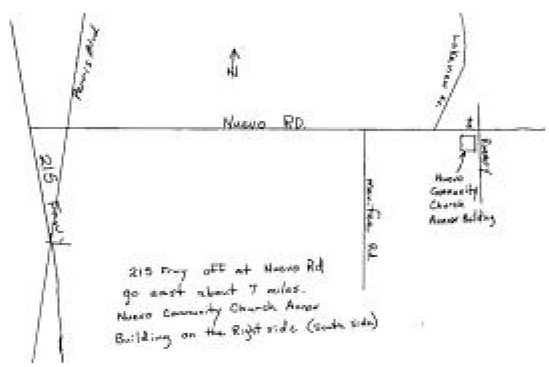
Table of Contents

2004 Private Schools Unified Science District Timeline

Entry Deadline:	Saturday, February 21, 2004
Postcards Due:	Saturday, February 21, 2004
Fee:	$10.00 per student/ $3.00 mailing fee
Project Set-Up:	Friday, February 27th, 4-6pm
Judging:	Friday, February 27th, 6pm
Viewing:	Saturday, February 28th, 9-11am
Awards:	Saturday, February 28th, 11-12 noon

*Every student will receive a participation certificate. Medals will be awarded to 1st, 2nd, & 3rd place winners in each division. Entries advancing to the Inland Science and Engineering Fair will receive a scholarship to cover entry fees.
*6-12th grade students must be interviewed by the judges. A wonderful opportunity to be involved in "Science Olympics" is offered and families are invited to wait with their other child(ren) for these students. Interviews will be conducted from 6-10PM.
*Please remove projects immediately after Awards Ceremony.
*We are very grateful to Nuevo Community Church for allowing us to use the facility. Please use good judgment at all times while on church property.

Nuevo Community Church Annex
29734 Nuevo Road
Nuevo, California



*RIMS Science & Engineering Fair:
Public Viewing April 21th, 2004 9am-9pm
National Orange Show - Damus Building

*2004 California State Science Fair: May 24-25, 2004
(MORE INFO: visit website at: www.usc.edu/cssf
California Science Center

REQUIREMENTS FOR COLLECTIONS DIVISION

Collections can be a good way to interest a child in the sciences. Scientific collections can be entered in our Science Fair. Collections can be entered either in "beginner" or "advanced" categories.

Examples of beginning collections would be minerals or rocks from an area or plants from one habitat. Good collections will be arranged in an artistic manner and with sufficient description to communicate information of a scientific nature. All items in collections must be labeled with the collection locality and the technical description or scientific name of the objects.

Advanced collections should illustrate a complex observation of nature or demonstrate a scientific theory. For example, to illustrate the natural regeneration of an area after a major fire, a collection might show the progression and frequency of the various species of plants as they re-establish themselves in the burn zone. Advanced collections must show evidence of proper field technique and accurate recording as documented in a detailed field notebook.

Non-endangered plants, rocks, shells, and so forth can be obtained with permission of the owner of the land where they are collected. Collections of dead or alive specimens from the animal kingdom (such require a Scientific Collection Permit which should be obtained before collecting can begin). Before starting this type of project, or if you have any general questions, please contact Robert Cashman at 909-678-1385. He can also be reached by e-mail:cashman@linkline.com.

HOW WILL MY ENTRY BE JUDGED?

A. Who are the judges?

Professionals such as scientists, engineers, doctors, and educators serve as judges at each level of the Science Fair competition. In the youngest categories, (third grade and below) we also have student judges. Our student judges are the prior winners in the Jr. and Sr. High categories. These student judges have not only submitted excellent quality work, they have competed at County and sometimes State level Science Fair competitions. In addition to the training and directions received by all judges prior to judging, they receive an extra training and practice judging seminar. They work as part of the team with a highly qualified adult volunteer. We believe this student judging program is beneficial to all levels of the Science Fair.

B. How does the judging process work?

Each division is usually judged as a whole by a team of three judges.

Judges are strongly encouraged--but cannot be required--to write comments on the judging form.

The final score is achieved by one of two ways: averaging the scores independently entered by each judge, or by mutual agreement among the three judges. Judges are allowed to review the results of their category upon the completion of the judging in order to assure accuracy of the judging process.

To ensure accuracy, we also have a quality control team that reviews each form and verifies accuracy in arithmetic.

Grades 6-12 Students will be interviewed at their displays by the judges.

C. The subjective nature of judging.

Remember: judges must evaluate certain aspects of your entry that are objective. For example they may look to see bibliography sources used; or if the written material is grammatical and correctly spelled. But judges must also evaluate interpretive aspects of your entry, which are qualitative in nature (for example: analysis and conclusions about the statistical data and results). Judges are also looking for age-appropriate ideas and usage of language. It is acceptable if an adult or older student helps a younger student. Most young students have critical thinking skills that are far more developed than their language arts skills. We do ask, however, that the student list the aid he received in an “acknowledgments” page of his notebook.

The guidelines on the pages following may help you prepare for judging.

PRIVATE SCHOOL UNIFIED SCIENCE DISTRICT

Judging Form – Grades 4-12

Project # ____________

Scientific Method (30 points)

_________ 1. Both problems and hypothesis are identified and clearly stated. (Max. = 2)
_________ 2. The problem is manageable and capable of being investigated. (Max. = 2)
_________ 3. The hypothesis is derived from literature search made prior to the experiment. (Max. = 2)
_________ 4. The procedure is detailed to allow for repetition by others. (Max. = 3)
_________ 5. The experiment is designed to yield valid, reliable and accurate data. Variables are identified and controlled. (Max. = 5)
_________ 6. The student has used a sufficient sample size and/or has repeated the experiment to provide sufficient data for analysis. (Max. = 5)
_________ 7. Data/observations are organized and presented in the journal section of the notebook as original entries (not copied). (Max. = 3)
_________ 8. Data/observations are summarized on tables or graphs. (Max. = 3)
_________ 9. Conclusions formulated are logical, based on the data or observation collected and relevant to the problem/hypothesis. (Max. = 3)
_________10. Remaining unanswered questions are acknowledged (Max. = 2)
_________ **Subtotal**

Thoroughness (15 points)

_________1. Student has prepared an in-depth annotated bibliography, which cites sources of information other than encyclopedias and textbooks. (Max. = 4)
_________2. The complete project is documented in a notebook, which is organized, neat and accurate. (Max. = 4)
_________3. The project demonstrates a depth and/or breadth of study that is age-appropriate. (Max. = 4)
_________4. It is evident the student committed considerable time and effort in developing the project. (Max. = 3)
_________ **Subtotal**

Clarity (10 points)

_________1. The display is effective—reflecting neatness, organization, and a logical progression. (Max. =5)
_________2. The student clearly communicates an understanding of the goal, procedure, and findings. (Max. = 5)
_________ **Subtotal**

Skills (15 points)

_________1. The student demonstrates the acquisition and use of laboratory/observational skills. (Max. = 3)
_________2. The student demonstrates the acquisition and use of design/construction skills. (Max. = 3)
_________3. The student demonstrates the acquisition and use of computational skills. (Max. = 4)
_________4. The student accomplished the project. (Max. = 5)
_________ **Subtotal**

Creativity (30 points)

_________1. The student's project is original, stemming from ideas conceived by the student (not in a lab text or provided by others. (Max. = 6)
_________2. The student has used equipment and/or materials creatively to obtain data/observations. (Max. = 12)
_________3. The student shows creative ability or originality in the analysis, interpretation and application of the data. (Max. = 12)
_________ **Subtotal**
_________ **Grand Total (Max. = 100)**

Comments: (continue on back if needed)

PRIVATE SCHOOLS UNIFIED SCIENCE DISTRICT

Judging Form—Grades K-3

Project #____________

Scientific Method (50 points)

_______ 1. Is the project composed of a question appropriate to study by the scientific method? (Max. = 8)

_______ 2. Does it include a clearly stated hypothesis? (Max. = 8)

_______ 3. Is the background research appropriate to the grade of the student? (Max. = 3)

_______ 4. Is the material list complete? (Max. = 4)

_______ 5. Is the procedure detailed? (Max. = 5)

_______ 6. Is the data clear and complete? (Max. = 5)

_______ 7. Is the data analysis clear? *(Analysis will be minimal at this age level)* (Max. = 3)

_______ 8. Is the conclusion clearly stated? Is it based on the data documented? (Max. = 7)

_______ 9. Has the experiment been repeated, or is the sample size sufficiently large? (Max. = 7)

_______ **Subtotal**

Notebook (15 points)

(Note: In grades K and Pre-K, it is OK to see dictated work. Most students can think above their writing skills)

_______ 1. Variables are identified and controlled. (Max. = 4)

_______ 2. Notebook is organized, neat written or dictated the items. (Max. = 4)

_______ 3. Breadth/depth of study are adequate for age level. (Max. = 3)

_______ 4. Time and effort by student are obvious. (Max. = 4)

_______ **Subtotal**

Clarity (10 points)

_______ 1. The display is effective reflecting neatness, organization, and a logical progression. (Max. = 5)

_______ 2. The student clearly communicates an understanding of the goal, procedure, and findings. (Max. = 5)

_______ **Subtotal**

Skills (10 points)

_______ 1. The student demonstrates the acquisition and use of laboratory and observational skills. (Max. = 5)

_______ 2. The student clearly communicates the acquisition and use of computational skills (is the work quantified?) (Max. = 5)

_______ **Subtotal**

Creativity (15 points)

_______ 1. The student's project is original, stemming from ideas conceived by the student as opposed to those found in a laboratory text or provided by others. (Max. = 8)

_______ 2. The student has used equipment and/or materials creatively to obtain data/observations. (Max. = 7)

_______ **Subtotal**

_______ **Grand Total (Max. = 100)**

Comments: *(continue on back if needed)*

What subject categories do the Inland Science and Engineering Fair suggest?

Elementary Division (4-5)

(Separate awards are given for each division. Team projects are judged at the highest grade level represented in the project.) Team projects are done collaboratively with two to four students in any of the four areas of science listed below.

