Riverside County Science and Engineering Fair Regulations and Information Packet

2019-2020

For additional information, contact:

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As an affiliate for the California State Science and Engineering Fair (CSSEF) and International Science and Engineering Fair (ISEF), these RCSEF rules and regulations are in accordance with the CSSEF and ISEF Rules and Regulations.

Revised 8/21/19

RCSEF Guidelines - Table of Contents

RCSEF Timeline

Activity	Date	Time	Place
District/Affiliate Fair Coordinators' Meeting	September 26, 2019	4:30 p.m. – 6 p.m.	RCOE Conference Center
Deadline to Submit Intel ISEF Interest Forms	September 27, 2019	5 p.m.	All forms due by 5 p.m.
Science and Engineering Fair Expo	September 28, 2019	9 a.m. – 1 p.m.	RCOE Conference Center
District/Affiliate Fair Project Registration Deadline	February 5, 2020	4:30 p.m.	All forms and payment due to RCOE by 4:30 p.m.
Project Review and Safety Screening	February 11, 2020	8 a.m. – 2 p.m.	RCOE Conference Room A
Riverside County Science and Engineering Fair	March 2-3, 2020	See below	Riverside Convention Center
California State Science Fair	April 20-21, 2020	Varies	California Science Center, Los Angeles
ISEF	May 10-15, 2020	Varies	Anaheim, California

Monday, March 2, 2020	
7:30 a.m. – 9:00 a.m.	Grades 4 and 5 Project Set Up *(no interviews)*
9:00 a.m. – 1:30 p.m.	Judging for Grades 4 and 5
7:30 a.m. – 8:30 a.m.	Junior Division (Gr. 6-8) / Senior Division (Gr. 9-12) Project Set Up
8:30 a.m. – 9:00 a.m.	Orientation for Junior Division and Senior Division
9:15 a.m. – 10:45 a.m.	Judging/Interviews for Junior Division and Senior Division
10:45 a.m. – 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 p.m. – 12:15 p.m.	Break for Students
12:15 p.m. – 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 3, 2020	
9:00 a.m. – 6:00 p.m.	Public Viewing
9:00 a.m. – 8:30 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 3. After 8:30 p.m., any projects that have not been picked up will be discarded.

RCSEF Recommended Affiliate Fair Timeline

August/September

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

October

- 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

November

- 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

December

- 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 and engineering fair - contact local news media
- Students develop final research papers

February

- Complete registration/application forms with students
- Affiliate fair coordinator submits all registration and application 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 which they would attend if they were not home schooled, and 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.

Student applications for the RCSEF are due from affiliate coordinators to the Riverside County Office of Education no later than February 5, 2020.

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 Meeting: February 11, 2020
Application review using the Acceptance Criteria by the RCSEF Scientific Review Committee.

Notice of Acceptance or Rejection: February 14, 2020
All applicants identified through the RCSEF Scientific Review Committee as candidates for rejection will be notified 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.

Category Assignments
All category assignments requested on student applications will be honored. Please be sure to select the correct category so the project is reviewed by the appropriate judges. If a project application does not have a category listed, the review committee will make the assignment based on the abstract.

International Science and Engineering Fair (ISEF) Delegation Project Deadlines*
Students requesting interview consideration to represent RCSEF as an ISEF finalist must meet the ISEF form submission deadlines as follows:
Deadline 1 - Initial Forms Open Window – July 1 through September 27, 2019.
Submit ISEF Forms 1, 1A, and 1B. The SRC will review forms and send feedback to applicants. If additional ISEF forms are required based on review of Forms 1, 1A, and 1B, students will be notified.
Deadline 2 - Form Revisions and submission of SRC requested forms – December 13, 2019.
Deadline 3 – Final revisions of ISEF forms due February 12, 2020.
*Failure to meet any of the ISEF form deadlines will result in a withdrawal from an ISEF interview for the consideration of the 2020 RCSEF ISEF finalist delegation.

RCSEF Student Instructions for Application

Application Deadline: February 5, 2020

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 <u>are not</u> acceptable. Registration forms/applications must be received by registration deadline date of February 5, 2020.

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.

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 and Engineering 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 in grades 6-12 will be present for oral interview on March 2, 2020 (grades 4 and 5 are not interviewed).

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, these criteria are intended to improve the quality of the Fair and to ensure that all participants are able to effectively communicate their project to the judges. Any student whose application is not accepted will be contacted through the affiliate coordinator and/or parent in a timely manner. The student/parent will have with an opportunity to participate in the appeals process.

