



CNUSD Science Fair

Project Guide

Why Do A Science Project?

The obvious answer is because your teacher requires it. But why would your nice teacher put you through the torture of doing a project? Science is different from many other ways of learning because of the way it is done. Science relies on testing ideas with evidence gathered from the natural world. Doing a long term science project is perhaps the best way to learn how to think like a scientist and make decisions through the lens of evidence. It is as much about learning a process as producing a product.

Where Do I Start?

A science fair project is different from a school report on a special topic like whales, planets, or climate change. It is also different from making a model such as a volcano or solar system. A science fair project involves **conducting an experiment to answer a question or solve a problem**.

- 1) Follow your interest—are you interested in sports, technology, music, food, gaming, solar energy, or another field. Select area of interest.
- 2) Brainstorm topic ideas within your area of interest.
- 3) Need more inspiration or ideas? Look at the list of sample projects that have been done in the past. You can also go to the Topic Selection Wizard and answer 25 questions and get more customized ideas just for you (http://www.sciencebuddies.org/science-fair-projects/recommender_register.php.) Another good site is: <https://www.exploravision.org/sample-projects>

Sample of Senior Projects Which Advanced to CNUSD District Fair

Do Aerodynamics Affect a Car's Performance?

Which Surfboard Design is the Biggest Drag?

At What Angle of Attack is the Lift of an Airplane Maximized?

Autonomous Robotic Vehicle: Waving Lives One At A Time

Stirling Engines

How do Different Ratios of Water to Cement Affect Concrete Strength?

Creepy Crawlies: Exposed to Light

The Perfect Beauty

A Comparative Study on Male and Female Performance on a Mathematical Analysis Survey

Rotational Barriers

Unleash the Energy

What Mixture of Ethanol and Gasoline Leaves the Least Residue?

Got Gas?

Which Gas Works the Best Inside A Light Bulb?

Soil vs. Earthquakes

Burnt to Ashes!

Point Source Plume Dispersion Flow Due to a Rise in Elevation

Hotshot: The Grauss Rifle Phase II

Alternative Energy to Power Your Vehicle: Wind Energy

Who Dunit?

Going Green: An Innovative Approach to Comfort

Fresh Water Galore: Saltwater Desalination

The Effects of Body Mass Index Number on Sensory Nerve Conduction

Do Eyebrows Assist In Facial Recognition?

DNA Transformation And The Spread of E.coli

What's That Growing In Your Mouth?

Soy: Carcinogen or Prevention?

Dilemma of the deep Seas

Honey, I Shrunk My Brain

Figure Skating Meets Physics

Determining the Angle
Fencing: Technical and Tactical
Sw-Sw-Sweet Potato
Magnetic Plants

Sample of Junior Division Projects Which Advanced to CNUSD District Fair

Mice, Mazes and Memory
Hang Up and Drive
Is It Really Cheaper To Buy In Bulk?
Got Lactose? Speed Up the Breakdown with a Temperature Catalyst
How Much Flavor Is In Your Bubble?
Sugar Rush
Rock and Roll Erosion
Radioactive Relay
Burnin' Up
Solar...Saving the Earth One Panel at a Time
Is the Ultrasonic Sensor Accurate for Distance?
What variable Produces the Most Energy for a LED Bulb?
Triple A: Algae Additives and Affects
The Re-growth of Plants
Communities Cleaning Water
The Eyes Have It
What Product Would Amplify Blood Pressure the Most?
Are You Anti-antibiotic?
Soapy Mystery
Will Daphnia Become Resistant to Caffeine?
Are You Shorter Than You Should Be?
Bottled Water Toxins
Stealth: Now You See It, Now You Don't
When Will it Burn? River Heights
Which Metal Object Has The Highest Pitch When Buzzed?
Which Type of Baseball Bat Hits a Baseball Further, Wooden or Aluminum?

Sample of Elementary Division Projects Which Advanced to CNUSD District Fair

Learning Styles: Same or Different?
Voice Recognition
How Much Louder are TV Commercials Than Regular Programs?
Taste Bud Experiment
Does Atmospheric Temperature Affect Heart Rate While Exercising?
"Family Traits: We've Been Fingereed"
Flowers: Life or Death?
Who Spilled the Beans?
DNA of BSK a.k.a. Fruit Salad
Get a Handle on Germs
Bacteria Growth
Affect of Impurities on the Boiling Point
Salt Anyone?
Do Crystals Form With or Without Oxygen?
Hydrogen Power H₂
How Much Energy Do Different Types of Nuts Contain?
Battle of the Acids
Mailing Mayhem
Solar Beads
What Type of Cup Insulates a Warm Beverage the Longest?
HEAT IT! Heat Absorption of Different Materials
How Waves Affect the Seashore
Rocks Absorbing Water
Wonderful Waste

Sea Water...Drinkable?!!
Landfill Awareness
The Uplifting Affects of Airfoils
Breaking Point
Size Matters in Floation
Turn Up the Heat!
Measuring Conduction of Electricity
Does the Color of Water Affect the Rate of Evaporation?

What's Next After I Choose A Project?

The California State Science Fair, The Riverside County Science Fair and the Corona-Norco Unified School Science Fair all highly recommend writing a research report on your topic before you start your laboratory investigation. Your classroom teacher will give you the specific details about your report.

Now That My Research Is Completed

STEP 1: Based on research and observations, ask a question

STEP 2: Predict the answer to the question (we call that prediction a hypothesis)

STEP 3: Design an experiment to generate data to test the hypothesis (easier than it sounds). The experiment should have a control and experimental group with the only difference between them being the variable you are testing. It is a good idea to keep a daily journal or log recording your work on your project.

STEP 4: Analyze the data to determine if the prediction should be accepted or rejected. Make your conclusion on your hypothesis using and citing evidence from the data from your experiment.

In all cases the *independent variable* (aka manipulated or explanatory variable) is the one you will manipulate (for example the size of a pumpkin) and the *dependent variable* (aka response variable) is the one you will measure (the number of seeds inside the pumpkin) in your experiment(s).

The DEPENDENT VARIABLE (must be quantitative), you could measure...

- size
- speed
- concentration
- frequency (how often something happens)
- angles and/or direction

The INDEPENDENT VARIABLE can be either quantitative (i.e. measurable with numbers) or qualitative (i.e. describable with adjectives).

Examples of qualitative variables would include:

- color: red, blue, green, yellow, orange
- gender: male, female
- size: small, medium, large

Special Notes on Experimentation:

- 1) If you are going to use humans, animals or tissue cultures there are special forms to fill out and rules to follow (they are included in the end of this booklet)
- 2) You may not use tobacco, consumable alcohol, firearms, explosives, or illegal drugs in your experiment.
- 3) For detailed rules please read through the attached Riverside County Science and Engineering Fair Regulations and Information Packet 2017-18.
- 4) **Please read over the categories and rules as they have radically changed from 2016-17 Science Fair.**

Project Categories:

1. Riverside County Science and Engineering Fair has changed their categories that have been in place for 20 years to new categories identical to those used by the California State Science Fair and the Intel International Science and Engineering Fair. You will find a detailed description of these categories in the RCSEF Regulation and Information Packet. All categories will be used in the CNUSD District Science Fair for Junior and Senior Divisions.
2. Elementary Division projects are eligible to compete at the County Fair but not the California State Science Fair or the Intel ISEF so they will compete in the following categories at the CNUSD Science Fair: (RCSEF Information Packet for descriptions of each of the categories)
 - Animal Science
 - Behavioral and Social Science
 - Biomedical and Health Science
 - Chemistry
 - Earth and Environmental Science
 - Energy
 - Engineering
 - Materials Science
 - Microbiology
 - Physics and Astronomy
 - Plant Science

Link to Riverside County Science and Engineering Fair Information Packet:

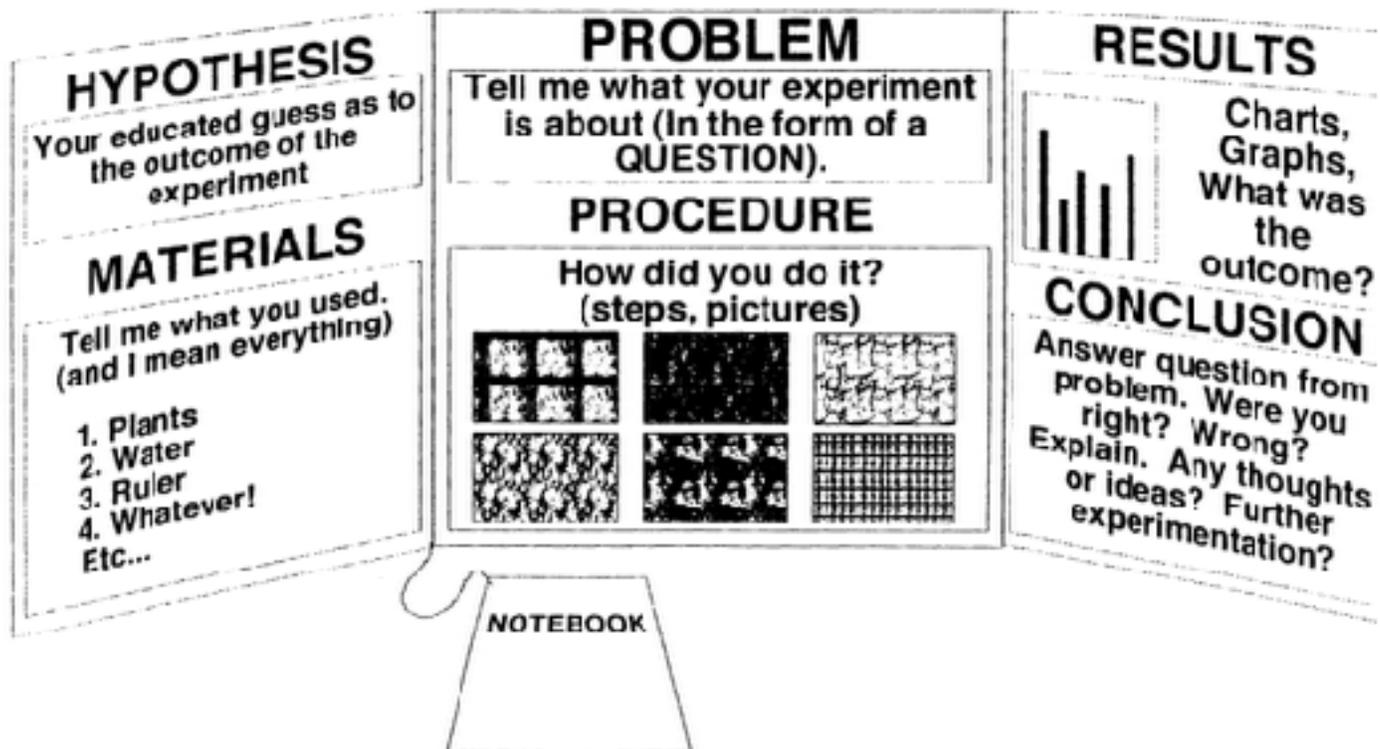
<http://www.rcoe.us/student-events/files/2014/06/RCSEF-Science-and-Engineering-Fair-Guidelines-complete-document.pdf>

What Should The Display Look Like?

Science Fair Project Display

MAX. DISPLAY SIZE FOR TABLE PROJECT: 4 FT WIDE X 2.5 FT DEEP X 5 FT TALL

MAX. DISPLAY SIZE FOR FLOOR PROJECT: 4 FT WIDE X 2.5 FT DEEP X 7.5 FT TALL



What Happens If I Win At My School Site?

If you win at your school's Science Fair you will advance to CNUSD District Fair. Last year we had over 5,000 students do science projects and 320 students advanced to the district competition. If you advance to the CNUSD District Science Fair you must prepare an abstract that is less than 200 words long.

What's in an abstract? Additional information in RCSEF Information Packet

Project Title:

Indicate the title of your project.

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, methods, and experimental design used in your project. Briefly describe your experiment or engineering methods.

Results:

Summarize the results of your experiment 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.



Riverside County Science and Engineering Fair Regulations and Information Packet

2017-2018

For additional information, contact:

Tracey Case, Administrator

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(951) 826-6570

*Adapted from California State Science Fair Rules and Regulations.
(Revised 8/14/2017)*

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RCSEF Timeline

Activity	Date	Time	Place
District/Affiliate Fair Coordinators' Meeting	September 12, 2017	4:30 – 6 p.m.	RCOE Conference Center
Science Fair Expo	October 28, 2017	9 a.m. – 1 p.m.	RCOE Conference Center
District/Affiliate Fair Coordinators' Meeting	January 9, 2018	4:30 – 6 p.m.	RCOE Conference Center
District/Affiliate Fair Project Registration Deadline	February 23, 2018	4:30 p.m.	All forms and payment due to RCOE by 4:30 p.m.
Project Review and Safety Screening	February 27, 2018	8 a.m. – 2 p.m.	RCOE Conference Room A
Riverside County Science and Engineering Fair	March 19-20, 2018	See below	Riverside Convention Center
District/Affiliate Fair Coordinators' Debriefing	May 8, 2018	4:30 – 6 p.m.	RCOE Conference Center
California State Science Fair	April 23-24, 2018	Varies	California Science Center, Los Angeles
Intel ISEF	May 13-18, 2018	Varies	Pittsburgh, Pennsylvania

Monday, March 19, 2018	
7:00 – 9:00 a.m.	Grades 4 and 5 Project Set Up (<i>no interviews</i>)
9:00 a.m. – 1:30 p.m.	Judging for Grades 4 and 5
7:00 – 8:30 a.m.	Junior Division (Gr. 6-8) / Senior Division (Gr. 9-12) Project Set Up
8:30 – 9:00 a.m.	Orientation for Junior Division and Senior Division
9:00 – 10:45 a.m.	Judging/Interviews for Junior Division and Senior Division
10:45 – 11:00 a.m.	Break for Students
11:00 a.m. – 12:00 p.m.	Judging/Interviews for Junior Division and Senior Division
12:00 – 12:15 p.m.	Break for Students
12:15 – 1:30 p.m.	Judging/Interviews for Junior Division and Senior Division
1:30 p.m.	Junior Division and Senior Division Students Released for Day

Tuesday, March 20, 2018	
9:00 a.m. – 6:00 p.m.	Public Viewing
9:00 a.m. – 9:00 p.m.*	Removal of Projects
6:00 p.m. – 7:30 p.m.	Awards Ceremony
7:30 p.m. (immediately following awards ceremony)	Meeting for projects advancing to California State Science Fair and ISEF

*All projects **must** be removed prior to or immediately following the awards ceremony on March 20. After 9 p.m., remaining projects will be discarded.

RCSEF Recommended Affiliate Fair Timeline

September/October:

- Schedule date of school-site science fairs
- Reserve location for school-site science fairs
- Affiliate fair representatives calendar Coordinators' Meeting
- Students attend Science Fair Expo

November:

- Affiliate fair representatives schedule workshops for teachers
- Orient students to the components of developing a science fair project
- Assist students in choosing a suitable topic

December:

- Students conduct library research
- Students write project proposal
- Students continue to seek guidance and background for projects
- Students develop list of materials needed for projects
- Discuss the nature of experimentation with students
- Discuss safety, controlled, and uncontrolled experiments with students
- Review observing, measuring, and data collection
- Provide students with time, space, and give guidance for experimentation
- Set up system for regular progress reports from students
- Always ensure safety rules conform to projects and are observed; discuss proper animal care

January:

- Affiliate fair representatives attend Coordinators' Meeting
- Review poster exhibit construction with students
- Discuss qualities of a good project display with students – construction, clarity, etc.
- Hold a Parent Information Night
- Provide project review and approval for students
- Recruit Science Fair judges

February:

- Students should develop conclusions and write research paper
- Review criteria for successful oral presentations
- Practice mock interviews (when applicable) with students
- Arrange a review of students' project by teaching staff
- Publicize your science fair - contact local news media
- Students develop final research papers
- Affiliate Fair Science Fair Day
- Complete registration forms with students
- Affiliate fair coordinator submits all registration forms to Riverside COE

RCSEF Registration/Application Checklist and Calendar

Participation in the Riverside County Science and Engineering Fair (RCSEF) is open to students attending a public school, private school, or charter school located within Riverside County. Home-schooled students may participate in the Riverside County SEF through the public school in Riverside County they would attend if they were not home schooled, at the discretion and approval of the public school or school district administration. Students must advance to the Riverside County SEF by participating in a district or affiliate fair prior to advancing to the county level.

Applications for the RCSEF must be submitted to your affiliate coordinator for submission to the Riverside County Office of Education no later than February 23, 2018.

Team Projects Note: Every member of a team project must complete his or her own application and include a separate application fee payment. Teams are limited to a maximum of three (3) students within their division.

RCSEF Application Acceptance Review / Category Assignment: February 27, 2018

Every application is reviewed using the Acceptance Criteria by the RCSEF Review and Safety Committee. In addition, this committee will read every project's abstract in order to review the correct subject category assignment.

Notice of Acceptance or Rejection: March 1, 2018

All applicants identified through the RCSEF Review and Safety Committee as candidates for rejection will be contacted no later than the above date to provide an opportunity for appeal. The official notice of acceptance will be the listing of names sent to affiliate fair coordinators.