1. **Earth Sciences – (ES)**
   Introductory experiments in earth and space sciences.
2. **Physical Sciences/Chemistry – (PS)**
   Introductory experiments in chemistry, energy and environmental sciences; engineering, electronics, and invention; mathematics; and physics.
3. **Life Sciences/Biology – (LS)**
   Introductory experiments in behavior and social sciences, biochemistry, botany, medicine and health, microbiology, and zoology.
4. **Consumer Sciences – (CS)**
   Examination, comparison, analysis, testing of manufactured devices or trade name chemicals, materials, etc. Product quality, safety and consumer satisfaction.

Students in Junior (J) (grades 6-8) and Senior (S) (grades 9-12) Divisions may compete in the following categories.

Team projects which are produced collaboratively with two to four students in one of the categories listed in the next section are judged along with the individual projects in the same category.

Junior & Senior Divisions (6-12)

Category	Examples	Related Categories
1. Applied Mechanics/Structures & Mechanisms/Manufacturing: Studies concerning the design, manufacture, and operation of structures and mechanisms, including characteristics of structures and materials (strength, flexibility, dynamic response), active/passive control, fatigue/fracture evaluations, elastic/plastic material characteristics.	*Antilock vs. Lock Brakes; Why did the Nimitz Freeway Collapse?; Shock attenuation in Baseball Helmets.* *Senior Division: Strengthening Concrete with Rice Ash Hull; Tensile Strength of Composite Materials.*	In the Junior Division, studies involving materials are included only for applications involving dynamic (in motion) environments. Engineering studies of soil stability during earthquakes belong in Earth Sciences. Projects focusing upon computers (as opposed to using them as a tool in the project) belong in Electricity and Electronics.

Behavioral Sciences: Studies of behavior, conditioned responses, learning, psychiatry, or psychology in humans and other animals, including the effects of chemical or physical stress on mental processes. In the Senior Division, this category includes anthropology, archaeology, and sociology.	*A Study of the Senses in Stress Management; Does Age Affect Implicit Learning?; The Effectiveness of Flash Cards vs. Computer Scripts; Effect of Caffeine on Memory.*	Junior Division projects concerning sociology, anthropology, or archaeology, or which involve questionnaire surveys, belong in Social Sciences. Animal behavior projects belong in Zoology. Sensory response studies belong in Physiology.
Category	**Examples**	**Related Categories**
3. Biochemistry/Molecular Biology: Studies at the molecular level of biochemical or physiological pathways in animals (including humans), micro-organisms, and plants.	*Lipooxygenase Influence on Lipofuscin Granule Formation in Bananas; Effects of P1 Precursors on Virus Growth; Catalyzed Reactions of Enzymes; Isolation of Pre-mRNA Mutants in Saccharomyces cerevisiae.*	Studies of the physical properties of biochemicals such as oxidation-reduction reactions belong in Chemistry. Functions of major organ systems belong in Physiology.
4. Chemistry: Studies in which chemical and physical properties of organic and inorganic materials (excluding biochemistry) are observed. In the Junior Division, studies are more specifically of reactions in which materials change composition or phase. This implies knowledge of the chemical structure of materials being tested. In the Senior Division, studies may include characterization of chemical products found in everyday life without implying knowledge of the chemical structure.	*Effects of Food Preparation on Vitamins; Determination of Ascorbic Acid Concentrating in Orange Juice Using a Redox Reaction; Isolation, Purification, and Specific Rotation Determination of Ricinoleic Acid; Conductivity of Electrolytes; Does Water Purity Affect Surface Tension?*	Chemical studies of metabolic processes or processes medicated by biochemical intermediates (e.g. enzymes) belong in Biochemistry.
5. Earth Sciences/Planetary Sciences/Physical Environments: Studies in surficial geology, geophysics, seismology, engineering geology, earthquake engineering, atmospheric physics, physical oceanography, marine geology, coastal processes, and comparative planetology. Studies of environmental factors not related to living things, and of the effects of human activity on naturally occurring physical phenomena.	*Gravity Current Velocities; Beach Sand Fluctuations and Cliff Erosion; Dependence of Liquefaction Upon Soil Composition; Solar Activity and Refraction Properties of the Ionosphere.*	Studies of the effects on physical phenomena by human activity involving pollution (as opposed to mechanical intervention) belong in Environmental Engineering. In the Junior Division, environmental studies using biological systems/organisms belong in Environmental Biology.
6. Electricity & Electronics: Experimental or theoretical studies with electrical circuits, computer design, electro-optics, electromagnetic applications, antennas and propagation and power engineering.	*Satellite Reception Without a Dish; Transmission of Information by Laser; Effect of Solar Power; How Vulnerable are Floppy Disks to Magnetic Fields?*	Projects that merely use electronics to study something else (e.g. hearing in birds) belong in another category (Zoology in this example).

7. Environmental Biology (Junior Division Only): Projects using biological systems/organisms to study the impact of natural and man-made changes on the environment. Examples of changes include: floods, fires, biohazardous spills, acid rain, and earth quakes.	*The Effects of Fires on Flora and Fauna; Rebirth after the Wild Fires; The Effects of Petroleum Contaminated Water on Aquatic Plants; How Does Water Quality Affect the Abundance and Diversity of Micro-invertebrates; Bacteria Pollution in our Beaches; Does Fire Stimulate Plant Growth?*	Studies performed within a normal physiological range under a sustained environment to examine the effect of substances or conditions on living things belong in the relevant basic science category (e.g., Plant Biology, Physiology, Zoology, etc.).
Category	**Examples**	**Related Categories**
8. Environmental Engineering: Projects which apply technologies such as recycling, reclamation, restoration, composting, and bioremediation which are directed to control the environment and/or the effects of pollution on the environment.	*Newspapers as Mulch; Oil Control; Water Hyacinth: Primary Water Treatment? What Soil Conditions Best Control Soil Erosion While Assisting Growth? Designing a New Home Sewer System.*	Studies of the effect of pollution on the environment at the basic science level belong in the appropriate basic science category. For the Junior Division, studies involving changes to the environment on biological systems/organisms belong in Environmental Biology.
9. Fluid Mechanics/Aerodynamics/Thermophysics: Experimental or theoretical studies in aerodynamics and propulsion of air, land, water, and space vehicles; aero/hydrodynamics of structures and natural objects; thermodynamics of energy production, energy utilization, and other industrial processes. Studies of the basic physics of fluid flow.	*Effect of Dimples on Golf Ball Flight; How Long Does It Take to Cook a Hot Dog? Airfoil Stall Characteristics; Can Chaos Theory Predict Turbulence?; Low Drag Launch Lug for Model Rockets; Absorption of Acoustic Waves; Homemade Heat Pump; Electricity from Wave Energy.*	For the Junior Division, studies of acoustic or thermodynamic properties of materials belong in Materials Science. Fundamental thermodynamic properties (e.g. specific heat) belong in Physics & Astronomy.
10. Materials Science (Junior Division Only): Studies of materials characteristics and properties with respect to their state (not in motion) applications in the real world. Includes measures and comparisons of materials strength, durability, insulating properties, flammability, and effectiveness for intended use. These characterizations do not imply knowledge of the chemical structure of materials being tested.	*Which Material is the Best Insulator?; Tensile Strength of Composite Materials; Water Absorption in Eight Selected Hardwoods With and Without Sealants; Best Plywood for Homemade Skateboards; Cotton, Linen, Wool: Which One Lasts Longer?; Fire Resistance of Roofing Materials; Which Laundry Detergent Works the Best?*	For Senior Division, these projects may be in Fluids/Aerodynamics, Environmental Engineering, Chemistry, Physics, or Applied Mechanics. Studies of fundamental properties of matter (e.g. specific heat) belong in Physics. Studies of materials reactions and recomposition belong in Chemistry. Studies of materials in dynamic applications belong in Applied Mechanics.
11. Mathematics & Software: Studies in geometry, topology, real and complex analysis, number theory, algorithm analysis and optimization, artificial intelligence, computability, computer graphics, modeling and simulation, programming environments and languages.	*Maximally Dispersed Points on a Sphere; Computer Modeled Evolution; Coupled Chaotic Systems and Stability; Mathematical Optimization of Multiple Precision Multiplication; Partitions of Positive Numbers; Neural Network Model of Vision*	Projects using mathematics or computers as a tool in the study of different subject belong in that category. Studies that merely model or simulate biological or physical systems usually belong in this category. Computer hardware projects belong in Electricity & Electronics.