Student researchers, as well as adults who have a role in the student projects, are expected to maintain the highest ethical standards. These include, but are not limited to:

Integrity. Honesty, objectivity, and avoidance of conflicts of interest are expected during every phase of research. The project should reflect independent research done by the student(s) and represent only one year's work.

Legality. Compliance with all federal, county, state, and local laws is essential. All projects must be approved by a Scientific Review Committee (SRC), and when necessary must also be approved by an Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), and/or Institutional Biosafety Committee (IBC).

Respect for Confidentiality and Intellectual Property. Confidential communications, as well as patents, copyrights, and other forms of intellectual property must be honored. Unpublished data, methods, or results may not be used without permission, and credit must be given to all contributions to research.

Stewardship of the Environment. It is the responsibility of the researcher(s) and the adults involved to protect the environment and its organisms from harm. All projects involve some amount of risk. Everyone is expected to recognize the hazards, assess the risks, minimize them, and prepare for emergencies.

Animal Care. Proper care and respect must be given to vertebrate animals. The guiding principles for the use of animals in research includes the following Four R's: replace, reduce, refine, respect.

Human Participant Protection. The highest priority is the health and well-being of the student researcher(s) and human participants.

Potentially Hazardous Biological Agents. It is the responsibility of the student and adults involved in the project to conduct and document a risk assessment, and to safely handle and dispose of organisms and materials.

Scientific fraud and misconduct are not condoned at any level of research or competition. This includes plagiarism, forgery, use of presentation of other researcher's work as one's own and

fabrication of data. Fraudulent projects will fail to qualify for competition in affilated fairs and RCSEF. RCSEF officials reserve the right to revoke recognition of a project subsequently found to have been fraudulent.

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. 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.

RCSEF Project Display Information

If there are any questions regarding Riverside County SEF Display and Safety regulations, please contact Yamileth 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 project displays. 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 video, 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.
- RCSEF agents and RCOE are not responsible for any items left at the display.

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

The display must reflect only the work conducted by the student(s). Minimal reference to mentor's or other researcher's work must only reflect background information or be used to clarify differences between student(s) work and others work. RCSEF Form 3 *(Professional Research Support Form)* must be submitted with student application and be displayed with project the day of the Fair.

Display Content for Continuation Projects

The project display should summarize only the current year's work. The title may include the duration of the project *(i.e., "Year Two of an Ongoing Study")*. Minimum reference to the conclusions of previous years' work may be shown without any specific data being displayed. RCSEF Form 2 *(Continuation/Research Progression Projects Form)* must be completed and submitted with student application. Reference to past work on the display board must be limited to summative past conclusory data and its comparison to the current year data set. No raw data from previous years may be publicly displayed; however, it may be included in the student research notebooks and/or logbooks if properly labeled.

Forms Required to be Visible and Displayed (only when applicable):

1. Set-up Approval Form *(received onsite at the RCSEF)*
    - This form documents the project as approved by the Scientific Review Committee and is used to document the Display and Safety Committee's review and final approval.
    - This form must be signed by the student(s) and the Display and Safety Committee member at time of inspection of project.
2. Professional Research Support Form *(RCSEF Form 3)*
    - If work was conducted in a regulated research institution, industrial setting, or any work site other than home, school, or field at any time during the current RCSEF project year, the Professional Research Support Form *(RCSEF Form 3)* must be completed and displayed with the project.
    - The information provided by the mentor on RCSEF Form 3 may be referenced to confirm that the information provided on the project is that of the student. Only minimal reference to mentor's or another researcher's work is allowable and must only reflect background information or be used to clarify differences between the student(s) and others' work.

Forms Required for All Projects

1. Completed RCSEF Student Application *(RCSEF Form 1)* as approved by the Riverside County SEF Scientific Review Committee.
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.)*

Forms Not to be at the Project Display or in the Exhibit Hall

Completed informed consent forms are not allowed to be present at the project display. Students may include a sample (incomplete) form in their logbook for research notebook but under no circumstance should the completed informed consent forms for a human participant be in the Exhibit Hall. They are to be submitted with the registration materials.

Audio Visual Presentations/Photographs

Students using audio-visual or multi-media presentations (i.e., 35mm slides, video, 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 officials. The decision made by any one of the groups mentioned 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 project 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 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. The use of logos including known commercial brands, institutional crests or trademarks, unless integral to the project and approved by the Display and Safety Committee.
   b. Personalized graphic/logo that is developed to indicate a commercial purpose or viability of an established or proposed business associated with the project, unless student-created in which it can be displayed on the board only once.
   c. Any reference to an institution or mentor that supported research except as provided in the official RCSEF paperwork, notably RCSEF Form 3.
   d. Any reference to patent status of the project.
   e. Any disks, CDs, business cards, printed materials, etc., *(including unofficial abstracts)* designed to be distributed to judges or the public.
   f. 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 additions 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 Scientific 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 are not responsible for damage to the project.