Confirmation of Category Assignment: March 1, 2018

All category assignments will be posted to the RCSEF web site. Individual requests for this information will not be accepted. You will receive confirmation of the category to which your project has been assigned through your affiliate fair coordinator. Appeals for change in category assignment will be accepted until Monday, March 5, 2018. RCSEF organizers are the final authority as to project acceptance and category assignments.

RCSEF Student Instructions for Registration/Application

Application Deadline: February 23, 2018

All information must be completed accurately, and all forms applicable to your project must be included. Applications are to be signed and given to affiliate fair coordinator who, in turn, will submit all applications to the Riverside County Office of Education. Keep a copy for your records.

Coordinators: Faxed registration forms/applications are not acceptable. Registration forms/applications must be received by registration deadline date of February 23, 2018.

Team Projects

Each Member of the team must complete a separate application. Teams are limited to a maximum of three (3) students within their division. Projects may only be grouped as follows: Elementary Division grades 4-5, Junior Division grades 6-8, and Senior Division grades 9-12. A project completed by students in two divisions will be judged at the higher division level. Students on a team must be enrolled from the same district or private/parochial/charter school.

Key Points

Project Title: Do not abbreviate unless necessary, but please avoid extremely long titles. Your title need not be the same as it was in your qualifying fair, but must be the same as it will appear on your display at the Riverside County Science and Engineering Fair.

Requirements

Indicate whether you have a floor display or a tabletop project. If you do not indicate a choice, you will be assigned a tabletop space. Please indicate if you need electricity for your project.

Certifications/Forms

If your project involves the use of human or animal tissue(s), live vertebrate animals, or human subjects, complete the appropriate Certification Form(s) and submit with your application to your affiliate fair coordinator.

Signatures

Both the student and parent/guardian must sign and date the form where indicated. Your affiliate Science Fair Coordinator must sign and date the form, certifying that your project complies with the rules and regulations. Your affiliate fair coordinator must certify that you are eligible to enter the Riverside County Science and Engineering Fair.

RCSEF Application Acceptance Criteria

1. Acceptance to present a project at the Riverside County Science and Engineering Fair (RCSEF) requires the approval of an application submitted for each student(s) from an affiliated fair. The fair is open to students in grades 4-12.
2. Each student on a team project must complete his/her own personal application and the Project Abstract. All abstracts for team members should be the same. Additional forms may be required (see Appendix).
3. Abstracts must demonstrate a level of knowledge and investigation that is appropriate for the grade of the student and discipline and which is beyond what is considered common knowledge. The investigations must demonstrate knowledge that is not found in middle or high school textbooks. Abstracts must communicate ideas effectively.
4. The methodology and experimental design should be appropriate for the discipline, and should include the following where appropriate:
 - experiments are appropriate to achieve the stated objective;
 - sample size and/or number of trials is sufficient for projects where replication is necessary to establish validity;
 - statistical analysis is appropriate for the discipline; the conclusion is relevant to the stated hypothesis.
5. Experimental projects which are merely demonstrations, display collections, and literature searches are generally not acceptable. In order to be acceptable, the student must use the demonstration, collection, or search results, to extract new information not previously known to the student.
6. Applications may be rejected for failing to follow the rules described in this handbook and safety guidelines as identified in the California Science Safety handbook.
7. Application fees are not refundable. Exceptions are made for multiple payments for the same application.
8. All rejected applications reviewed by RCSEF officials will be granted an appeals process (with the exception of those applications which do not contain an Abstract).
9. All projects submitted must reflect work completed during the current academic school year. If work from a previous year is used within the current project, the student must submit the Continuation of Research Form (see Appendix).
10. Submitting an application to RCSEF assumes student will be present for oral interview on March 19, 2018 (grades 6 through 12 only).

Students, parents, and advisors should be aware that these acceptance criteria are not intended to limit the number of participants but rather by requiring higher standards for project abstracts, the criteria is intended to improve the quality of the Fair and to ensure that all participants are able to effectively communicate their project to the judges. Every application so identified this year will be contacted in a timely manner with an opportunity to participate in the appeals process.

The purpose of the rules is to:

1. Protect the rights and welfare of the student researcher.
2. Protect the rights and welfare of the human participant.
3. Ensure adherence to state regulations.
4. Ensure the use of safe laboratory practices.
5. Protect the environment.
6. Determine eligibility in the competition for the RCSEF.

Submission of an application to the RCSEF does not guarantee acceptance to the Fair. Fair officials reserve the right to reject applications on the basis of inappropriate content and for violations of Fair regulations. Projects which are substandard (poor quality) or incomplete will also be rejected. The basis for this judgement of quality is exclusively from the information provided within the student application. The Riverside County Science and Engineering Fair does not consider other submitted materials or awards won at school or district fairs.

Riverside County SEF Display Regulations

Any questions regarding Riverside County SEF Display and Safety regulations to Yami Shimojyo at yshimojyo@rcoe.us

Display and Safety Authority

The Riverside County SEF Display and Safety Committee is the final authority on display and safety issues for projects approved by the SRC to compete in the Riverside County SEF. The Riverside County SEF Display and Safety Committee may require students to make revisions to conform to display and safety regulations.

Students must take full responsibility for the safety of all parts of their exhibits. Please review all display and safety regulations in the following pages. Please note that:

- The purpose of the display is to communicate the experimentation done, but not necessarily to provide a live demonstration of the experimentation. Consider use of photographs and drawings.
- Valuable material and equipment should be simulated or pictured. Items may be brought for demonstration during judging and then removed. No gas or water outlets are provided. Electrical outlets are within six feet if requests on student application.
- No plants, food, chemicals, liquids (including water), hazardous materials or equipment, or unattached items may be on display.
- Containers for high pressure gases must be empty. No open flames are allowed.
- Toxic, hazardous, combustible, or cryogenic materials are prohibited.
- All parts of the exhibit should be securely attached to the display board.

Display Regulations

The following regulations must be adhered to at Riverside County SEF:

Maximum Size of Project:

- Depth (front to back): 2.5 feet or 76 centimeters
- Width (side to side): 4 feet or 122 centimeters
- Height (table): 6.5 feet or 198 centimeters
- Height (floor): 9 feet or 274 centimeters

Please be aware when ordering posters that the mechanism that supports the poster should conform to the maximum size limitations stated above.

1. All project materials and support mechanisms must fit within the project dimensions.
2. Projects displayed on tables are the preferred standard. Projects which require floor access may utilize a table for a portion of their display, but the entire display must still fit within the width and depth limitations specified above. Projects with floor displays may be placed out of numerical sequence and possibly away from other projects in the same subject category.
3. All projects must fit within these prescribed space limitations. This includes elements of the project that may extend or protrude. Displays which are admitted, but are later augmented to exceed the space limitations will be disqualified until brought into conformance. Using the aisle between projects as additional display space, even temporarily during interviews, is cause for disqualification.

Display Content for Regulated Research Institution

1. Regulated Research Institution Projects
The display must reflect on the work conducted by the student.
 - Minimal reference to mentor's or other researcher's work must only reflect background information or be used to clarify differences between student's and others' work.

Forms Required for All Projects

1. Original of official Abstract and Certification as approved by the Riverside County SEF Scientific Review Committee. *(Submitted with registration forms)*
2. Completed Riverside County SEF Project Set-up Approval Form *(Received on-site at the Fair.)*
3. Project Display Information Form attached to the back of the display board. *(Form available online or available on-site at the Fair.)*

Completed informed consent forms are not allowed to be present at the project display. They are to be submitted with the registration materials.

Audio Visual Presentations/Photographs

Students using audio-visual or multi-media presentations (for example 35mm slides, videotapes, images, graphics, animations, etc., displayed on computer monitors; or other non-print presentation methods) must be prepared to show the entire presentation to the Display and Safety Inspectors before the project is approved.

Any photograph/visual image/chart/table and/or graph is allowed if:

1. It is not deemed offensive or inappropriate (*which includes images/photographs showing invertebrate or vertebrate animals/humans in surgical, necrotizing or dissection situations*) by the Review Committee, the Display and Safety Committee, or Riverside County Office of Education. The decision made by any one of the groups mentioned above is final.
2. It has a credit line of origin ("Photograph taken by..." or "Image take from..." or "Graph/Chart/Table taken from..."). (*If all images, etc. being displayed were taken or created by the student or are from the same source, one credit line prominently and vertically displayed on the backboard/poster or tabletop is sufficient.*)
3. It is from the Internet, magazine, newspaper, journal, etc., and a credit line is attached. (*If all photographs, etc. are from the same source, one credit prominently and vertically displayed is sufficient.*)
4. It is a photograph or visual depiction that does not provide any public disclosure or identifying information of human subjects, regardless of the method or modality of that public disclosure (*i.e., pictures, videos, etc.*). Human participants and the project researcher must have their faces covered.