12. Microbiology: Studies of epidemiology, genetics, growth, and physiology of bacteria, fungi, protozoa, or viruses.	*Studies of Light Producing Bacteria; Effect of Light Before and After UV Damage to E. Coli; What Sugars do Yeast Use?*	Projects using bacteria as a tool to study another subject belong in that subject. For example, a study using bacteria to monitor the effectiveness of disinfectants belongs in Chemistry. Studies measuring antibiotic activity belong in Pharmacology.
Category	**Examples**	**Related Categories**
13. Pharmacology/Toxicology: Studies of drug or chemical effects at the cellular or organismic level on animals, humans, or plants.	*Effect of Caffeine on Daphnia; Effect of Insecticides on Mosquitoes; Vitamin Deficiencies; Copper Toxicity of Marine Embryos.*	Projects which study the effect of fertilizers on plant growth belong in Plant Biology. Studies of growth of microorganisms belong in Microbiology. In the Junior Division, studies of the toxic effects of environmental changes on biological systems belong in Environmental Biology.
14. Physics & Astronomy: Experimental or theoretical studies of the physical properties of matter, solar physics, astrophysics, orbital mechanics, observational astronomy, and astronomical surveys. Computer simulations of physical systems are appropriate in this category.	*Jupiter's Decametric Emission; Emissivity As a Function of Geometry; Solar Activity and Geosynchronous Satellites; Do High Temperature Superconductors have a First Order Phase Transition?; Chaotic Pendulum.*	Studies of other planets themselves (as opposed to their orbits) belong in Earth Sciences.
15. Physiology: Studies of major organ system functions involving genetics, immunology, neurobiology, pathology, reproduction, or sensory biology in mammals.	*Effect of Age on Aerobic Abilities; Peripheral Vision; Correlation of Strength with Gender; Effect of Vaccination of Antibody Development in Neonatal Bovines.*	Projects studying physiology of birds, insects, etc., belong in Zoology. Studies of the effect of chemicals on a physiological function may belong in Pharmacology.
16. Plant Biology: Studies of the genetics, growth, morphology, pathology, or physiology in plants or algae.	*The Effects of Organic and Inorganic Fertilizers on Plant Growth; Effect of Rhizobium on Legume Plants (Pisum); Transpiration of Plants Under Different Light Sources.*	Studies which use plants to restore the environment may belong in Environmental Engineering. Studies of the effect of chemicals other than fertilizers on plants belong in Pharmacology. In the Junior Division, studies using plants which involve environmental changes may belong in Environmental Biology.
17. Social Science (Junior Division Only): Studies or surveys of attitudes, behaviors, or values of a society or groups within a society (e.g. anthropology, archaeology, or sociology).	*Racial Awareness in Infants; Subliminal Persuasion by Television; AIDS Awareness in Teens.*	Projects in Psychology and Psychiatry belong in Behavioral Sciences. Senior Division projects appropriate for this subject category belong in Behavior Sciences.
18. Zoology: Studies of evolutionary origins, genetics, growth, morphology, physiology, or reproduction, in animals other than mammals. Studies of the behavior of all animals (excluding humans) in their natural habitats (or reproduction of them).	*Hot Fish, Cold Fish: Respiration in Goldfish; Hearing and the Dominance Hierarchy of Crickets; Effect of Gravity on Living Organisms; Invertebrates in Kelp Holdfasts; Auditory Stimuli in Interganglial Neurons of Acheta Domesticus; Bird Responses to Boar Rootings.*	Studies of mammalian physiology belong in Physiology. Studies in which animals serve as a model for human behavior belong in Behavioral Sciences.

INSTRUCTIONS FOR APPLICATION DEADLINE: March 21, 2004, 4:30PM

All information must be filled out completely and accurately, and all forms applicable to your project must be included. **Type or print in ink**. Keep a photocopy for your records. **Only legible forms will be accepted. FAXed applications are not acceptable**. Applications may be sent by messenger or overnight mail, provided they are received by the application deadline.

Team Projects

Each member of the team must complete a separate application, taking care to list the same project title, and check the "Team Project" box in addition to the category box on the Project Summary as well as list the other members of their team on the front side of the application. All members of the team should submit their applications together.

Some Key Points

Name:	Your name as you wish it to be listed in the printed Inland Area Science and Engineering Fair Program.
Address:	Your mailing address. If your mail is delivered to a post office box, use that address.
Home Phone:	We use this number to call you, if your application is incomplete or would other wise be rejected.
Social Security:	Many organizations give cash or savings bonds as prizes. Those not providing a Social Security number will not be eligible for cash prizes.
School Information:	List your project advisor's/teacher's first and last name. Similarly, list both the first and last name of your school's principal. Do not use abbreviations for school districts as many are the same.
Phonetic Spelling of Name:	If the emcee at the Awards Ceremony can possible mispronounce your name, please enter a phonetic spelling. Use only English characters (e.g., a,b,c).
Project Title:	Do not abbreviate unless necessary. Your title need not be the same as it was in your qualifying fair, but must be the same as will appear on your display at the Inland Area Science and Engineering Fair.
Requirements:	Indicate whether you have a floor display or a table top project. If you do not indicate a choice, you will be assigned a table top space. You must mark electrical outlet if you will need one; otherwise none will be provided. You must bring your own extension cord. **The Fair has no extension cords available for project use!**
Certifications:	If your project involves the use of human or animal tissue(s), live vertebrate animals, or human subjects, complete and include the Certification Form.
Signatures:	Both you and a parent or guardian must sign and date the form where indicated. You district Science Fair Coordinator must sign and date the form, certifying that your project complies with the rules and regulations. Your district coordinator must certify that you are eligible to enter the Inland Area Science and Engineering Fair.

***Applications must come in as a packet containing all completed forms from a district with a completed green transmittal sheet. NO individual applications will be accepted.**

Mail to: Bob Cashman (909) 678-1385, P.O. Box 915, Wildomar, CA 92595

INSTRUCTIONS FOR PROJECT SUMMARY (ABSTRACT)

Please type (single or double-spaced) or print neatly. If you use a word processor, use a typesize no smaller than 10 point. Use dark ink (not blue), which will photocopy. Do not exceed the space allotted or include additional pages because only this one side will be given to your judges.

NAME - Your name (and those of your co-authors if yours is a Team Project) only. Do not include your county, or teacher's name.

PROJECT TITLE - This is the title as indicated on the Application, and as it will appear on your actual display. It should clearly indicate the subject as explained in the Summary Statement. Additionally, Special and Recognition Award judges use project titles to determine eligibility for their awards. A title unclear as to subject matter may cause your project to be overlooked.

DIVISION - Check your grade level (4-5 = Elementary, 6-8 = Junior, 9-12 = Senior).

PREFERRED CATEGORY - Indicate your preferred category only if yours is not a Team Project. If you are undecided, indicate your possible choices in order of preference.

01 Applied Mechanics
02 Behavioral Sciences
03 Biochemistry/Molecular Biology
04 Chemistry
05 Earth Sciences
06 Electricity & Electronics
07 Environmental Biology (Jr. Div. Only)
08 Environmental Engineering
09 Fluid Mechanics/Aerodynamics/Thermophysics
10 Materials Science (Jr. Div. Only)
11 Mathematics & Software
12 Microbiology
13 Pharmacology/Toxicology
14 Physics and Astronomy
15 Physiology
16 Plant Biology
17 Social Science (Jr. Div. Only)
18 Zoology

PROJECT ABSTRACT - Not all project abstracts will need to include all of these elements.

OBJECTIVE OR GOAL - State the objective, goal, or hypothesis upon which the project is based. Example: My objective was to learn if the feeding habits of hummingbirds are affected by color.

MATERIALS AND METHODS - Indicate the materials and methods used in your project. Materials may include the use of a specific computer program, different types of construction material, plants, bacteria, etc. Briefly describe your experimental design or engineering methods.

RESULTS - Summarize your results and indicate how they pertain to your objective.

CONCLUSION/DISCUSSION - Indicate if your results supported your hypothesis or enabled you to attain your objective. Discuss briefly how information from this project expands our knowledge about the category subject.

SUMMARY STATEMENT - In one sentence, state what your project is about.

HELP RECEIVED - Give the names of mentors, institutions, and people who helped with the project. Indicate if you are a participant in the NSF Young Scholars Program.

Junior & Senior Division Only 2004

DEADLINE: March 21, 2004

Your application should be turned in to your DISTRICT Science Fair Coordinator by mid-March.

INLAND SCIENCE AND ENGINEERING FAIR
STUDENT PROJECT ENTRANCE APPLICATION

DIRECTIONS FOR COMPLETING ENTRANCE APPLICATION:

Type or print all requested information. Complete each section as directed and Abbreviate wherever necessary.

NAME ➧	LAST NAME OF ENTRANT	FIRST NAME OF ENTRANT	M. I.
ADDRESS ➧	ADDRESS (NUMBER) AND STREET		
	CITY		ZIP CODE

HOME PHONE (INCLUDE AREA CODE) ( )	BIRTHDAY (MO/DAY/YR) / /	GRADE	PLEASE CHECK ☐ MALE ☐ FEMALE	SOCIAL SECURITY # Not required if you do not wish to receive a cash

NAME OF SCHOOL	SCHOOL PHONE NUMBER (INCLUDE AREA CODE)
NAME OF DISTRICT (DO NOT ABBREVIATE) PRIVATE SCHOOLS UNIFIED SCIENCE DISTRICT	NAME OF TEACHER (LIST FIRST & LAST NAME)
NAME OF PRINCIPAL (LIST FIRST & LAST NAME)	TO HELP OUR M.C. INTRODUCE STUDENTS, PLEASE SPELL YOUR NAME PHONETICALLY

PROJECT TITLE — ABBREVIATE IF NECESSARY, BUT DO NOT USE MORE THAN EIGHTY CHARACTERS AND SPACES

DIVISION

☐ JR. 6-8
☐ SR. 9-12

CATEGORY SUBJECT TO REVIEW AT ENTRANCE

CHECK ONLY ONE:

☐ Appl. Mechanics/ Structures & Mechanisms/ Manufacturing (01)
☐ Behavior Sciences (02)
☐ Biochemistry/Molecular Biology (03)
☐ Chemistry (04)
☐ Earth Science/Planetary Science/Physical Environments (05)
☐ Electricity & Electronics (06)
☐ Environmental Biology (Jr. Only) (07)
☐ Environmental Sciences/Ecology (08)
☐ Materials Science (Jr. Only) (10)
☐ Mathematics & Software (11)
☐ Microbiology (12)
☐ Pharmacology/Toxicology (13)
☐ Physics and Astronomy (14)
☐ Physiology (15)
☐ Plant Biology (16)
☐ Social Science (Jr. Div. Only) (17)
☐ Zoology (18)

Check if this is a team project ☐

ONLY FILL IN THIS PART, IF A TEAM PROJECT	Name of Other Team Member:	Name of Other Team Member:	Name of Other Team Member

DOES PROJECT INVOLVE LIVE VERTEBRATE ANIMALS?
☐ NO ☐ YES (If Yes, attach Certification of Humane Treatment of Vertebrate Animals)

DOES PROJECT INVOLVE HUMAN SUBJECTS?
☐ NO ☐ YES (If Yes, attach Certification of Compliance of Research Involving Human Subjects)

DOES PROJECT INVOLVE USE OF TISSUE(S), HUMAN PART(S) OR ANIMAL PART(S) INCLUDING BLOOD?
☐ NO ☐ YES (If Yes, attach Certification of Tissue Sample Source)

DOES PROJECT INVOLVE USE OF RECOMBINANT DNA, FLAMMABLE OR EXPLOSIVE MATERIAL, CONSUMABLE ALCOHOL, TOBACCO, DRUGS OR MEDICATIONS, BACTERIA, HAZARDOUS CHEMICALS, LASERS, OR EXPOSED ELECTRICAL WIRES?
☐ NO ☐ YES (If Yes, refer to rules and regulations for required procedures and restrictions.)