Display Items Not Allowed on the Judging Floor

1. Living organisms, including plants.

2. Glass or glass objects unless deemed by 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.)*

3. Soil, sand, rock, cement and/or waste samples, even if permanently encased in a slab of acrylic.

4. Taxidermy specimens or parts.

5. Preserved vertebrate or invertebrate animals.

6. Human or animal food.

7. Human/animal parts or body fluids *(for example, blood, urine).*

8. 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).*

9. All chemicals including water. Absolutely no liquids can be utilized in the project display.

10. All hazardous substances or devices. *(Examples include poisons, drugs, firearms, weapons, ammunition, reloading devices, grease/oil and sublimating solids such as dry ice.).*

11. 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).* Filters, including microbial, may not be displayed unless the Display and Safety Committee can reasonably determine that the device was cleaned or was never used. Receipts should be included in notebooks and/or logbooks.

12. Sharp items. *(Examples include syringes, needles, pipettes, knives.)*

13. Flames and highly flammable materials.

14. Batteries with open-top cells or wet cells.

15. Drones or any flight-capable apparatus unless the propulsion power source is removed.

16. 3D printers unless the power source is removed.

17. Inadequately insulated apparatus capable of producing dangerous temperatures.

18. Any apparatus with belts, pulleys, chains, or moving parts with tension or pinch points that are not appropriately shielded.

19. Any display items that are deemed distracting *(i.e., sounds, lights, odors, etc.)*.

20. 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 printers, 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.

5. 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).*

6. An insulating grommet is required at the point where any wire or cable enters any enclosure.

7. No exposed live circuits over 36 volts are allowed.

8. There must be an accessible, clearly visible on/off switch or other means of quickly disconnecting from the 120-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 at all times while the student(s) is/are conducting their research and displaying the 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, slingshots, 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. Regarding rocket propelled projectiles, only commercially produced Class A or smaller engines are permitted.

4. The length of the rocket must not measure less than 10 inches (25 cm) or more than 15 inches (38 cm).

5. The minimum size of the launch site for class A or similar engines should extend to a radius of 100 feet (30 m) from the firing position.

6. Application for a special launch permit may be required by local fire protection agencies.

7. Designated supervisors and/or teachers should caution their students about the dangers of experimenting with rockets and missiles, especially the dangers in the preparation and use of noncommercial rockets and propellants. **Teachers must refrain from the following practices**:
    a. Providing chemicals for rockets or missiles or helping students to obtain them.
    b. Using, or permitting to be used, liquid or solid fuels in the classroom (such use essentially constitutes a controlled explosion).
    c. Permitting the construction of rockets, missiles, or component parts in the classroom or shop.
    d. Allowing students proximity to the firing area.
    e. Launching anything other than the commercially produced rocket engines of known size and predictable range.

8. Further rocket safety precautions can be found within the CA Science Safety Handbook, 2014, pages 169-170, 282-286.

Regulated Drones

Projects involving unmanned aircraft systems (UAS)/drones must follow all federal, state, and county laws. See the Federal Aviation Administration (FAA) website, **www.faa.gov.uas/registration**, for more details.

Hazardous Devices

The documentation of risk assessment (Form 8) is required when a student researcher works with potentially hazardous, dangerous equipment, and/or other devices, in or outside of a laboratory setting that requires a moderate to high level of expertise to ensure their safe usage. Some commonly used devices *(Bunsen burners, hot plates, saws, drills, etc.)* may not require a documented risk assessment, assuming the student researcher has experience working with the device. Use of other potentially dangerous devices such as high vacuum equipment, heated oil baths, NMR equipment, and high temperature ovens must have documentation of a risk assessment. It is recommended that all student designed inventions have documentation of a risk assessment.

Radiation

A risk assessment (documented on Form 8) must be conducted when a student's project involves radiation beyond that normally encountered in everyday life. Non-ionizing radiation includes the spectrum of ultraviolet (UV), visible light, infrared (IR), microwave (NW), radiofrequency (RF), and extremely low frequency (ELF).

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 confirm 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.

Potentially Hazardous Biological Agents (PHBA)

1. Prior review and approval is required for the use of potentially hazardous microorganisms (including bacteria, viruses, viroids, prions, rickettsia, fungi, and parasites), recombinant DNA (rDNA) technologies or human or animal fresh/frozen tissues, blood, or body fluids.