Items/Materials Not Allowed ON Project DISPLAY

1. Any items that are acknowledgements, self-promotions or external endorsements (*such as naming the research institution, mentor or patent pending statements*) and/or are intended for distribution including:
 - a. Any disks, CDs, business cards, printed materials, etc., (*including unofficial abstracts*) designed to be distributed to judges or the public.
 - b. Flash drives, brochures, booklets, endorsements, and additional give-away items including, but not limited to, pins, key chains, food, etc.
2. Postal addresses, World Wide Web, email and/or social media addresses, QR codes, telephone and/or fax numbers of a project or student.
3. Awards won in previous competitions.
4. Active Internet or email connections as part of displaying or operating the project at the Riverside County SEF.

5. Prior year's written material or visual depictions on the vertical display board **(Exception: The project title displayed in the student's booth may mention duration of the project)**. For example, Year 2 on an Ongoing Study.

*Any attempt to replenish or return removed items from the above list is a violation and will result in items being confiscated by the Display and Safety Committee and may result in the project failing to qualify for competition.

Other Display Regulations

1. No changes, modifications, or additional to projects may be made after approval by the Display and Safety Committee and the Review Committee. Participants who do not adhere to the signed agreement regarding this regulation will fail to qualify for competition.
2. It is highly recommended that your name, school, grade, and district be placed on all notebooks or materials that are left with your project. A project data book and research paper are not required but are highly recommended.
3. Any inadequately insulated apparatus producing extreme temperatures that may cause physical burns is not allowed.
4. Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points must be for display only.
5. Project sounds, lights, odors, or any other display items must not be distracting. Exceptions to this rule may be permitted for judging demonstrations. Approval must be given prior to judging.
6. Projects can be continued under the table but it is not be used for storage.
7. Riverside County Office of Education officials, the Review Committee, and/or the Display and Safety Committee reserve the right to remove any project for safety reasons or to protect the integrity of the Riverside County SEF and its rules and regulations.
8. If a project fails to qualify and is not removed by the student, Fair officials will remove the project in the safest manner possible but is not responsible for damage to the project.

Display Items Not Allowed on the Judging Floor

1. Living organisms, including plants.
2. Soil, sand, rock, cement and/or waste samples, even if permanently encased in a slab of acrylic.
3. Taxidermy specimens or parts.
4. Preserved vertebrate or invertebrate animals.
5. Human or animal food as part of the exhibitor demonstration of the project.
6. Human/animal parts or body fluids (*for example, blood, urine*).
7. Plant materials (*living, dead, or preserved*) that are in their raw, unprocessed, or non-manufactured state (*Exception: manufactured construction materials used in building the project or display*).
8. All chemicals including water (*projects may not use water in any form in a demonstration*).
9. All hazardous substances or devices (*including but not limited to poisons, drugs, firearms, weapons, ammunition, reloading devices, and lasers*).
10. Items that may have contained or been in contact with hazardous chemicals (*Exception: item may be permitted if professionally cleaned and documented for such cleaning is available*).
11. 3-D Printers.
12. Dry ice or other sublimating solids.
13. Sharp items (*including but not limited to syringes, needles, pipettes, knives*).
14. Weapons or weapon paraphernalia of any kind.
15. Flames or highly flammable materials (*including magnified light sources*).
 - a. A Fresnel lens cannot be used in conjunction with a light source – it becomes an open flame.
16. Batteries with open-top cells or wet cells.

17. Glass or glass objects unless deemed by the Display and Safety Committee to be an integral and necessary part of the project (*for example, glass that is an integral part of a commercial product such as a computer screen*).
18. Any apparatus deemed unsafe by the Scientific Review Committee, the Display and Safety Committee, or Riverside County Office of Education officials (*examples: large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks, 3D prints, etc.*)

Electrical Regulations

1. Electrical power supplied to the project is 120 volt.
2. Electrical devices must be protectively enclosed. Any enclosure must be non-combustible. All external non-current carrying metal parts must be grounded.
3. Energized wiring, switches, and metal parts must have adequate insulation and over-current safety devices (*such as fuses*) and must be inaccessible to anyone other than the student. Exposed electrical equipment or metal that possibly may be energized must be shielded with a non-conducting material or with a grounded metal box to prevent accidental contact.
4. Decorative lighting or illumination is discouraged. If used, lighting must be as low a voltage as possible and must be LED lighting that does not generate heat. Light bulbs are prohibited. When student is not at the exhibit, all electrical power must be disconnected, or power bars must be switched off (*Exception: during pre-judging audio visual displays may be available*).
5. No exposed live circuits over 36 volts are allowed.
6. There must be an accessible, clearly visible on/off switch or other means of quickly disconnecting from the 120 or 220 volt power source.

Laser Requirements

Any Class 1 or Class 2 lasers, along with only Class 3A or 3R lasers, are allowed to be used provided a student avoids indiscriminate exposure to other students, judges, or visitors (*except if passed through magnifying optics such as microscopes and telephones, in which case they may not be used*). No other lasers may be used or displayed.

1. Displays with lasers should have a warning sign: "LASER RADIATION – DO NOT STARE INTO BEAM."
2. Any laser must be labeled by the manufacturer so that power output can be inspected. Lasers without labels will NOT be "cleared."
3. LED's that consume over 1 watt, unless they are in a commercial light bulk/fixture or otherwise shielded, will not be allowed.
4. Lasers will be confiscated with no warning if not used in a safe manner. Serious offenses may result in failure to qualify.

Tobacco, Alcohol and Controlled Substances GROUNDS FOR IMMEDIATE DISQUALIFICATION

1. No project may use consumable tobacco, alcohol or illegally obtained narcotics and/or controlled substances. This includes surveys that compare use of the above substances (*e.g., smokers vs. non-smokers*).
2. Controlled substances (*drugs, chemicals, anesthetics, etc., the use of which is regulated by 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.

Chemicals

1. Projects that use a chemical with a hazard rating of five or with asterisks are not permitted.
2. For help on chemical use, use The Science Safety Handbook for California Public Schools (2014 edition) downloadable at:
www.cde.ca.gov/pd/ca/sc/documents/scisafebook2014.pdf.

SAFETY REGULATIONS

The following safety regulations must be adhered to when a student exhibits a project at the Riverside County SEF.

Firearms, Explosives and Projectiles

1. Fire regulations prohibit the use of highly flammable or combustible materials in project displays. Education Code, Section 48915. "Firearm" means any device designed to be used as a weapon from which a projectile is expelled through a barrel by the force of any explosion or other form of combustion. Examples of dangerous objects include but are not limited to: air soft guns, paint ball guns, BB guns, pellet guns, air rifles, brass knuckles, fist packs, nunchaku, sling shots, throwing stars, darts, and any object likely to cause injury to person or property that has no reasonable use at school. Education Code 48900(b).
2. Projects involving the discharge of a single or multiple projectiles by mechanical, chemical or electromagnetic means are not permitted. Examples: archery, tackle, air guns, firearms of any type, etc.
3. Rocket-propelled projectile or similar device with an engine greater than 0.60 inch in diameter.

Biofuels

1. Research regarding biofuel/alcohol production must conform to the U.S. Department of Treasury, Alcohol and Tobacco Trade Bureau regulations.
2. Permits must be obtained prior to the production of any alcohol fuel. Application and Regulation information for permits visit: www.ttb.gov/forms/f511074.pdf.

Tobacco, Alcohol and Controlled Substances GROUNDS FOR IMMEDIATE DISQUALIFICATION

1. No project may use consumable tobacco, alcohol or illegally obtained narcotics and/or controlled substances. This includes surveys that compare use of the above substances (e.g., smokers vs. non-smokers).
2. Controlled substances (drugs, chemicals, anesthetics, etc., the use of which is regulated by 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.

Chemicals

Projects that use a chemical with a hazard rating of five or with asterisks are not permitted. For help on chemical use, use The Science Safety Handbook for California Public Schools (2014 edition) downloadable at:
www.cde.ca.gov/pd/ca/sc/documents/scisafebook2014.pdf.

Human Subjects and Live Vertebrate Animals

When applicable, the following form(s) must be submitted with your application to the district/affiliate fair coordinator. Personal and school identification, including photograph must be concealed.