In consideration of your permitting the undersigned student to take part in the Inland Area Science and Engineering Fair, we waive all claims against the IASEF and all sponsors for injury to or death of persons or loss or damage of property in any way occurring in connection with the IASEF, and we agree to

☐ We have read and understood the rules and regulations governing the Inland Area Science and Engineering Fair and agree to abide by them.
☐ We understand projects not removed after the award's ceremony will be disposed of.

SIGNATURE OF ENTRANT	DATE SIGNED
SIGNATURE OF PARENT(S)/GUARDIAN(S)	DATE SIGNED

I certify this entrant was a place winner in our District Science Fair

District Fair Coordinator Date

Page 1 of 2
Jr / Sr

Form for 4th-5th Grade Projects Only
2004

INLAND SCIENCE AND ENGINEERING FAIR
STUDENT PROJECT ENTRANCE APPLICATION

DEADLINE: March 21, 2004

Your application should be turned in to your DISTRICT Science Fair Coordinator by mid-March.

DIRECTIONS FOR COMPLETING ENTRANCE APPLICATION:

Type or print all requested information. Complete each section as directed and Abbreviate wherever necessary.

NAME ➧	LAST NAME OF STUDENT	FIRST NAME OF STUDENT	M. I.
ADDRESS ➧	ADDRESS (NUMBER) AND STREET		
	CITY		ZIP CODE

HOME PHONE (INCLUDE AREA CODE) ( )	BIRTHDAY (MO/DAY/YR) / /	GRADE	PLEASE CHECK ☐ MALE ☐ FEMALE	SOCIAL SECURITY # Not required if you do not wish to receive a cash prize

NAME OF SCHOOL/PRIVATE SCHOOL ADDRESS	SCHOOL PHONE NUMBER (INCLUDE AREA CODE) ( )
NAME OF DISTRICT (DO NOT ABBREVIATE) PRIVATE SCHOOLS UNIFIED SCIENCE DISTRICT	NAME OF TEACHER (LIST FIRST & LAST NAME)
NAME OF PRINCIPAL (LIST FIRST & LAST NAME)	TO HELP OUR M.C. INTRODUCE STUDENTS, PLEASE SPELL YOUR NAME PHONETICALLY

PROJECT TITLE	ABBREVIATE IF NECESSARY, BUT DO NOT USE MORE THAN EIGHTY CHARACTERS AND SPACES

CATEGORY SUBJECT TO REVIEW AT ENTRANCE	☐ Earth Sciences ☐ Life Sciences/Biology	☐ Physical Sciences/Chemistry ☐ Consumer Sciences	Check if this is a team project ☐

ONLY FILL IN THIS PART, IF A TEAM PROJECT	Name of Other Team Member:	Name of Other Team Member:	Name of Other Team Member

DOES PROJECT INVOLVE LIVE VERTEBRATE ANIMALS?
☐ NO ☐ YES (If Yes, attach Certification of Humane Treatment of Vertebrate Animals)

DOES PROJECT INVOLVE HUMAN SUBJECTS?
☐ NO ☐ YES (If Yes, attach Certification of Compliance of Research Invoving Human Subjects)

DOES PROJECT INVOLVE USE OF TISSUE(S), HUMAN PART(S) OR ANIMAL PART(S) INCLUDING BLOOD?
☐ NO ☐ YES (If Yes, attach Certification of Tissue Sample Source)

DOES PROJECT INVOLVE USE OF RECOMBINANT DNA, FLAMMABLE OR EXPLOSIVE MATERIAL, CONSUMABLE ALCOHOL, TOBACCO, DRUGS OR MEDICATIONS, BACTERIA, HAZARDOUS CHEMICALS, LASERS, OR EXPOSED ELECTRICAL WIRES?
☐ NO ☐ YES (If Yes, refer to rules and regulations for required procedures and restrictions.)

In consideration of your permitting the undersigned student to take part in the Inland Area Science and Engineering Fair, we waive all claims against the IASEF and all sponsors for injury to or death of persons or loss or damage of property in any way occurring in connection with the IASEF, and we agree to

☐ We have read and understood the rules and regulations governing the Inland Area Science and Engineering Fair and agree to abide by them.
☐ We understand projects not removed after the award's ceremony will be disposed of.

SIGNATURE OF STUDENT	DATE SIGNED
SIGNATURE OF PARENT(S)/GUARDIAN(S)	DATE SIGNED

I certify this entrant was a place winner in our District Science Fair

District Fair Coordinator Date

Page 1 of 2

2004 INLAND AREA SCIENCE AND ENGINEERING FAIR

SUMMARY FOR JUDGES

YOUR NAME	**SCIENCE FAIR USE ONLY**
PROJECT TITLE	
	DIVISION __Elem (4) __Elem (5) __Jr. (6-8) __Sr. (9-12)

REQUIREMENTS NOTE: FLOOR DISPLAYS MAY BE PHYSICALLY ISOLATED FROM OTHER PROJECTS IN YOUR CATEGORY.	ÿ Electrical outlet (100 V; 60 cycle; 500 watt MAXIMUM) ÿ Table Project (4 feet wide x 2.5 feet deep by 6.5 feet tall MAXIMUM) ÿ Floor Project (4 feet wide x 2.5 deep x 9 feet tall MAXIMUM)	**NOTE: YOU WILL BE PROHIBITED FROM DISPLAYING AN OVERSIZED PROJECT.**

Abstract (Only text in this box will be given to judges. Do not attach any other page.)

Help Received in Doing Project (e.g., Mother helped type report; neighbor helped wire board; used lab equipment
At university X under the supervision of Dr. Y; participant in NSF Young Scholars Program)

Page 2 of 2
Jr. / Sr.

INLAND SCIENCE AND ENGINEERING FAIR
GENERAL REGULATIONS

1. Construction must be durable with all parts firmly attached. No attachment to walls will be allowed. Provision for the support for the back of the exhibit should be made. Maximum size is:

   Table Project
   122 cm wide X 76 cm ft. deep X 198 cm ft. tall (4 ft. wide X 2.5 ft. deep X 6.5 ft. tall)

   Floor Project
   122 cm wide X 76cm ft. deep X 274 cm ft. tall (4 ft. wide X 2.5 ft. deep X 9 ft. tall)

2. If applicable, Certification of Humane Treatment of Live Vertebrate Animals or Certification of Compliance of Research Involving Human Subjects or Certificate of Tissue Sample must be submitted with your application. Personal and school identification must be concealed at the time of judging.

   · **Human parts other than teeth, hair, nails, histological sections, and liquid tissue slides (properly acquired) may not be exhibited.**

   · **Photographs or other visual presentations of any surgical techniques, dissections, autopsies and/or laboratory techniques depicting vertebrate animals in other than normal conditions may not be displayed on the student's exhibit but may be contained in the accompanying notebook.**

3. **No project may use consumable alcohol, tobacco or illegally obtained narcotics and/or controlled substances. This includes surveys on projects that compare use of the above substances; (e.g. smokers vs. non-smokers).**

4. **No living or non-living plants, mold, viral or bacterial materials may be on display.**

   - Controlled Substances (drugs, chemicals, anesthetics, etc., the use of which is regulated by the Comprehensive Drug Abuse Prevention and Control Act of 1970) must conform to existing local, state, and federal laws. Such substances may not be exhibited at the Fair.

   - All recombinant DNA research must be carried out in accordance with current NIH Guidelines for Research Involving Recombinant DNA Molecules. Only research normally conducted without containment in a microbiological laboratory and performed under the supervision of an appropriately qualified scientist will be permitted. The facilities to be used must be described in the research plan. Research requiring containment is prohibited.

5. **Live vertebrate animals may not be displayed during the Fair.** (Students conducting projects involving live vertebrate animals must provide a completed Certificate of Humane Treatment of Live Vertebrate Animals, see page 42).

   - State of California Education Code Title 2, Division 2, Part 28, Chapter 4, Article 5 (51540). In the public elementary and high schools or in public elementary and high school sponsored activities and classes held elsewhere than on school premises, live vertebrate animals shall not, as part of a scientific experiment or any purpose whatsoever:

     (a) Be experimentally medicated or drugged in a manner to cause painful reactions or induce painful or lethal pathological conditions.
     (b) Be injured through any other treatments, including, but not limited to, anesthetization or electrical shock. Live animals on the premises of a public elementary or high school shall

be housed and cared for in a humane and safe manner. **The provisions of this section are not intended to prohibit or constrain vocational instruction in the normal practices of animal husbandry.**

- In addition, PSUSD and the Inland Science and Engineering Fair **will not** accept projects which involve: a) performing surgery on live vertebrate animals; b) performing the sacrifice of live vertebrate animals; or c) conducting experiments involving toxicity, controlled substances, consumption of consumable alcohol, tobacco, nutritional deficiencies, or physical or psychological stress.
- Projects that required certification by a biomedical scientist -

(a) It is permissible for the student and designated adult supervisor to consult with a biomedical scientist to obtain detailed instructions and guidance in techniques to be used by the student under the direct continuous supervision of a designated adult supervisor (for research **not** conducted in the biomedical scientist's lab). In this instance the designated adult supervisor will be required to certify in writing jointly with the biomedical scientists.

(b) Either the biomedical scientist or adult supervisor must provide continuing supervision to assure compliance with the protocol.

(c) Major deviations from the approved protocol may be implemented only with the written approval of the biomedical scientist.

(d) The biomedical scientist or adult supervisor must be in the same locality as the student for the duration of the experimental work except for short trips. This means that a project started in one city may not be continued in another unless an alternate designated adult supervisor, approved by the biomedical scientist prior to the continuation of the experimental work, agrees to supervise the project.