2. An affiliated fair SRC, an IBC, or an IACUC must approve all research before experimentation begins. The initial risk assessment determined by the student researcher and adults supervising the project must be confirmed by the SRC, IBC, or IACUC.

3. Experimentation involving the culturing of potentially hazardous biological agents, even BSL-1 organisms, is prohibited in a home environment. However, specimens may be collected at home as long as they are immediately transported to a laboratory with the BSL containment determined by the affiliated fair SRC.

4. Research determined to be a Biosafety Level 1 (BSL-1) must be conducted in a BSL-1 or higher laboratory. The research must be supervised by a Designated Supervisor or a Qualified Scientist. The student must be properly trained in standard microbiological practices.

5. Research determined to be a Biosafety Level 2 (BSL-2) must be conducted in a laboratory rated BSL-2 or above (commonly limited to a Regulated Research Institution). The research must be reviewed and approved by the Institutional Biosafety Committee (IBC) if the Regulated Research Institution requires the review. The research must be supervised by a Qualified Scientist. For a high school BSL-2 laboratory, the SRC must review and approve. The research must be supervised by a Qualified Scientist.

6. Students are prohibited from designing or participating in BSL-3 or BSL-4 research.

7. Laboratory studies designed to culture known clinically significant multidrug resistant organisms (MDROs) are prohibited.

    a. Representative examples include, but are not limited to the following known agents: MRSA (Methicilin-Resistant Staphylococcus aureus), VISA/VRSA (Vancomycin Intermediate or Resistant Staphylococcus aureus), VRE (Vancomycin-Resistant Enterococci), CRE (Carbapenem Resistant Enterobacteriacae), ESBLs (Extended Spectrum Beta-Lactamase producing gram negative organisms), and fungi (yeasts or molds) with known resistance to antifungal agents.

8. All potentially hazardous biological agents must be properly disposed at the end of experimentation in accordance with their biosafety level. For BSL-1 or BSL-2 organisms, Autoclave at 121 degrees Celsius for 20 minutes, use of a 10% bleach solution (1:10 dilution of domestic bleach), incineration, alkaline hydrolysis, biosafety pick-up and other manufacturer recommendations are acceptable.

Classification of Biological Agents

Risk Groups

Biological agents, plant or animal, are classified according to biosafety level risk groups. These classifications presume ordinary circumstances in the research laboratory, or growth of agents in small volumes for diagnostic and experimental purposes.

BSL-1 risk group contains biological agents that pose low risk to personnel and the environment. These agents are highly unlikely to cause disease in healthy laboratory workers, animals, or plants. The agents require Biosafety Level 1 containment. Examples of BSL-1 organisms are Agrobacterium tumifaciens, Micrococcus leuteus, Neurospora crassa, Bacillus subtilis.

BSL-2 risk group contains biological agents that pose moderate risk to personnel and the environment. If exposure occurs in a laboratory situation, the risk of spread is limited and it rarely would cause infection that would lead to serious disease. Effective treatment and preventive measures are available in the event that an infection occurs. The agents require Biosafety Level 2 containment. Examples of BSL-2 organisms are Mycobacterium, Streptococcus pneumonia, Salmonella choleraesuis.

BSL-3 risk group contains biological agents that usually cause serious disease (human, animal, or plant) or that can result in serious economic consequences. Projects in the BSL-3 group are prohibited.

BSL-4 risk group contains biological agents that usually produce very serious disease (human, animal, or plant) that is often untreatable. Projects in the BSL-4 group are prohibited.

Levels of Biological Containment

There are four levels of biological containment (Biosafety Level 1-4). Each level has guidelines for laboratory facilities, safety equipment, and laboratory practices and techniques.

BSL-1 containment is normally found in water-testing laboratories, in high schools, and in colleges teaching introductory microbiology classes. Work is done on an open bench or in an appropriate biosafety hood. Standard microbiological practices are used when working in the laboratory. Decontamination can be achieved by treating with chemical disinfectants or by steam autoclaving. Lab coats and gloves are required. The laboratory work is supervised by an individual with general training in microbiology or a related science.

BSL-2 containment is designed to maximize safety when working with agents of moderate risk to humans and the environment. Access to the laboratory is restricted. Biological safety cabinets (Class 2, type A, BSC) must be available. An autoclave should be readily available for decontaminating waste materials. Lab coats and gloves are required; eye protection and face shields must also be worn as needed. The laboratory work must be supervised by a scientist who understands the risk associated with working with the agents involved.