- Certification of Humane Treatment of Live Vertebrate Animals Form (*RCSEF Form 4*)
 - Certificate of Compliance of Research involving Human Subjects (*RCSEF Form 5*)
 - Participant Informed Consent Form (*RCSEF Form 6*)
 - Human and Vertebrate Animal Tissue Form (*RCSEF Form 7*)
 - *Acceptable substitute forms: ISEF Form 4, 5A, 5B, 6B*
-
- The display of bacterial cultures and live or dead vertebrates, invertebrates, plants or microorganisms or their parts, is not permitted (e.g. teeth, hair, fur, feathers). Only illustrations or photographs of microorganisms and animals are permitted.
 - Photographs or other visual presentations of surgical techniques, dissections, autopsies, and/or laboratory techniques depicting vertebrate animals in other than normal conditions may not be displayed. Hide a participant's face to protect identity.
 - Live vertebrate animals may not be displayed during the fair.
 - State of California Education Code 51540: In the public elementary and secondary schools or in public 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:
 - Be experimentally medicated or drugged in a manner to cause painful reactions or induce painful or lethal pathological conditions.
 - 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 practices of animal husbandry.

Prohibited Research and Disclosure on Human Subjects

1. Student researchers may not publish or display information in a report that identifies the human subject directly or through identifiers linked to the subjects (including photographs) without written consent.
2. Students are prohibited from administering medications and performing medical procedures on human subjects.
3. Students under the age of 21 are prohibited by federal and state law from using controlled substances in their research project. These substances include all forms of alcohol, explosive materials, tobacco, and firearms. *Education Code section 48900 (b)*

Projects That Require Certification of a Biomedical Scientist

When applicable, these items must be submitted with your application to the district/affiliate fair coordinator. Personal and school identification, including photograph must be concealed.

- Certification of Humane Treatment of Live Vertebrate Animals Form (*RCSEF Form 4*)
 - Certificate of Compliance of Research Involving Human Subjects (*RCSEF Form 5*)
 - Participant Informed Consent Form (*RCSEF Form 6*)
 - Human and Vertebrate Animal Tissue Form (*RCSEF Form 7*)
 - *Acceptable substitute forms: ISEF Form 5A, 5B*
-
1. 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 microbiological laboratories 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.
 2. 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 laboratory). In this instance, the designated adult supervisor will be required to certify in writing jointly with the biomedical scientist.
 3. Either the biomedical scientist or adult supervisor must provide continuing supervision to assure compliance with the protocol.
 4. Major deviations from the approved protocol may be implemented only with the written approval of the biomedical scientist, but may never violate the California Education Code.
 5. 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, and agrees to supervise the project.

For All Projects Involving Tissue Samples

Live tissue samples must be taken from a continuously maintained tissue culture line already available to institutional researchers or from animals already being used in an on-going institutional research project.

Students may not be involved in the direct acquisition of these samples from living human or vertebrate animals.

All projects must confirm to the California Education Code Title 2, Division 2, Part 28, Chapter 4, Article 5, 51540.

Students may conduct research on human blood, blood products, or other body fluids only if tissues are handled in accordance with standards and guidelines set form in OSHA 29CFR, Subpart z, 1810.1930 – Blood Borne Pathogens under the supervision of a qualified scientist.

All bodily fluids shall be treated in the same manner as pathogenic or potentially pathogenic agents as defined in *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, published by CDC-NIH.

Human blood and blood products, including student researcher's own blood, must be documented by a research institution or certified blood test as free of Acquired Immune Deficiency Syndrome (AIDS) and Hepatitis antibodies and antigens prior to the student receiving the tissue. Teeth shall be sterilized and certified free of blood and blood products.

For All Projects Using Any Live Vertebrate Animal, Excluding Humans

The State of California Education Code §51540: In the public elementary and high schools or in public elementary and high school 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 practices of animal husbandry.

RCSEF 2018 Project Categories

Choosing Your Category

Please read the **category definitions** carefully. These definitions may be different from those used in your school or district fair. Examples of titles of past projects appropriate to each category have been included to help you decide category placement.

The Review and Safety Committee (composed of scientists and engineers from universities and industry, as well as science and engineering teachers) reads each Project Abstract/Summary in order to review each project category submittal. Your project may be placed into a category which is different from the one to which it was assigned at your school or district/affiliate fair. This is not unusual and is done to assure that similar projects are placed together with each other in the same category. Proper category selection increases your project's likelihood of recognition through fair awards.

Your assigned category will be determined by the specific focus of your study, not the general subject area.

The categories noted on the following pages, along with their definitions, related categories, and sample project titles apply to the 2018 Riverside County Science and Engineering Fair.

RCSEF Project Categories – All Grade Levels/Divisions

Category Number	Category	Description
01	Animal Sciences	<p>This category includes all aspects of animals and animal life, animal life cycles, and animal interactions with one another or with their environment. Examples of investigations included in this category would involve the study of the structure, physiology, development, and classification of animals, animal ecology, animal husbandry, entomology, ichthyology, ornithology, and herpetology, as well as the study of animals at the cellular and molecular level which would include cytology, histology, and cellular physiology.</p> <p><i>(Animal Behavior; Cellular Studies; Development; Ecology; Genetics; Nutrition and Growth; Physiology; Systematics and Evolution)</i></p>
02	Behavioral and Social Sciences	<p>The science or study of the thought processes and behavior of humans and other animals in their interactions with the environment studied through observational and experimental methods.</p> <p><i>(Clinical and Developmental Psychology; Cognitive Psychology; Neuroscience; Physiological Psychology; Sociology and Social Psychology)</i></p>
03	Biochemistry	<p>The study of the chemical basis of processes occurring in living organisms, including the processes by which these substances enter into, or are formed in, the organisms and react with each other and the environment.</p> <p><i>(Analytical Biochemistry; General Biochemistry; Medicinal Biochemistry; Structural Biochemistry)</i></p>
04	Biomedical and Health Sciences	<p>This category focuses on studies specifically designed to address issues of human health and disease. It includes studies on the diagnosis, treatment, prevention or epidemiology of disease and other damage to the human body or mental systems. Includes studies of normal functioning and may investigate internal as well as external factors such as feedback mechanisms, stress or environmental impact on human health and disease.</p> <p><i>(Cell, Organ, and Systems Physiology; Genetics and Molecular Biology of Disease; Immunology; Nutrition and Natural Products; Pathophysiology)</i></p>
05	Biomedical Engineering	<p>Projects that involve the application of engineering principles and design concepts to medicine and biology for healthcare purposes including diagnosis, monitoring and therapy. Prominent biomedical engineering applications include the development of biocompatible prostheses, various diagnostic and therapeutic medical devices ranging from clinical equipment to micro-implants, common imaging equipment such as MRIs and EEGs, regenerative tissue growth, pharmaceutical drugs and therapeutic biologicals.</p> <p><i>(Biomaterials and Regenerative Medicine; Biomechanics; Biomedical Devices; Biomedical Imaging; Cell and Tissue Engineering; Synthetic Biology)</i></p>
06	Cellular and Molecular Biology	<p>This is an interdisciplinary field that studies the structure, function, intracellular pathways, and formation of cells. Studies involve understanding life and cellular processes specifically at the molecular level.</p> <p><i>(Cell Physiology; Cellular Immunology; Genetics; Molecular Biology; Neurobiology)</i></p>

Category Number	Category	Description
07	Chemistry	Studies exploring the science of the composition, structure, properties, and reactions of matter not involving biochemical systems. <i>(Analytical Chemistry; Computational Chemistry; Environmental Chemistry; Inorganic Chemistry; Materials Chemistry; Organic Chemistry; Physical Chemistry)</i>
08	Computational Biology and Bioinformatics	Studies that primarily focus on the discipline and techniques of computer science and mathematics as they relate to biological systems. This includes the development and application of data-analytical and theoretical methods, mathematical modeling and computational simulation techniques to the study of biological, behavior, and social systems. <i>(Computational Biomodeling; Computational Epidemiology; Computational Evolutionary Biology; Computational Neuroscience; Computational Pharmacology; Genomics)</i>
09	Earth and Environmental Sciences	Studies of the environment and its effect on organisms/systems, including investigations of biological processes such as growth and life span, as well as studies of Earth systems and their evolution. <i>(Atmospheric Science; Climate Science; Environmental Effects on Ecosystems; Geoscience; Water Science)</i>
10	Embedded Systems	Studies involving electrical systems in which information is conveyed via signals and waveforms for purposes of enhancing communications, control and/or sensing. <i>(Circuits; Internet of Things; Microcontrollers; Networking and Data Communications; Optics; Sensors; Signal Processing)</i>
11	Energy: Chemical	Studies involving biological and chemical processes of renewable energy sources, clean transport, and alternative fuels. <i>(Alternative Fuels; Computational Energy Science; Fossil Fuel Energy; Fuel Cells and Battery Development; Microbial Fuel Cells; Solar Materials)</i>
12	Energy: Physical	Studies of renewable energy structures/processes including energy production and efficiency. <i>(Hydro Power; Nuclear Power; Solar; Sustainable Design; Thermal Power; Wind)</i>
13	Engineering Mechanics	Studies that focus on the science and engineering that involve movement or structure. The movement can be by the apparatus or the movement can affect the apparatus. <i>(Civil Engineering; Computational Mechanics; Control Theory; Ground Vehicle Systems; Industrial Engineering-Processing; Mechanical Engineering; Naval Systems)</i>
14	Environmental Engineering	Studies that engineer or develop processes and infrastructure to solve environmental problems in the supply of water, the disposal of waste, or the control of pollution. <i>(Bioremediation; Land Reclamation; Pollution Control; Recycling and Waste Management; Water Resources Management)</i>