(e) A biomedical scientist is defined as one who possesses an earned doctoral degree in science or medicine and who has current working knowledge of the techniques to be used in the research under consideration.

(f) A designated adult supervisor is defined as an individual who has been properly trained in the techniques and procedures to be used in the investigation. The biomedical scientist must certify that the designated adult supervisor has been so trained.

6. Electrical materials must be in keeping with standard safety laws and practices. Displays will be inspected for compliance with such laws (500 watt maximum;).

- Wiring must be properly insulated and fastened.
- Wiring, switches and the metal parts of high voltage circuits must be located out of reach of observers and must include an adequate overload safety device.
- High voltage equipment must be shielded with grounded metal box or be caged to prevent accidental contact.
- Approved connecting cords of the proper load-carrying capacity must be used for 110-volt operation of lights, motors, transformers, and other equipment.
- Standard switches must be used for 110-volt circuits. Open knife switches or bell-ringing push buttons are not acceptable for circuits exceeding 12 volts.
- Batteries with open top cells (wet cell batteries) are not permitted.

- Electrical connections in 110-volt AC must have an Underwriters Laboratories approved cord of proper load-carrying capacity at least two meters long and equipped with a standard grounded plug.

- Devices (vacuum tubes, lasers, etc.) that generate dangerous rays must be properly shielded.

- Only Class I and Class II (not Class III or Class IV) lasers may be operated at the Fair. These lasers must:

1) have a protective housing or barricade preventing human access to the beam during operation;

2) be disconnected from the power source when not being operated;

3) be operated only by the exhibitor; and

4) when displayed, be accompanied by a sign reading:
LASER RADIATION; DO NOT STARE INTO BEAM.

7. Open flames will not be permitted in the display. No gas or water outlet will be provided.

   - Research involving gasohol must conform to Department of Treasury, Bureau of Alcohol, Tobacco and Firearms (AFT) regulations. **For specific information, call the Western Region office, (415) 974-9616.**

   - Fire regulations prohibit the use of highly flammable or combustible materials in project displays. Backboard panels must be of masonite, pegboard, hardboard, foam core, or wood to which poster paper, cardboard, or fabric may be attached.

   - No dangerous or combustible chemicals may be exhibited. (Tanks which have held such chemicals, unless first purged with carbon dioxide, are also prohibited.) Rockets MUST NOT contain fuel.

   - Chemicals listed in Appendix Ill-C-10, page 155 of the "Science Safety Handbook for California High Schools" may only be used under the direct supervision of a qualified teacher/advisor. No project that uses a chemical with a hazard rating of five will be allowed to participate in the Inland Science Fair.

   - Devices producing temperatures in excess of 100^o C must be adequately insulated.

8. A student may participate in only one project (for example, a student may not enter an individual and a team project and may not enter one or two individual projects.) Teams are limited 2-3 students. No limit is placed on the number of team projects per district, but each team project uses one of your district's allocations. Projects may only be grouped as follows: 4th and/or 5th, 6-8, 9-12. (And projects done by students of differing grades will be judged at the highest grade level.

9. All experimental work must be done by the student. Adults may supply materials, advice, and consultation. **(Districts/schools should not advance to Inland Science and Engineering Fair displays that do not meet this requirement.)**

10. The Science Fair Committee reserves the right of refusal of an exhibit which it deems unsafe or unsuitable for public exhibition. This includes, but is not limited, to any projects which display or discuss subjects that require parental consent and/or rights of review.

11. The project may have begun at any time during the year preceding the pre-registration date. A previously investigated topic may continue under investigation, but data previously displayed must be treated as "research." New data must be generated, displayed, and conclusions drawn based on this data.

12. Displays entered in the Inland Science and Engineering Fair must have been selected at a local school system science fair or selection process during the two months preceding the pre-registration date.

The above regulations conform to the recommendations of the California Education Code.
Their enforcement is **required** for all projects and participants.

The Science Fair Committee and all cooperating groups will assume no responsibility for loss or damage to any exhibit or part thereof. Students assume responsibility for all displayed equipment. It is recommended that valuable components including original notebook or data not be left on public display.

MANUAL FOR MAKING A SCIENCE FAIR PROJECT

Who is this manual written for?

The student preparing a science fair project (and his/her parents).

Why was this manual written?

Because science fair projects are very scary and intimidating for many people!
However, with a little help, they can be lots of fun and full of adventure.

How will this manual help you?

I. It tells you exactly what a Science Fair Project is (and is not).

II. It outlines the specific steps you need to take in order to do a Science Fair Project

- A. Overview of steps
- B. Detailed description of steps

III. It describes the format for:

- A. Your Project Report
- B. Your Project display board

IV. It provides additional useful information:

Appendix A. List of possible project topics

Appendix B. Bibliography Formats

What do you do if you 'get stuck?'

Ask for help! Once you get over the first few hurdles you will find science projects to be an adventure full of fun.

I. WHAT EXACTLY IS A SCIENCE FAIR PROJECT?

A Science Fair Project is simply a project that uses the SCIENTIFIC METHOD.

That probably doesn't help a whole lot, so here is the definition of the scientific method.

The Scientific Method is a method for discovering about the physical world through repeatable observations in a controlled environment.

Let's look at this definition in detail:

****"A method of discovering…"* - Fasten your seat belts; the scientific method leads you down an exciting path of discovery!

****"…about the physical world…"* - the scientific method is an amazingly good tool to help you understand and appreciate the beauty and fascination of the physical world. It is also far superior to intuition or guesswork for discovering solutions to practical problems relating to the physical world.

****"... through repeatable observations..."* - This is the indispensable core of the scientific method. The "Laws of Nature" are nothing more than observations repeated so frequently that we assume their reliability and call them laws. Your observations are the raw data of your project.

****"...in a controlled environment..."* - This is the great challenge of the scientific method. Many a wrong conclusion has been drawn because uncontrolled variables have confounded an experiment. The goal of a scientific experiment is to control all variables except the one(s) under study. This assures repeatability and accurate conclusions.

Finally, a Science Fair Project

IS NOT JUST a display of something in science or nature
IS NOT JUST a presentation of a scientific discovery made in the past
IS NOT JUST a research report about a scientific concept or something in nature.

It IS a project that puts the SCIENTIFIC METHOD into practice!

II. STEPS FOR COMPLETING A SCIENCE FAIR PROJECT

A. Overview of Steps

1. Topic

   Find a topic that allows you to use the scientific method. Your topic should be in the form of a question. Your project will answer the question of your topic.

2. Background Research

   Do some homework on your topic in preparation for your experiment. The goal or your research is to be able to predict the answer to the question in your topic, that is, to make a hypothesis about the outcome of your project.

3. Hypothesis

   What will be the results of your controlled experiment? Take an educated guess (in light of your background research) and record it. Your hypothesis should be your prediction of the answer to the question of your topic.

4. Procedure

   How will you create a controlled experiment to test your hypothesis? Think it through and write it down.

5. Equipment/Materials

   What materials/equipment will you use in your experiment? Record your list and gather them.

6. Results

   6.a. Data Collection

   Perform your experiment and carefully record your **observations** (your data). Note any deviations from your procedure or other interesting observations. You should record your data in a science log (a spiral notebook, for example), or they can be computer generated.

   6.b. Data Analysis

   What does your data say? Graph your data or do other analysis to clarify your data.

7. Conclusion

   Finally, draw your conclusion, that is, was your hypothesis correct or not? That is, did you correctly predict the answer of the question in your topic? If not, you may have made a really big discovery. Why wasn't your hypothesis correct?

8. Next Step

   What will be your next step? Is there other data, a different approach, or other related topics you would like to explore in the future?

II. B. Detailed Description of Science Fair Project Steps

1. <u>Topic</u>

Find a topic that allows you to use the scientific method. Your topic should be in the form of a question. Your project will answer the question of your topic.

Please refer to the list of possible ideas in this manual. You may also choose to extend an experiment that you have previously done or seen done. Or, you may look for an experiment to explore a scientific principle or idea that you have been wondering about. For best results and the most fun, choose a topic that is interesting to you!!!

Whatever topic you choose, <u>be sure that you can use the scientific method</u>. Remember that the core of the scientific method is making repeatable observations. To test for a good topic, try to visualize an experiment for the topic in which you are collecting data, that is, making 'repeatable observations!'

<u>Example</u>:
Topic: *What is the Effect of Cola on Plant Growth?*

Can you visualize an experiment for this topic in which you could gather repeatable observations? For example, put two identical plants together in a room and "water" one plant with cola and the other plant with water. Measure the height of the plants every day for a week to see which grows taller.

2. <u>Background Research</u>

Do some homework on your topic in preparation for your experiment. The goal or your research is to be able to predict the answer to the question in your topic, that is, to make a hypothesis about the outcome of your project.

The goal of your background research is to learn enough about the principles surrounding your topic so that you can predict (make an "educated guess" about) the outcome of your experiment.

Head for the library. A search through the card catalog should start you in the right direction. Another good place to start is with general references such as *Van Nostrand's Scientific Encyclopedia,* the *McGraw-Hill Encyclopedia of Science and Technology* and the *Merck Manual.* For more detailed research, you may want to look for a review article in one of the indices to scientific literature such as *Index Medicus* (medical or health related), *General Science Index* or *Biological and Agricultural Index.* Another useful reference is the *Reader's Guide to Periodical Literature,* which lists magazine articles by topic.

Take notes and be sure that you keep a list of your references. Please refer to Appendix B, page 32-34, 'Bibliography Formats.' You will save yourself a lot of time by correctly recording the reference as it is used. Otherwise, you will have to waste time looking up the reference a second time in order to get the correct reference information.

Note cards are a convenient method of keeping track of your research. Two to five references are usually sufficient, depending on the depth you wish to get into the research.

Talk to experts, local or otherwise, about your topic. Find out as much as you can before starting your experiments. If, for example, you were planning to compare different types of soil and how plants grow in that soil, you might contact the U.S. Dept. of Agriculture or a nursery. If you were going to study the heart, you could possible contact your family doctor.