BSL-3 containment Is required for infectious agents that may cause serious or potentially lethal diseases as a result of exposure by inhalation. Projects in the BSL-3 group are prohibited.

BSL-4 containment Is required for dangerous/exotic agents that pose high risk of life-threatening disease. Projects in the BSL-4 group are prohibited.

Sources: Potentially Hazardous Biological Agents

American Biological Safety Association: ABSA Risk Group Classification – list of organisms
www.absa.org

American Type Culture Collection 9ATCC)
www.atcc.org

Bergey's Manual of Systematic Bacteriology website – follow links for resources and microbial databases for a collection of international websites of microorganisms and cell cultures
www.bergeys.org/resources.html

Biosafety in Microbiological and Biomedical Laboratories (BMBL) – Fourth Edition, Published by CDC-NIH.
www.cdc.gov/biosafety/publications/bmbl5/BMBL.pdf

World Health Organization Safety Manual
www.who.int/diagnostics_laboratory/guidance/en/
Canada – Agency of Public Health – list of non-pathogenic organisms
www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment.html

American Society for Microbiology
www.asm.org/division/w/web-sites.htm

Microbiology Society Charles Darwin House 12 Roger Street London WC1N 2JU UK,
education@microbiologysocieyt.org, **http://microbiologyonline.org**

NIH Guidelines for Research Involving Recombinant DNA Molecules. Published by National Institutes of Health.
https://osp.od.nih.gov/wp-content/uploads/2013/06/NIH_guidelines.pdf

OSHA – Occupational Health and Safety Administration
www.osha.gov

Roles and Responsibilities of Students and Adults

The Student Researcher(s)
The Student Researcher is responsible for all aspects of the research project including:

- Enlisting the aid of any required supervisory adults (Adult Sponsor, Qualified Scientist, etc.)
- Obtaining necessary approvals (SRC, IRB, etc.)
- Following the rules and guidelines of the RCSEF and obtaining all necessary approvals (SRC, IRB, etc.) and completing all appropriate documentation.
- Completing the project, which may include but is not limited to, experimentation, data collection, engineering, data analysis, and any other process or procedures related to the project.
- Understanding and abiding by the Ethics Statement and attesting to this understanding on RCSEF Form 1.

To avoid conflict of interest, no Adult Sponsor, parent, or other relative of a student, the Qualified Scientist, or Designated Supervisor who oversees a project may serve on the SRC or IRB reviewing that project.

The Adult Sponsor
- An Adult Sponsor may be a teacher, parent, professor, and/or other professional scientist.
- An Adult Sponsor should be knowledgeable in the area of the student's research, be familiar with the regulations around procedures and materials that apply to the student project, particularly when involving human participants, vertebrate animals, potentially hazardous biological agents or hazardous chemicals, devices, or activities.
- An Adult Sponsor should have close contact with the student throughout the timeline of the project.

The Adult Sponsor is responsible for:
- Working with the student to evaluate any possible risks involved in order to ensure the health and safety of the student conducting the research and the humans and/or animals involved in the study.
- Reviewing the student's Checklist and Research Plan/Project Summary to ensure that a) experimentation follows local, state, and Federal laws and RCSEF rules; b) forms are completed by other required adults; and c) criteria for the Qualified Scientist adhere to those set forth in the RCSEF Rules and Guidelines.

The Qualified Scientist
- Should have a doctoral/professional degree in a scientific discipline that relates to the student's area of research, and or have extensive experience and expertise in the student's area of research.

- Must be thoroughly familiar with the regulations that govern the student's area of research including all federal, local, state, and county regulations and laws.
- Can also serve as the Adult Sponsor, if that person meets both sets of qualifications.
- May live elsewhere and not be local to the student, in which case a Designated Supervisor has been appointed and trained to serve as the onsite supervision as necessary for the specific student project.

The Qualified Scientist responsibilities include:

- Reviewing the RCSEF rules relevant to the project and approving the student's research plan or engineering design prior to the start of experimentation.
- Providing direct supervision throughout the timeline of the project or coordinating with a Designated Supervisor to serve in this capacity.
- Ensuring the proper training of the Student Researcher and/or Designated Supervisor in the necessary procedures.
- Completing the required documentation and RCSEF forms as applicable.

The Designated Supervisor

- Does not need an advanced degree.
- Must be familiar with the student's project and agree to any training necessary.
- May also serve as the Adult Sponsor of the project.
- Must be knowledgeable about the humane care and handling of animals if the project involves the use of vertebrate animals (where behavior/habitat is influenced by humans).