Category Number	Category	Description
15	Materials Science	The study of the integration of various materials forms in systems, devices, and components that rely on their unique and specific properties. It involves their synthesis and processing in the form of nanoparticles, nanofibers, and nanolayered structures, to coatings and laminates, to bulk monolithic, single-/poly-crystalline, glassy, soft/hard solid, composite, and cellular structures. It also involves measurements of various properties and characterization of the structure across length scales, in addition to multi-scale modeling and computations for process-structure and structure-property correlations. <i>(Biomaterial; Ceramic and Glasses; Composite Materials; Computation and Theory; Electronic, Optical, and Magnetic Materials; Nanomaterials; Polymers)</i>
16	Mathematics	The study of the measurement, properties, and relationships of quantities and sets, using numbers and symbols. The deductive study of numbers, geometry, and various abstract constructs, or structures. <i>(Algebra; Analysis; Combinatorics, Graph Theory, and Game Theory; Geometry and Topology; Number Theory; Probability and Statistics)</i>
17	Microbiology	The study of micro-organisms, including bacteria, viruses, fungi, prokaryotes, and simple eukaryotes as well as antimicrobial and antibiotic substances. <i>(Antimicrobial and Antibiotics; Applied Microbiology; Bacteriology; Environmental Microbiology; Microbial Genetics; Virology)</i>
18	Physics and Astronomy	Physics is the science of matter and energy and of interactions between the two. Astronomy is the study of anything in the universe beyond the Earth. <i>(Atomic, Molecular, and Optical Physics; Astronomy and Cosmology; Biological Physics; Condensed Matter and Materials; Mechanics; Nuclear and Particle Physics; Theoretical, Computational, and Quantum Physics)</i>
19	Plant Sciences	Studies of plants and how they live, including structure, physiology, development, and classification. Includes plant cultivation, development, ecology, genetics and plant breeding, pathology, physiology, systematics and evolution. <i>(Agriculture and Agronomy; Ecology; Genetics and Breeding; Growth and Development; Pathology; Plant Physiology; Systematics and Evolution)</i>
20	Robotics and Intelligent Machines	Studies in which the use of machine intelligence is paramount to reducing the reliance on human intervention. <i>(Biomechanics; Cognitive Systems; Control Theory; Machine Learning; Robot Kinematics)</i>
21	Systems Software	The study or development of software, information processes or methodologies to demonstrate, analyze, or control a process/solution. <i>(Algorithms; Cybersecurity; Databases; Human/Machine Interface; Languages and Operating Systems; Mobile Apps; Online Learning)</i>
22	Translational Medical Science	Projects that aim to improve human health and longevity by translating novel discoveries in the biomedical sciences into effective activities and tools for clinical and public health use. Bi-directional in concept, projects can be those developed through basic research moving toward clinical testing (bench-to-bedside) or projects that provide feedback about the applications of new treatments and how they can be improved (bedside-to-bench). <i>(Disease Detection and Diagnosis; Disease Prevention; Disease Treatment and Therapies; Drug Identification and Testing; Pre-Clinical Studies)</i>

RCSEF Writing Your Abstract

Your abstract is important. Your judges will receive this abstract in advance of the Fair so that they can preview your work. Your judges will be able to better understand your work and prepare for your interview if you follow these samples or use similar formats.

While most abstracts should include all of the elements listed here, all elements may not be appropriate for all categories.

Project Title:

Indicate the title of your project.

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, methods, and experimental design used in your project. Briefly describe your experiment or engineering methods.

Results:

Summarize the results of your experiment and indicate how they pertain to your objective. Describe possible applications of your research and the impact to society.

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.

RCSEF Project Abstract Examples

Experimental Abstract Example:

How the pH of an Acid Affects Copper Plating

I was fascinated by an experiment we recently did on using an acid to plate copper on a nail. I wanted to explore the topic further, which is why I chose to study how the pH of an acid affects copper plating. After some research, I guessed that the lower the pH the more copper would be deposited on the nail. For my experiment, I made several different solutions of acid with pH's ranging from 1 to 7. Then, I placed the pennies in each jar overnight. After that, I took out the penny and replaced it with the nail in each jar and observed what happened over three days. The nail in the solution with a pH of 1 was completely dissolved. The nail in the solution with a pH of 2 was partially dissolved. The nail in the solution with a pH of 3 had a fair amount of copper plated on it. The nail in the solution with a pH of 5 had a bit of copper. The nail in the solution with a pH of 7 was unaffected. I learned that the pH of the acid solution is important to copper plating, but unlike my hypothesis, it needs to be around pH of 3 to be the most effective.

Engineering Abstract Example:

Development by Design and Testing of a Miniature to Harness Kinetic Energy from Airflow Around a Moving Automobile

This project presents a summary of a successful design, fabrication and testing of wind turbines mounted on a car roof for the purpose of extracting power from the kinetic energy (dynamic pressure) contained in the wind flow around the car. The placement of the turbine was based on aerodynamic considerations. Various design concepts were tested and evaluated. Drag tests were conducted that showed the turbine did not negatively impact vehicle performance. NACA (National Advisory Committee for Aeronautics) ducts were evaluated and shown to offer additional choice for turbine design and placement. The results obtained from the tests conducted in this research demonstrate the feasibility for the efficient extraction of energy from wind flow around an automobile. Literature research consisting mainly of a review of NACA reports supported the findings of this study.

RCSEF What to Expect During the Judging

Students in grades 4 and 5 will set up their projects but will not participate in an interview with judges. Students in the junior division (grades 6-8) and senior division (grades 9-12) will meet with the judges and should expect the following:

1. You should prepare an oral summary of the important points of your project which you can present in no more than 60 seconds.
2. Following your summary, you may find it useful to prepare several short capsule descriptions of important aspects of your project. You know your project better than anyone, so you should have the best ideas of what is important, but you could prepare answers for such questions as "Where did you get the idea for this project?" "What is special or distinctive about your project?" "What is the next thing you would do with your results?" "What questions has your project now generated?" You might also explicitly prepare for the question you hope the judges will ask.
3. If yours is a team project, one person should act as the team spokesman at the beginning and present the introductory oral summary. This summary should include the rationale for the project being a group, rather than an individual, enterprise, and how each member contributed. Each member of the group should be fully knowledgeable about the project and be prepared to then discuss his/her part.
4. Be sure to have each judge initial the form provided during the Fair. This is your record of your project's judges. Special Award judges may also judge your project; however they will not need to initial the form. Special Award judges are identified by a special name badge.

What Should You Expect The Judges To Do?

1. You should be interviewed by 2 to 5 different judges for your category that will spend about 8 minutes discussing your project with you. It is difficult to space these interviews equally, so do not get discouraged if there is a long wait between judges. Do not worry about comparing the number of your judges with your neighbors. You, or they, may be getting Special and Recognition Awards interviews.
2. Many judges prefer to learn about your project by asking questions. Be prepared for them to interrupt your presentation.