As you summarize your background research for your Science Fair Project Report, your focus should be to describe what you learned that led you to be able to predict (make an educated guess about) the outcome of your experiment.

3. Hypothesis

What will be the results of your controlled experiment? Take an educated guess (in light of your background research) and record it. Your hypothesis should be your prediction of the answer to the question of your topic.

'Taking a guess' doesn't sound very scientific, does it? It is, however, an important part of the process. It forces you to think through the principles involved in your experiment and use them to predict the results of your experiment.

So, consider your topic, your research and the experiment that you are visualizing.
Then take an "educated guess" about the probable outcome of your project.
Record it as your hypothesis.

Example:
Hypothesis: I think that...
If I give one plant cola and another plant water...
then the plant with water will grow more rapidly.

4. Procedure

How will you create a controlled experiment to test your hypothesis? Think it through and write it down.

Here is where you put meat onto the bones of the experiment that you have visualized. What will be the step-by-step procedure you will follow in performing the experiment? What type of observations will you make? What data will you record?

Example:
Procedure:
Put two nearly identical potted plants of the same height in the sun. Each day put 50 ml of water in pot 1 and 50 ml of cola in pot 2. Each day measure and record plant heights to the nearest centimeter. Continue the experiment for one week.

Repeat the experiment a second time.

NOTE: Put on your Sherlock Holmes hats, all you budding detectives. Remember that the most challenging part of an experimental procedure is to control all of the variables.

For example, what variables could confound the Cola experiment being used as our example?

i) Putting in different amounts of water versus cola. This could mislead you into thinking that the difference in growth was due to cola versus water, when it could be due to the difference in the quantity of liquid received.

ii) One plant getting more sun than the other. This could also mislead you into thinking that the difference in growth was due to cola versus water, when it could be due to the difference in time in the sun.

Notice that the procedure of our cola example tries to account for each of these variables. Notice also that if these variables were not controlled, it would be impossible to draw a valid conclusion since you would not know the reason for the difference in growth observed.

So, as you plan the procedure for your experiment, be as thoughtful as possible to control all of the possible variables.

Also note that our example experiment has a built in control - the plant "watered" with water. This is very important. Without this control, plant growth data on the plant "watered" with cola wouldn't have told you very interesting information. Always plan a control sample (one that is familiar) in your procedure.

Final note: You should plan in your procedure to perform your experiment at least twice to be sure that you have repeatable observations. Repetition allows you to be sure that no unknown variables have confounded your experiment.

For example, in our cola experiment, suppose your pet cat “watered” one of the plants without your knowledge. If you only did the experiment once, you could draw the wrong conclusion about what killed the plant. However, if you repeated the experiment, it would be unlikely that the experiment wrecking pet would “water” the same plant, so you would realize that something had gone wrong with your experiment.

5. Equipment/Materials

What materials/equipment will you use in your experiment? Record your list and gather them.

Compile a list of materials and equipment required to successfully complete your experiment. Decide what will have to be purchased, what will have to be borrowed, what will have to be built and what can be substituted. As you work, be neat and thorough - a sloppy or imprecise component of an experiment can also confound an experiment.

Example:

Equipment: Two sets of two potted plants (same kind and size); measuring cup, graduated cylinder, etc., that measures milliliters; ruler that measures centimeters.
Materials: Water, cola (less than a six pack of 12 ounce cans)

6. Results

6.a. Data Collection

Perform your experiment and carefully record your observations (your data). Note any deviations from your procedure or other interesting observations. You may record your data in a science log (a spiral notebook, for example), or it may be computer generated.

Here is the heart of the project... performing the experiment, making observations and recording the data.

For collecting your data, keep a simple log. This is often called a journal, science notebook or experimental notebook. (A spiral notebook works great.) It contains a listing of your experiments (Table of Contents), your procedures (or a reference to the procedure, e.g., **"See** procedure dated *4/17")*, the observations that you made (your data) and mistakes that you realize you made (this may be the key to interpreting your results ... or to making a breakthrough discovery).

Please note that it is critical to the scientific method to note any deviations from your procedure ('mistakes') or other interesting observations. It is not bad to have made mistakes - all people who do experiments make mistakes. However, you will ruin your opportunity to learn if you forget about or try to cover up your mistakes. Instead, note them carefully They really may be the key to some new discovery'. At a minimum, they will help you to understand the results that you get from your experiment. Again, mistakes are a normal part of experiments - use them to your advantage by recording them.

You may want to create tables to facilitate recording your data. You may also want to take photographs, etc., and paste them into your log to show your results.

Example:
Data Collection

REPETITION # 1

	PLANT # 1		*PLANT#2*		
DATE	*Water (ml)*	*Height (cm)*	*Cola (ml)*	*Height (cm)*	*Notes/Observations*
4-16	*50*	*7*	*50*	*7*	
4-17	*75*	*7*	*75*	*8*	**** I slipped and added too much cola; I then added extra water too*
4-18	*50*	*8*	*50*	*9*	
4-19	*50*	*8*	*50*	*10*	
4-20	*50*	*9*	*50*	*10*	
4-21	*50*	*9*	*50*	*11*	
4-22	*50*	*10*	*50*	*12*	

REPETITION # 2

	PLANT # 3		*PLANT # 4*		
DATE	Water (ml)	Height (cm)	Cola (ml	Height (cm)	Notes/Observations
4-23	*50*	*8*	*50*	*8*	
4-24	*50*	*8*	*50*	*9*	
4-25	*50*	*9*	*50*	*10*	
4-26	*50*	*9*	*50*	*11*	
4-27	*50*	*10*	*50*	*11*	
4-28	*50*	*10*	*50*	*12*	****Cola plant budded*
4-29	*50*	*11*	*50*	*13*	

6.b. Data Analysis

What does your data say? Graph your data or do other analysis to clarify your data.

Now is the time for data analysis, if necessary. You have conducted your experiment(s) -- at least twice. Your log is full of data entries. Congratulations, you have your raw data. But what does your data mean? Data analysis helps you to answer this question.

Analysis of your data can help you to better understand your data. It may include graphing your data, doing regression of your data, doing calculations with your data (e.g., calculating differences between two groups or calculating percent changes), etc.

In our cola example, the student would probably want to find the difference between the height of the cola plant and the water plant for each day. He or she would then want to average the results of the first and second repetitions. The last step would be a graph of days on the x-axis versus centimeters of growth on the y-axis.

7. Conclusions

Finally, draw your conclusion, that is, was your hypothesis correct or not. That is, did you correctly predict the answer of the question in your topic. If not, you may have made a really big discovery. Why wasn't your hypothesis correct?

Your conclusion specifies if your hypothesis was correct or not. If your hypothesis was correct, then you accurately understood the principles surrounding your experiment/project and have confirmed the principles with additional 'repeatable observations.' Congratulations!

If your hypothesis is not correct, you should explain the reason. It could fall under one of the following three categories.

i) You made a mistake in your experiment and your results are not valid. Sometimes you don't have time to repeat the experiment - that's O.K. - you have stilled learned something about how difficult it is to run a controlled experiment. Congratulations!

ii) You did not understand some aspect of the system that you are working with, so you made a wrong 'guess' for your hypothesis. This is definitely also O.K. - you have learned a valuable lesson. Congratulations!

iii) You have made a breakthrough scientific discovery - keep your original notebook with your original data (and sign and date it) - you may need it to patent your discovery. Congratulations!

Example:

Conclusion:

The hypothesis that the water plant would grow more rapidly than the cola plant was wrong. The results repeatedly show that the cola plant grows faster than the water plant. It also budded. I expected that the caffeine of the cola would stunt the plant growth. However, apparently the sugar of the cola was more important for stimulating plant growth than caffeine was for stunting growth.

8. Next Step

What will be your next step? Is there other data, a different approach, or other related topics you would like to explore in the future?

An interesting additional experiment would be to compare a diet cola plant to a cola plant to determine if sugar really is the cause of the stimulated plant growth.

These are the steps that will allow you to prepare a successful project using the scientific method. Note that success is defined as learning about science and the scientific method.

The final steps in preparation for the Science Fair are to write your report and create your display.

III.A. Project Report

Project Report

Clear documentation of your research and your experiment.

Needless to say, your report format should follow the exact sequence as your experiment.

i) Topic (Title Page)
Make it clear and as concise as possible, so that others can also visualize an experiment on the topic. Your topic will be on the Title Page of your report, along with your name and the date.

ii) Background Research (Introduction)
Describe as clearly as possible what you learned about your topic that led you to make your hypothesis. Also include why you choose your project.

iii) Hypothesis
Concisely record your educated guess about the results of your experiment.

iv) Procedure
Carefully record the step by step procedure that you will follow in your experiment, the observations that you will make and the data that you will record. The goal is to write your procedure such that you could give it to another person and that person could reproduce the same experiment exactly

v). Equipment/Materials
Make a complete list, including any 'specifications' necessary for success of the experiment (e.g., ruler that measures to the quarter inch).

vi) Results

a. Data Collection

Your data should be **in** your science log. List in an orderly fashion all of your observations and information that you gathered. This should be done in a neat manner. You may want to copy pages from your log and include them in this section of your report. Or, you may want to take the data from your log and put it into a more orderly format in your report.

b. Data Analysis

In this section include any graphs or other analysis you have done to clarify your data.

vii) Conclusions

Draw your conclusion, that is, was your hypothesis correct or not. If it is not correct, then describe the reason why. List any problems, or possible explanations for unexpected results or findings. Your conclusion must be based on your results.

viii) Next Step

What will be your next step? Is there other data, a different approach, or other related topics you would like to explore In the future? Also include any unanswered questions that require further research.

ix) Annotated Bibliography

Include all research from books, internet, personal interviews, etc. in annotated form. See appendix B, for details.

x) Acknowledgements

On the last page in your notebook, list the people you would like to thank for helping you with your project. State how they helped you. Points will not be subtracted from your score.