Designated Supervisor responsibilities include:

- Providing direct supervision of the student experimentation.
- Completing the required documentation when applicable.
- Reviewing and completing the Risk Assessment Form (Form 8) when needed.

Review Committees

The Institutional Review Board (IRB)
An Institutional Review Board (IRB) is a committee that, according to federal regulations (45-CFR-46), must evaluate the potential physical and/or psychological risk of research involving humans. All proposed human research must be reviewed and approved by an IRB before experimentation begins. This includes reviews of any surveys or questionnaires to be used in a project.

Federal regulations require local community involvement. Therefore, it is advisable that an IRB be established at the school level to evaluate human research projects. If necessary, the local or RCSEF-affiliated SRC can serve as an IRB. An IRB must consist of a minimum of three members including the following:

- An educator
- A school administrator (preferably principal or vice principal)
- A medical or mental health professional. The medical or mental health professional may be a medical doctor, nurse practitioner, physician's assistant, doctor of pharmacy, registered nurse, psychologist, licensed social worker, or licensed clinical professional counselor. The medical or mental health professional on the IRB may change depending on the nature of the study. This person must be knowledgeable about and capable of evaluating the physical and/or psychological risk involved in a given study.

Additional Expertise: If an expert is not available in the immediate area, documented contact with an external expert is recommended. A copy of all correspondence with the expert (e.g., emails) must be attached to RCSEF Form 5 and can be used in lieu of the signature of that expert.

To avoid conflict of interest, no Adult Sponsor, parent or other relative of the student, the Qualified Scientist, or Designated Supervisor who oversees the project may serve on the IRB reviewing that project. Additional members are recommended to help avoid a potential conflict of interest and to increase the expertise of the committee.

IRBs exist at federally Regulated Research Institutions (e.g., universities, medical center, NIH, correctional facilities). Prisoner advocates must be included on the IRB when research participants are incarcerated. The institutional IRB must initially review and approve all proposed research conducted at or sponsored by that institution. The Adult Sponsor and the local IRB are responsible for ensuring that the project is appropriate for a student and adheres to the RCSEF rules.

An IRB is responsible for assessing risk and documenting the determination of risk level on RCSEF Form 5. However, in reviewing projects just prior to a fair, if the SRC serving at that level of completion judges an IRB's decision is inappropriate, thereby placing human participants in jeopardy, they may override the IRB's decision and the project may fail to qualify for competition. It is advised that IRBs consult with the local or affiliated fair SRCs and/or with the RCSEF SRC in questionable cases.

The Affiliated Fair Scientific Review Committee (SRC)

A Scientific Review Committee (SRC) is a group of qualified individuals that is responsible for evaluation of student research, certifications, research plans and project displays for compliance with the rules, applicable laws and regulations at each level of science and engineering fair competition. Affiliated fairs may authorize local SRCs to serve in this prior review capacity. The operation and composition of the local and Affiliated Fair SRCs must fully comply with the RCSEF rules. Directions for obtaining preapproval are available from the affiliated fair. Most proposed research projects involving vertebrate animals and/or potentially hazardous biological agents must be reviewed and approved before experimentation. Local or regional SRC prior review is not required for human studies previously reviewed and approved by a properly constituted IRB. All projects, including those previously reviewed and approved by an IRB must be reviewed and approved by the SRC after experimentation and before competition in an affiliated fair. Projects which were conducted at a Regulated Research Institution (not home, school, or field) and which were reviewed and approved by the proper institutional board before experimentation, must also be approved by the affiliated fair SRC. An SRC must consist of a minimum of three persons, including the following:

1. A biomedical scientist with an earned graduate degree
2. An educator
3. At least one additional member

Additional expertise: Many project evaluations require additional expertise (e.g., on biosafety and/or of human risk groups.) If the SRC needs an expert as one of its members and one is not in the immediate area, all documented contact with an external expert must be submitted. If animal research is involved, at least one member must be familiar with proper animal care procedures. Depending on the nature of the study, this person can be a veterinarian or animal care provider with training and/or experience in the species being studied.

To avoid conflict of interest, no Adult Sponsor, parent or other relative of the student(s), the Qualified Scientist, or the Designated Supervisor who oversees the project may serve on the SRC reviewing that project. Additional members are recommended to diversify and to increase the expertise of the committee.