RCSEF Judging Criteria

Science Project Judging Criteria	Engineering Project Judging Criteria
<p>Research Question (10 pts.)</p> <ul style="list-style-type: none"> a. Clear and focused purpose b. Identifies contribution to field of study c. Testable using scientific methods 	<p>Research Question (10 pts.)</p> <ul style="list-style-type: none"> a. Description of a practical need or problem to be solved b. Definition of criteria for proposed solution c. Explanation of constraints
<p>Design and Methodology (15 pts.)</p> <ul style="list-style-type: none"> a. Well-designed plan and data collection methods b. Variables and controls defined, appropriate and complete 	<p>Design and Methodology (15 pts.)</p> <ul style="list-style-type: none"> a. Exploration of alternatives to answer need or problem b. Identification of a solution. c. Development of a prototype/model
<p>Execution: Data Collection, Analysis and Interpretation (20 pts.)</p> <ul style="list-style-type: none"> a. Systematic data collection and analysis b. Reproducibility of results c. Appropriate application of mathematical and statistical methods d. Sufficient data collected to support interpretation and conclusions/claim 	<p>Execution: Construction and Testing (20 pts.)</p> <ul style="list-style-type: none"> a. Prototype demonstrates intended design b. Prototype has been tested in multiple conditions/trials c. Prototype demonstrates engineering skill and completeness
<p>Creativity (20 pts.)</p> <ul style="list-style-type: none"> a. Project demonstrates significant creativity in one or more of the above criteria 	<p>Creativity (20 pts.)</p> <ul style="list-style-type: none"> a. Project demonstrates significant creativity in one or more of the above criteria
<p>Presentation Display (35 pts.)</p> <p>Poster – 10 pts.</p> <ul style="list-style-type: none"> a. Logical organization of material b. Clarity of graphics and legends c. Supporting documentation displayed <p>Interview - 25 pts.</p> <p><i>NOTE: not applicable for Elementary (Grades 4 and 5) Division as those students are not interviewed</i></p> <ul style="list-style-type: none"> a. Clear, concise thoughtful response to questions b. Understanding of basic science relevant to project c. Understanding interpretation and limitations of results and conclusions d. Degree of independence in conducting project e. Recognition of potential impact in science, society, and/or economics f. Quality of ideas for further research g. For team projects, contributions to and understanding of project by all members 	<p>Presentation Display (35 pts.)</p> <p>Poster – 10 pts.</p> <ul style="list-style-type: none"> a. Logical organization of material b. Clarity of graphics and legends c. Supporting documentation displayed <p>Interview - 25 pts.</p> <p><i>NOTE: not applicable for Elementary (Grades 4 and 5) Division as those students are not interviewed</i></p> <ul style="list-style-type: none"> a. Clear, concise thoughtful response to questions b. Understanding of basic science relevant to project c. Understanding interpretation and limitations of results and conclusions d. Degree of independence in conducting project e. Recognition of potential impact in science, society, and/or economics f. Quality of ideas for further research g. For team projects, contributions to and understanding of project by all members

RCSEF Awards for Participation

1. The most valuable aspect of the Riverside County Science and Engineering Fair may well be the opportunity for students to meet and share experience with judges possessing similar interests.
2. Merit-based awards: A maximum of two gold medals, three silver medals, and three bronze medals will be awarded in each category for each division. One sweepstakes award in each division will also be awarded, as deemed appropriate by the judges. Certificates of participation will be provided to every student. The certificates will be provided to students when they pick up their projects on March 20. Medals will be presented at the awards ceremony on March 20. If a student is not present for the awards ceremony and receives a medal, the medal will be sent to the district/affiliate fair coordinator shortly after the ceremony.
3. Special achievement awards will be provided by representatives of agencies and are awarded by criteria established by the agencies. Special achievement awards are independent of selections made by the Riverside County Science and Engineering Fair judging process.
4. Judges of the Riverside County SEF shall select projects, in keeping with state and county criteria, to receive a recommendation for advancement to advanced levels of competition in other fairs including:
 - California State Science Fair (CSSF) for grades 6-12
 - National Broadcom Masters competition for grades 6-8
 - Intel International Science and Engineering Fair (ISEF) for grades 9-12

Those projects to receive a recommendation for advancement to the next level of competition and/or medal winners will be announced during the awards ceremony on March 20.

5. **All judging decisions are final and are not subject for appeal.**

RCSEF Form Requirements

The following form(s) must be completed as required and approved by your teacher/advisor prior to the start of your research. Approval is subject to confirmation by the RCSEF Scientific Review Committee (SRC). All required approval forms must be submitted as part of the RCSEF application. These may include:

Student Application Form (RCSEF Form 1).

- This form must be completed by all students entering the Riverside County Science and Engineering Fair.

Continuation of Research Form (RCSEF Form 2)

- Required for projects that are a continuation/progression in the same field of study as a previous project.
- The completed form must be submitted with the RCSEF Student Application form.

Certification of Professional Research Support Form (RCSEF Form 3)

- Students who perform an experiment as part of an industry, university, hospital or institution other than their school must submit a Certification of Professional Research Support form. The form must be filled out and signed by the adult supervisor or principal investigator at that institution after the student has completed the experimentation.
- The completed form must be submitted with the RCSEF Student Application form.

Certification of Humane Treatment of Live Vertebrate Animals Form (RCSEF Form 4)

- Required for projects involving live vertebrate animals (dogs, cats, fish, rats, hamsters, horses, and birds are a few common examples of vertebrate animals).
- All projects involving nonhuman vertebrate animals must conform to the regulations listed in these guidelines and on the Certification of Humane Treatment of Live Vertebrate Animals form.
- The Certification of Human Treatment of Live Vertebrate Animals must be signed by the appropriate individuals before the project is started.
- The project must conform to California State Education Code Section 514540 and the International Science and Engineering Fair Regulations for Experiments with Animals.
- If any animal injury, stress, or death occurs, the project must be terminated.
- The completed form must be submitted with the RCSEF Student Application form.
- Vertebrate animal studies without this certification will not be allowed in the Fair for exhibition or judging.

Certification of Compliance of Research Involving Human Subjects Form (RCSEF Form 5)

- Required for projects involving human subjects and/or interviewees.
All projects involving human subjects must conform to the regulations listed in these guidelines and on the Certification of Compliance of Research Involving Human Subjects Form.
- The Certification of Compliance of Research Involving Human Subjects Form must be completed and signed by the sponsoring teacher/advisors before the project is begun.
- The completed form must be submitted with the RCSEF Student Application form.
- Human studies without this certification form will not be allowed in the Fair for exhibition or judging.

Participant Informed Consent Form (RCSEF Form 6)

- Required for projects involving human subjects and/or interviewees.
- The Participant Informed Consent Form is used to gain permission of study participants involved in the project.
- The completed form must be submitted with the RCSEF Student Application form.

Human and Vertebrate Animal Tissue Form (RCSEF Form 7)

- Required for projects involving human or other vertebrate animal tissue (including teeth and hair roots), blood, blood products and body fluids.
- All projects that involve the use of tissues from humans or vertebrates must conform to the regulations listed in these guidelines and on the Human and Vertebrate Animal Tissue Form.
- Students may not be involved in the direct acquisition of recombinant DNA, tissue, organs, or other body parts (including blood and meat) from human or vertebrate animals; they must be acquired by adults or from a commercial or medical source.
- Human and Vertebrate Animal Tissue Form must be completed and signed by the company, agency or person providing or buying the samples. The form must be approved and signed by the sponsor/advisor before the project is begun.
- The completed form must be submitted with the RCSEF Student Application form.
- Projects involving tissue studies without this certification will not be allowed in the fair for exhibition or judging.

Appendix

RCSEF Student Application (RCSEF Form 1) – Page 2 of 2

Student Name:
Is your project a continuation of a previous year's study? <input type="checkbox"/> No <input type="checkbox"/> Yes <i>If yes, complete Continuation of Research Form (RCSEF Form 2) and submit with registration.</i>
Did you complete your project with a university, hospital, or outside institution other than your school? <input type="checkbox"/> No <input type="checkbox"/> Yes <i>If yes, complete Certification of Professional Research Support Form (RCSEF Form 3) and submit with registration.</i>
Does project involve live vertebrate animals? <input type="checkbox"/> No <input type="checkbox"/> Yes <i>If yes, complete Certification of Humane Treatment of Live Vertebrate Animals Form (RCSEF Form 4) and submit with registration.</i>
Does project involve human subjects? <input type="checkbox"/> No <input type="checkbox"/> Yes <i>If yes, complete Certification of Compliance of Research Involving Human Subjects Form (RCSEF Form 5) and Participant Informed Consent Form (RCSEF Form 6) and submit with registration.</i>
Does project involve human or other vertebrate animal tissue? <input type="checkbox"/> No <input type="checkbox"/> Yes <i>If yes, complete Human and Vertebrate Animal Tissue Form (RCSEF Form 7) and submit with registration.</i>
Does your project display require electricity? <input type="checkbox"/> No <input type="checkbox"/> Yes
Does your project display require more height than the standard table? <input type="checkbox"/> No <input type="checkbox"/> Yes <i>(if yes, a suitable floor area will be provided, but out of numeric sequence and may not be placed with the category table projects.)</i>
Type of Entry (check one) <input type="checkbox"/> Individual <input type="checkbox"/> Group <i>(if group, list all group member names)</i> <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="width: 30%; border-bottom: 1px solid black; text-align: center;">Name</div> <div style="width: 30%; border-bottom: 1px solid black; text-align: center;">Name</div> <div style="width: 30%; border-bottom: 1px solid black; text-align: center;">Name</div> </div>
Project Title <i>(limit of 120 characters)</i>
Preferred Category
Abstract <i>(limit of 300 words; (must include Objectives/Goal, Methods/Materials, Results, Conclusions/Discussion))</i>
Summary Statement <i>(in one sentence, state what your project is about)</i>
Help Received Doing Project <i>(e.g., used lab equipment at university X under the supervision of Dr. Y; participant in NSF Young Scholars Program) (see regulation)</i>



RCSEF Continuation/Research Progression Projects Form (RCSEF Form 2)

Required for projects that are a continuation/progression in the same field of study as a previous project.