The final steps in preparation for the Science Fair are to write your report and create your display

Project Report

Clear documentation of your research and your experiment.

Project Display

Clear summary of your project for your friends, family and judges.

Section III of this manual provides more specific instructions about preparing your report and display.

III B. Project Display

Project Display

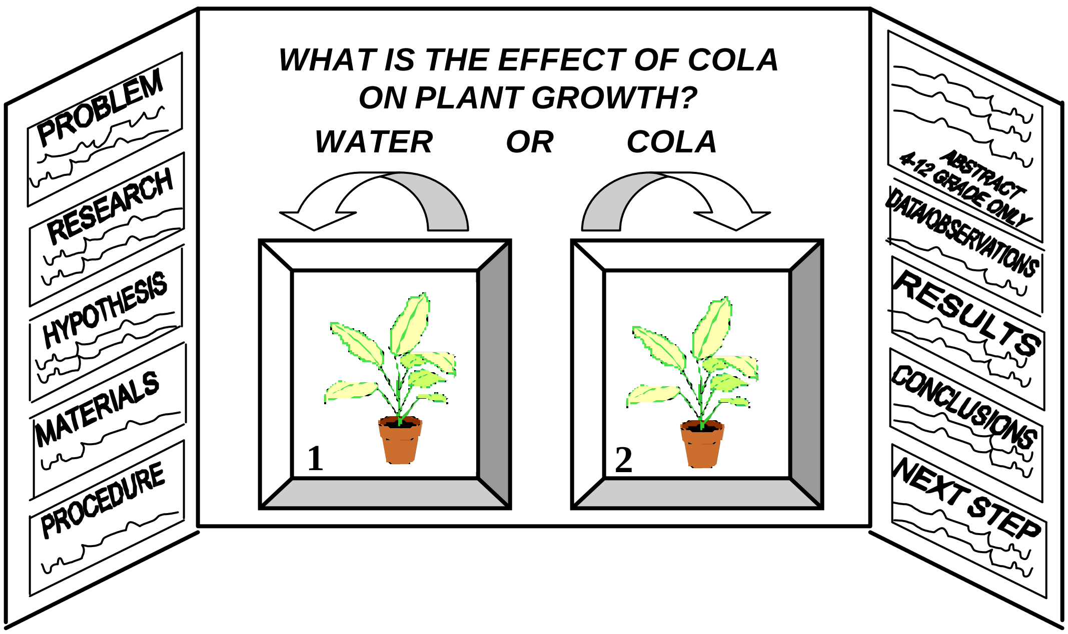
Clear summary of your project for your friends, family and judges. Backboard panels must be of masonite, peg board, hardboard, foam core, or wood to which poster paper, cardboard, or fabric may be attached. Construction must be durable with all parts firmly attached. No attachment to walls will be allowed. Provisions for the support for the back of the exhibit should be made.

Maximum size is:

Table Project:	122 cm wide x 76 cm deep x 198 cm tall (4ft. wide x 2.5 ft. deep x 6.5 ft. tall)
Floor Project:	122 cm wide x 76 cm deep x 274 cm tall (4ft. wide x 2.5ft. deep x 9 ft. tall)

Below is a sketch that provides a general layout of a display. Be sure that your display states your project title, hypothesis, materials. procedure, data/observations, results, conclusions, next step and abstract (4-12 grade only) for easy reading by the observer. Also include the journal or log which must include all your hand written data/observations. Your project report may be in a pocket on your display board, or it may be in front of your display board along with your science logbook and any equipment necessary to explain your project (or photos or equipment)

Keep it simple, inexpensive, neat, colorful and interesting. The more creative you are in the use of materials, the more interesting your display will be. You might want to choose two or three colors. such as red, black, and white, or green, yellow, and black and then limit yourself to this color scheme as you select your backing letters.



This drawing is just a single example of how the Scientific Method can be used to set up a display. You are free to incorporate other methods. The use of visuals, testing apparatus and photographs is strongly encouraged.

ACKNOWLEDGMENTS AND BIBLIOGRAPHY

1. This manual was modified from a T.V.U.S.D. manual, "Eight Steps for Tackling a Science Fair Project."

2. Brisk, Marion A., 1001 Ideas for Science Projects, Second Ed., New York: Arco, Prentice Hall, 1994, p5-16.

3. Jenkins, John E., Basic Science for Christian Schools, South Carolina: Bob Jones University Press, 1983, Chapter 2, “The Scientific Method.”

APPENDIX A

SUGGESTED SCIENCE PROJECT TOPIC QUESTIONS

BIOLOGICAL SCIENCE

How does the amount of sunlight affect plant growth?

How does the color of light affect plant growth?

What conditions effect the growth of mold?

How do temperature conditions affect yeast cell reproductions?

How does exercise affect your pulse or your respiration rate?

How are brine shrimp affected by the concentration of salt water?

How do mouthwashes affect bacterial growth?

How does ultraviolet light affect the bacterial count on food?

What is the effect of aspirin on the life of cut flowers?

How does the depth of planting a seed affect the production of roots?

How do various conditions affect the speed or distance a mealworm travels?

What is the effect of a magnetic field on the growth of beans or radishes?

What is the effect of light on an earthworm’s behavior?

What are the effects of artificial and natural sunlight on plants?

What is the effect of temperature on the growth of plants?

What effects do different light colors have on phototropism?

How does sight affect taste?

How does smell affect taste?

How does the composition of a liquid affect the germination of bean seeds?

How do earthworms affect the growth of plants?

What is the effect of soil composition on plant growth?

How does electricity affect plant growth?

What is the effect of temperatures on seed germination?

How does temperatures affect web construction of spiders?

How do various surfaces affect mealworm behavior?

How does gravity affect the growth of seeds?

How does geotropism affect plant growth?

PHYSICAL SCIENCE

How does the type of a filter affect the purity of water?

How do the number of coils affect an electromagnets strength?

What is the effect of various materials on the transmittance of sound?

What is the effect of lens shape on light transmittance?

What is the effect of humidity (or temperature) on rusting?

How does the type of metal affect the rate of oxidation?

How does the angle of on inclined plane affect the amount of work required to lift an object?

What is the effect of various surfaces on friction?

How does dehydrating food affect its density?

How do various materials affect insulation?

What is the effect of various materials on conduction of electricity?

How does the shape of a reflective surface affect the reflection of light?

What is the effect of focal point of a lens on magnification?

How does the color of a container affect the way light energy is absorbed?

What is the effect of substance composition on its magnetic attraction?

What is the effect of metal type on heat conduction?

What is the effect of kit construction on its flight? (hard to test)

What is the effect of water content on rate of corrosion?

What is the effect of wattage on its efficiency?

What is the effect of wing shape on airplane flight?

How do various materials affect heat conduction?

EARTH SCIENCE

What is the effect of weathering on materials?

What is the effect of temperature on crystal growth?

What are the effects of terracing on erosion?

APPENDIX B
BIBLIOGRAPHY FORMATS

Annotated Bibliography

(Interview)

Anderson, Paul. Science fiction writer and professor of literature. Interview by author, 15 October, 1994, San Francisco.

Mr. Anderson talked about his views of today's society and how he envisions the future. This interview was helpful in understanding the role of a writer in shaping the views of his readers.

(Book with one author)

Barnes, Ron. Learning Systems for the Future. Bloomington, Indiana: Indiana University Press) 1972.

This book offers a look at schooling today and in the future; it describes in detail the technological changes that could take place.

(Book with two authors)

Clevenger, Kurt, and Nicholas Rescher. Values and the Future: The Impact of Technological Change on American Values. New York: The Free Press, 1969.

This is a series of essays by social scientists which focuses on the role technology has played In our society and how it will affect the future. I found it difficult reading) but enjoyed the interesting views on the subject.

(Encyclopedia with no author)

“Computers in our Schools”. Encyclopedia Americana. 1994, Vol.12, pp.55-60.

This article offered a broad overview of how educators are using computers

(Pamphlet with no author)

The Future of Our Schools. California Department of Education, 1994.

This new source gives the latest view of our state's predictions about major changes to be expected in the schools from kindergarten to high school.

(Magazine article with author)

Frame, Donald. "A Look at the Future". Time Magazine. New York: Time-Life Inc. July 29,1984., pp.35-38.

The article, which was written by someone whose opinion is valued by others when discussing future technology, was very helpful in sorting out the different types of technology evolving today.

(Internet Source)

Gomes, Lee. "Computers in the Classroom: A Great Place to Visit." Mercury News. May 3, 1992. telnet lambda parc. xerox. com 8888, @go #50827, press 13 (5 Dec.1994).

This Internet article looked into three specific classrooms in a California elementary school to see how teachers are using them to help students write.

(A film or video tape)

The Whiz Kids & Computers in our Schools. Wim Wenders, director-producer, Orion Pictures Corporations, 1993.

This entertaining film is also highly informative giving a realistic picture of how are schools incorporate computers in the curriculum and how that mi9ht improve even more in the future.

(Television program)

Your Children's Future with Technology in the Classroom part 1. KOED (Channel 9). San Francisco. PBS. 10-11 pm., 23 November, 1994.

This special on educational television is helpful with interviews with experts in the field of computers in the classroom but also contains a student's perspective on how they help education.

INLAND SCIENCE AND ENGINEERING FAIR

CERTIFICATION OF HUMANE TREATMENT OF
LIVE VERTEBRATE ANIMALS

Name of Student ____

Project Title ____

Any student research involving animals MUST COMPLY with the requirements of the **California Education Code** stated below and Regulation #5 of the Inland Science and Engineering Fair.

HUMANE TREATMENT OF ANIMALS, State of California Education Code Title 2, Division 2, Part 28, Chapter 4, Article 5 (51540). In the public elementary and high schools or in public elementary and high school sponsored activities and classes held elsewhere than on school premises, live vertebrate animals shall not, as part of a scientific experiment or any purpose whatever:

(a) Be experimentally medicated or drugged in a manner to cause painful reactions or induce painful or lethal pathological conditions.

(b) Be injured through any other treatments, including, but not limited to, anesthetization or electric shock.