A Scientific Review Committee (SRC) examines projects for the following:

- Evidence of proper supervision
- Completed forms, signatures, research dates and preapproval dates (when required)
- Evidence of proper team composition
- Compliance with rules and laws governing human and/or animal research and research involving potentially hazardous biological agents and hazardous chemicals, activities, or devices
- Compliance with the RCSEF ethics statement
- Use of accepted and appropriate research techniques
- Evidence that risks have been properly assessed
- Evidence of search for alternatives to animal use
- Humane treatment of animals
- Documentation of substantial expansion for continuation projects
- Evidence of literature search and appropriate attribution

Combined SRC/ IRB Committee

A combined committee is allowed as long as the membership meets both the SRC and IRB requirements listed in these guidelines.

Human Participants

The following rules were developed to help student researchers adhere to federal regulations governing professional scientists and to protect the welfare of both human participants and the student researcher. Health and well-being is of the highest priority when students conduct research with human participants.

According to Code of Federal Regulation 45, CFR 46, a human participant is a living individual about whom an investigator conducting research obtains (1) data or samples through intervention or interaction with individual(s) or (2) identifiable private information. Examples of projects that are considered "human participant research" include:

- Participants in physical activities (e.g., physical exertion, ingestion of any substance, any medical procedure)
- Psychological, education, and opinion studies (e.g., surveys, questionnaires, tests)
- Studies in which the researcher is the subject of the research
- Testing of student designed invention, prototype or computer application by human participants other than student researcher
- Data/record review projects that include data that are not de-identified/anonymous (e.g., data set that includes name, birthdate, phone number, or other identifying variables)
- Behavioral observations that
    - Involve any interaction with the observed individual(s) or where the researcher has modified the environment (e.g., post a sign, place an object)
    - Occur in non-public or restricted access settings (e.g., daycare settings, doctor's office)
    - Involve the recording of personally identifiable information

Rules for Projects with Human Participants

1. Student researchers must complete ALL elements of the Human Participants portion of the Certificate of Compliance of Research involving Human Subjects (RCSEF Form 5) to evaluate and minimize the physical, psychological and privacy risks to their human participants.

2. Student research involving human participants must be reviewed and approved by an Affiliate Fair representative (e.g., classroom teacher, Science and Engineering Fair Coordinator, Principal, etc.) **before any interaction** (e.g., recruitment, data collection) with human participants may begin. It is the responsibility of the affiliate fair representative to evaluate potential physical and/or psychological risks of the project and make a determination about whether the project is appropriate for student research and safe for the student researcher and participants.

    a. Projects that are conducted at a Regulated Research Institution (RRI) (e.g., university, hospital, medical center, government lab) must have IRB approval from the RRI. A copy

of the IRB approval for the project must be obtained. A letter from an adult mentor and/or Qualified Scientist is not sufficient documentation of the RRI IRB review and approval process.

3. The student must comply with all determinations made by the affiliate fair or RRI IRB before beginning any interaction with human participants (e.g., recruitment, data collection).

4. Participation in research may begin only after research participants have voluntarily given informed consent/assent (in some cases with parental permission). Adult research participants may give their own consent. Research participants under 18 years of age and/or individuals not able to give consent (e.g. developmentally disabled individuals) give their assent, with the parent/guardian providing permission.

    a. Informed consent requires that the researcher provides complete information to the participant (and where applicable, parents or guardians) about the risks and benefits associated with participation in the research study, which then allows the participants and parents or guardians to make an informed decision about whether or not to participate.

    b. Participants must be informed that their participation is voluntary and that they are free to stop participating at any time (i.e., they may participate or decline to participate, with no adverse consequences of non-participation or aborted participation).

    c. Informed consent may not involve coercion.

    d. When written parental permission is required and the study includes a survey, the survey must be attached to the consent form.

    e. The student researcher may request that the IRB waive the requirement for written informed consent/parental permission in his/her research plan if the project meets specific requirements. See section on IRB waivers for more information about situations in which written parental permission and/or written informed consent can be waived by the IRB.

5. The research study must be in compliance with all privacy laws (e.g., U.S. Family Educational Rights and Privacy Act (FERPA) and the U.S. Health Insurance Portability and Accountability Act (HIPAA)) when they apply to the project (e.g. the project involves medical information).

6. Students are prohibited from independently diagnosing disease, administering medication, and/or performing medical procedures on human participants. A student may observe and collect data for analysis of medical procedures, medication/treatment efficacy, and diagnosis of illness only under the direct supervision of a licensed health

care provider/professional. This medical professional must be named in the research plan and protocol approved by the RCSEF SRC/IRB. The IRB must also confirm that the student is not violating the appropriate practice act (medical, nursing, pharmacy, etc.) of the state or country in which he/she is conducting the research.

7. Student researchers may NOT publish or display information in a report that identifies the human participants directly or through identifiers linked to the participants (including photographs) without the written consent of the participant(s) (Public Health Service Act, 42, USC 241 (d)).