Name of Student: _____

Project Title: _____

Components	Current Research Project	Previous Research Project Year(s)
Title		
Change in goal/purpose/objective		
Changes in methodology		
Variable studied		
Additional changes		

I hereby certify that the above information is correct and the current year Abstract and Certification and project display board properly reflect work done only in the current year.

Student Signature	Date Signed
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RCSEF Professional Research Support Form (RCSEF Form 3)

(Acceptable substitute forms: ISEF Form 1C)

This form is required of all projects completed partially or entirely within the facilities of a professional research organization, whether academic, industrial, or government. Include this form and any attachments with your application. Complete the top two lines before delivering the form to your research advisor.

Student Name(s)
Project Title

For Institutional Representative: Note any additional responses on separate attached pages.

1. What led the student(s) to your organization?
 - Announced institutional program (e.g., NSF or NASA REU, Summer Interns)
 - Student(s) independently sought us out for unspecified research experience
 - Student(s) independently sought us out for this specific project
 - Student(s) only needed specialized measurement tools in our lab
 - Other: _____

2. What was the origin of this specific project?
 - Intended path of our regular research program
 - Tangentially related to our research and suggested to the student as a project
 - Student(s) independently proposed this project to us
 - Other: _____

3. What special training or instruction was required of the student(s) prior to starting in the lab? Include legally required training as well as training in the use of specific equipment/procedures.

4. What specific procedures or special equipment did the student(s) personally use for the project? Please list and describe. (Do not list procedures student only observed.)

5. What did the facility or members of the research group do to aid the student(s) in completing this project?

Institutional Professional Researcher Name _____

Institution Name _____

Telephone Number _____ E-mail Address _____

Signature of Professional Researcher _____

Relationship to Student _____



RCSEF Certification of Humane Treatment of Live Vertebrate Animals

Page 1 of 3 (RCSEF Form 4)

(Acceptable substitute forms: ISEF Form 5A, 5B)

Any student research involving animals **MUST COMPLY** with the requirements of the California Education Code stated below and **in** the Safety Rules of the Riverside County 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 whatsoever:

- Be experimentally medicated or drugged in a manner to cause painful reactions or induce painful or lethal pathological conditions.
- 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 Riverside County Science and Engineering Fair rules 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 designated 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.

Complete the following pages (2 and 3) and submit with your Student Application Form.



RCSEF Certification of Humane Treatment of Live Vertebrate Animals Page 2 of 3 (RCSEF Form 4)

Name of Student(s): _____

Project Title: _____

Research Plan

Project Purpose	Starting Date	
Location of Investigation (include name of facility and address)		
Live vertebrate animals to be used:		
Genus, species, and common name:	Number of animals:	Animals obtained from:
Describe proposed animal care methods (cage size, number of animals per age, temperature of where animals are housed, frequency of feeding and watering, frequency of cage cleaning, type of bedding, where will animals be returned when research is completed):		
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).		

(Use additional sheet if necessary)



RCSEF Certification of Humane Treatment of Live Vertebrate Animals

Page 3 of 3 (RCSEF Form 4)

I certify that this plan will adhere to the State of California Education Code Title 2, Division 2, Part 28, Charter 4, Article 5, Humane Treatment of Animals, and the ISEF Regulations for Experimentation with Animals. I understand this form must be approved and signed by all parties **before** the project can begin.

Student Name (Print)	Student Signature
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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.

Teacher/Advisor Name (Print)	Signature of Teacher/Advisor
School Name	Date Signed

CERTIFICATION BY ANIMAL CARE SUPERVISOR/DESIGNATED ADULT SUPERVISOR (may be Teacher or Parent) 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.

Animal Care / Designated Adult Supervisor (Print)	Signature of Animal Care / Designated Adult Supervisor	
Institution Name	Position	Date Signed
Institution Address (<i>leave blank if home address</i>)		
Institution Phone (<i>leave blank if home phone</i>)		

NOTE: Complete this page if your project involves experimentation with live vertebrate animals or animal parts in a research or clinical facility where the use of anesthetics, drugs or euthanasia becomes necessary.

CERTIFICATION BY BIOMEDICAL SCIENTIST (if required) of compliance with California Education Code and the Regulations for the Riverside County Science and Engineering Fair.

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.

Biomedical Scientist (Print)	Signature of Biomedical Scientist	
Institution Name	Position	Date Signed
Institution Address (<i>leave blank if home address</i>)		
Institution Phone (<i>leave blank if home phone</i>)		



RCSEF Certification of Compliance of Research Involving Human Subjects Page 1 of 2 (RCSEF Form 5)

(Acceptable substitute forms: ISEF Form 4)

A SURVEY MUST BE ATTACHED TO THIS FORM if applicable

Projects involving human subjects may have additional requirements that are being considered by the state.

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



Certification of Compliance of Research Involving Human Subjects Page 2 of 2 (RCSEF Form 5)

RESEARCH PLAN

Project Purpose	Starting Date
Describe proposed experimental procedures (<i>explain why human subjects are proposed for the experimentation</i>):	
Describe and assess any potential risk (<i>physical, psychological, social, legal, or other</i>):	
Describe potential benefits to the individual or society:	

(Use additional sheet if necessary)

Signature of Student: _____ Date: _____

CERTIFICATION BY TEACHER/ADVISOR: I certify compliance with Code of Federal Regulations 45 CFR section 46 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.

Teacher/Advisor Name (Print)	Signature of Teacher/Advisor
School Name	Date Signed

NOTE: 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 Riverside County Science and Engineering Fair.



RCSEF Participant Informed Consent Form (RCSEF Form 6)

Instructions to the Student Researcher(s): An informed consent/assent/permission form should be completed with consultation of an Adult Sponsor, Designated Supervisor, or Qualified Scientist. This form is used to provide information to the research participant (or parent/guardian) and to document written informed consent, minor assent, and/or parental permission.

- When written documentation is required, the researcher keeps the original, signed form.
- Students may use this sample or may copy all elements of it into a new document.

If the form is serving to document parental permission, a copy of any survey or questionnaire must be attached.

Student Researcher(s)	Title of Project
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I am asking for your voluntary participation in my science and engineering fair project. Please read the following information about the project. If you would like to participate, please sign the appropriate area below.

Purpose of project	Time required for participation
If you participate, you will be asked to	
Potential Risks of Study	Benefits of Study
How confidentiality will be maintained	

If you have questions about this study, feel free to contact:

Adult Sponsor/Designated Supervisor/Qualified Scientist	Phone / E-mail
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Voluntary Participation. Participation in this study is completely voluntary. If you decide not to participate, there will be no negative consequences. If you decide to participate, you may stop participating at any time and you may decide not to answer any specific question(s).

By signing this form, I am attesting that I have read and understand the information above and I freely give my consent/assent to participate or permission for my child to participate.

Name of Participant	Signature	Date Signed
Name of Parent/Guardian	Signature	Date Signed



RCSEF Human and Vertebrate Animal Tissue Form (RCSEF Form 7)

Required for research involving fresh/frozen tissue (including primary cell lines, human and other primate established cell lines and tissue cultures), blood, blood products, and body fluids. If the research involves living organisms, please be sure that the proper human or animal forms are completed.

Name of Student: _____

Project Title: _____

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

What vertebrate animal tissue will be used in this study? *(check all that apply)*

- Fresh or frozen tissue sample
- Fresh organ or other body part
- Blood
- Body fluids
- Primary cell/tissue cultures
- Human or other primate established cell lines
- Hair
- Teeth
- Other _____

Where will the above tissue(s) be obtained?

How will the tissue(s) be used in the project?

Student Signature

Date Signed

CERTIFICATION

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

Qualified Scientist / Designated Supervisor (Print)	Signature of Qualified Scientist / Designated Supervisor
Institution Name	Date Signed



**This sheet to be submitted by Affiliate Fair Coordinator.
RCSEF Affiliate Fair Registration Summary Sheet**

District/School: _____

District/Affiliate Fair Coordinator's Name: _____

Cell Phone Number: _____ E-Mail Address: _____

	Student Name	Grade	G or I (Group or Individual)	School Site	Project Title
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

This form may be duplicated, retyped giving the same information. Submit with all student registration forms. Deadline for submission: February 23, 2018



Riverside County Science and Engineering Fair Project Display Information

Please be sure to include the following information on the back of your project display board. Students may use this template by printing, cutting, and pasting the template on to the back of the project board. Project display labels will also be available the day of the fair for students to complete and adhere to their projects.

Student Name: <i>(If group, include all student names)</i>	
Project Title:	
School:	
District:	
Division:	<input type="checkbox"/> Elementary (Gr. 4-5) <input type="checkbox"/> Junior Division (Gr. 6-8) <input type="checkbox"/> Senior Division (Gr. 9-12)