Live animals on the premises of a public elementary or high school shall be housed and cared for in a humane and safe manner. The provisions of this section are not intended to prohibit or constrain vocational instruction in the normal practice of animal husbandry.

“Experiments involving any procedures which are not in violation of the 'painful reaction’ or ‘injured’ restrictions of the California Education Code and are not in violation of Inland Science and Engineering Fair Rule #5 are permitted if certified by a qualified biomedical scientist **prior** to the beginning of the investigation. It is permissible for the student and designated adult supervisor to consult with a biomedical scientist to obtain detailed instructions and guidance in the techniques to be used by the student under the direct continuous supervision of the designated adult supervisor (for research **not** conducted in the biomedical scientist's lab). In this instance the designated adult supervisor will be required to certify in writing jointly with the biomedical scientist. Either the biomedical scientist or adult supervisor must provide continuing supervision to assure compliance with the protocol. Major deviations from the approved protocol may be implemented only with the written approval of the biomedical scientist. The biomedical scientist or designated adult supervisor must be in the same locality as the student for the duration of the experimental work except for short trips. This means that a project started in one city may not be continued in another unless an alternate designated adult supervisor, approved by the biomedical scientist prior to the continuation of the experimental work, agrees to supervise the project. A biomedical scientist is defined as one who possesses an earned doctoral degree in science or medicine and who has current working knowledge of the techniques to be used in the research under consideration. A designated adult supervisor is defined as an individual who has been properly trained in the techniques and procedures to be used in the investigation. The biomedical scientist must certify that the designated adult supervisor has been so trained. For additional information see pages 78~8O in the 'Science Safety Handbook for California High Schools.'

RESEARCH PLAN

Purpose of Project: ____

Starting Date: ____

Site at which investigation will take place:

Name ____

Address ____**Page 1 of 4**

Live vertebrate animals to be used:

a) Genus, species, and common name ____

b) Number of animals _____________

c) Animals obtained from ____

List objectives of the experiment and describe fully the methods and techniques involved. When the use of electrical current, laser beams, sound stimuli or other artificial stimuli are an integral part of the Research Plan, they must not exceed the normal tissue tolerances for the species concerned (as indicated in the Biology Data Handbook, 2nd Edition; editors, P.O. Altman and S.S. Dittmer; publisher, Federation of American Societies for Experimental Biology).

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Describe proposed methods of animal care:

a) Cage size _________________________

b) Number of animals per cage _____________

c) Temperature range (maximum and minimum) degree Celsius 0 room where animals are to be kept _____________________________________

d) Frequency of feeding and watering _____________________________________

e) Frequency of cleaning cage ____

f) Type of bedding to be used ____

g) Where will animals be housed? ______________________________________

h) Where will animals be returned when research is complete? ____________________ ____

Name of animal care supervisor ____

Name of biomedical scientist ____

Name of designated adult supervisor ____

Signature of student ____ **Page 2 of 4**

This section **must** be completed for **all** vertebrate animal projects.

CERTIFICATIONS

THE FIRST TWO CERTIFICATIONS MUST BE COMPLETED FOR
ALL PROJECTS INVOLVING LIVE VERTEBRATE ANIMALS

CERTIFICATION BY TEACHER/ADVISOR I agree to sponsor the student named above and assume responsibility for compliance with the existing rules and regulations pertaining to experiments with animals.

Signature ____

Name (type or print) ___________________________________ Date

____

Institution ____ Title

____

Institution Address ______________________________________ Phone _______________________________

Home Address ____

Home Phone _______________________________

CERTIFICATION BY ANIMAL CARE SUPERVISOR of compliance with California Education Code. (Must be completed prior to receipt of animals by the student.)

I certify that I have reviewed and approved the Research Plan and will supervise and accept primary responsibility for the quality of care and handling of the live vertebrate animals used by the designated student. I further certify that I am knowledgeable in the proper care and handling of experimental animals and meet prevailing animal supervisory requirements.

Signature ____

Name (type or print) ___________________________________ Date

____

Institution ____ Title

____

Institution Address ____

Telephone Number ____

Home Address ____

Home Telephone Number ____

Source of My Authority/Expertise ____

CERTIFICATION BY BIOMEDICAL SCIENTIST (if required) of compliance with California Education Code and Rule #5 of the General Regulations for the Inland Science and Engineering Fair. (Must be completed prior to the start of the project.)

I certify that I have read the General Regulations for the Inland Science and Engineering Fair; that I have reviewed and approved the Research Plan; that if the student or designated adult supervisor is not trained in the necessary procedures, I will ensure his/her training; that I will assure that the requirements of the California Education Code are fully met; that I will provide advice and supervision personally or through a designated adult supervisor throughout the project; and that I am a qualified scientist with an earned doctoral degree (Ph.D., M.D., D.V.M.) and a working knowledge of the techniques to be used by the students in this research.

Signature ____

Name (type or print) ____________________________________ Date ________________________________

Institution ____ Title ________________________________

Institution Address ____

Telephone Number ____

Home Address ____

Home Telephone Number ____

Source of My Authority/Expertise ____

CERTIFICATION BY DESIGNATED ADULT SUPERVISOR (if required)

I certify that I have been trained in the techniques to be used by this student; that I have read the General Regulations for the Inland Science and Engineering Fair, and that I will provide direct supervision for the research.

Signature ____

Name (type or print) ____________________________________ Date ________________________________

Institution ____

Institution Address ____

Telephone Number ____

Home Address ____

Home Telephone Number ____

Source of My Authority/Expertise ____

This form, properly completed, must be part of the carefully planned procedures for experimentation with live vertebrate animals or animal parts. It must accompany any such project exhibited at, or when presented for any public display associated with, the Inland Science and Engineering Fair. All sections must be completed except the "Certification by Biomedical Scientist" and the "Certification of Designated Adult Supervisor" which need be completed only by those students carrying on experiments involving anesthetics, drugs, thermal procedures, chemicals, or if euthanasia (defined above) is required.

PLEASE ATTACH A COPY OF YOUR SURVEY

INLAND SCIENCE AND ENGINEERING FAIR

CERTIFICATION OF COMPLIANCE OF RESEARCH INVOLVING HUMAN SUBJECTS

Name of
Student____

Project
Title____

Because federal regulations have become increasingly more rigid, students must plan carefully before undertaking research which involves the use of human subjects in either behavioral or biomedical studies. This will protect subjects from unnecessary exposure to physical or psychological risks and experimenters and schools from legal complications.

A human subject is legally defined as:

A person about whom an investigator (professional or student) conducting scientific research obtains (1) data through intervention or interaction with the person or (2) identifiable private information.

A subject at risk is legally defined as:

Any individual who may be exposed to the possibility of injury, including physical, psychological or social injury, as a consequence of participation as a subject in any research...

Students using human subjects must comply with all regulations that reflect the will of society and plan proper methodology for the protection of those subjects. It is essential that they be alert to humane concerns at all times. The following steps must be taken before any student begins research involving subjects:

1. The student completes the "Research Plan" section of this form and submits it to the sponsoring teacher.
2. The sponsoring teacher reviews the "Research Plan" and determines if **ANY POTENTIAL** physical, psychological, or social risk is involved (as defined in **subject at risk** above).
    a) If none is apparent, the teacher signs the certification. (No additional certification is necessary.)
    b) If any question exists, the student must redesign the experimental study or plan a different study.

NOTE: Any project involving human subjects that is developed with the advice and assistance of personnel at a medical/scientific organization must comply with any regulations of that organization requiring approval of its Institutional Review Board and Informed Consent Certification.

RESEARCH PLAN

Describe proposed experimental procedures:

Explain why human subjects are proposed for this experimentation:

Describe and assess any potential risk (physical, psychological, social, legal or other):

Describe the potential benefits to the individual or society:

Signature of Student ____ Date _____________________________

CERTIFICATION

CERTIFICATION BY TEACHER/ADVISOR of compliance with federal regulations for the protection of human subjects in behavioral and biomedical research. (Must be completed before the start of experimentation.)

I certify that, upon reviewing this research plan, I found that the experimental procedures constitute no physical, social, or psychological risk to either experimenter or subjects.

I agree to supervise this experimentation and will ensure that it is conducted in a humane, risk-free manner.

Signature ____________________________________Name (type or print) _____________________________

Title ____

Institution ____ Phone _______________________________

Institution Address ____

Home Address ____

Home Phone_______________________________________Date___________________________________

Source of My Expertise/Authority ____

This form, properly completed, must be part of the carefully planned procedures of any experiment involving human subjects. It must accompany any such project exhibited at, or presented for, any public display with the Inland Science and Engineering Fair.

Page 2 of 2

INLAND SCIENCE AND ENGINEERING FAIR

CERTIFICATION OF TISSUE SAMPLE SOURCE

Name of Student ____

Project Title ____

This form must be completed for all projects using tissue(s), organ(s), human part(s), or animal parts, Including blood.

When live or preserved tissue samples or parts of human or vertebrate animals are obtained by the student from an institution or biomedical scientist, a statement signed **by** the adult providing the tissue is required. Students may **NOT** be involved in the direct acquisition of these samples from living human or other vertebrate animals.

Live tissue samples must be:

a) from a continuously maintained tissue culture line already available to institutional researchers, OR

b) from animals already being used in an on-going institutional research project.

RESEARCH PLAN

1. Tissue(s), organ(s), or part(s) used: ____________________________________
____
____

   Tissue sample is from:
   ___ Human source
   ___ Vertebrate animal source

Genus, species and common name ____
____

2. Starting Date: ____

3. Purpose of Project: ____
____
____

Page 1 of 2

4. List objectives of the experiment and describe fully the methods and techniques involved:

Signature of Student ____Date __________

CERTIFICATION

Institution or company that is source of Tissue Sample:

Name

____

Address ____

____

I certify that the above listed materials were provided by me or my institution and that the student listed was NOT involved in the direct acquisition of the samples provided or purchased.

____ ____

Signature Title

____

____

Date Telephone Number

Page 2 of 2