8. All published instruments that are not in the public domain must be administered, scored and interpreted by a Qualified Scientist as required by the instrument publisher. Any and all use and distribution of the test must be in accordance with the publisher's requirements, including procurement of legal copies of the instrument.

9. Studies that involve the collection of data via use of the internet (e.g., email, web-based surveys) are allowed, but researchers should be aware that they can pose challenges in a) collecting anonymous data, b) obtaining informed consent and c) ensuring that participants are of the appropriate age to give informed consent. See the Online Survey Consent procedures (**https://sspcdn.blob.core.windows.net/files/** Documents/SEP/ISEF/Resources/Online-Survey-Consent- Procedures.pdf).

10. After initial IRB approval, a student with any proposed changes in the Research Plan must repeat the approval process and regain approval before resuming interaction (recruitment, data collection) with human participants.

11. After experimentation and before competition, the Affiliated Fair will review for compliance with all rules.

12. The following forms are required when doing projects involving human participants:
    a. Student Application Form (RCSEF Form 1)
    b. Certification of Compliance of Research Involving Human Subjects (RCSEF Form 5)
        a. IRB approval form from an IRB may be accepted in place of the RCSEF Form 5.
        b. All applicable consents and survey(s)
    c. Participant Informed Consent Form (RCSEF Form 6)
        a. All completed forms need to be kept confidential and on file with the student researcher.
    d. Certification of Professional Research Support Form (RCSEF Form 3), when applicable
    e. Risk Assessment Form (RCSEF Form 8), when applicable

Human Participant Involvement in Student-Designed Invention, Prototype, Computer Application and Engineering/Design Projects

Student-designed invention, prototype, computer application and engineering/design projects that involve testing of the invention by any human participant require attention to the potential risks to the individual(s) testing or trying out the invention/prototype.

1. IRB review and pre-approval is necessary when the student-designed invention, prototype, application, etc. is tested by human participants other than the student researcher(s) or a single adult guardian, adult sponsor, qualified scientist, designated supervisor when the testing requires an adult tester. This includes surveys conducted regarding potential use, review of the product and/or opinions regarding the project.

2. Projects in which the invention, prototype or project involves a medical diagnosis or intervention (as defined by the FDA or Medical Practices Act) and is tested on human participants must be conducted at a Regulated Research Institution (RRI) with a Qualified Scientist and receive IRB Approval from the Institution.

3. A Risk Assessment Form (RCSEF Form 8) is recommended for all student-designed inventions or prototypes.

Exempt Studies (Do Not Require IRB Pre-approval or Human Participant Paperwork)

Some studies involving humans are exempt from IRB pre-approval or additional human participant forms. Exempt projects for the RCSEF and affiliated fairs are:

1. Student-designed Invention, Prototype, Computer Applications or Engineering/Design Project in which the student is the only person testing the invention, prototype or computer application and the testing does not pose a health or safety hazard. It is recommended that a Risk Assessment Form (RCSEF Form 8) be completed. The use of human participants (other than the student researcher him/herself) for this testing requires IRB review and approval.

2. Data/record review studies (e.g., baseball statistics, crime statistics) in which the data are taken from preexisting data sets that are publicly available and/or published and do not involve any interaction with humans or the collection of any data from a human participant for the purpose of the student's research project.

3. Behavioral observations of unrestricted, public settings (e.g., shopping mall, public park) in which all of the following apply:
   a. the researcher has no interaction with the individuals being observed
   b. the researcher does not manipulate the environment in any way and
   c. the researcher does not record any personally identifiable data.

4. Projects in which the student receives pre-existing/retrospective data in a de-identified/anonymous format which complies with both of the following conditions:
    a. the professional providing the data certifies in writing that the data have been appropriately de-identified before being given to the student researcher and are in compliance with all privacy and HIPAA laws, and
    b. the affiliated fair SRC ensures that the data were appropriately de-identified by review of the written documentation provided by the supervising adult(s).

Human Participant Risk Assessment

All human participant projects are considered to have some level of risk.

No more than minimal risk exists when the probability and magnitude of harm or discomfort anticipated in the research are not greater (in and of themselves) than those ordinarily encountered in everyday life or during performance of routine physical or psychological examinations or tests.

More than minimal risk exists when the possibility of physical or psychological harm or harm related to breach of confidentiality or invasion of privacy is greater than what is typically encountered in everyday life. Most of these studies require documented informed consent or minor assent with the permission of parent or guardian (as applicable).

1) Examples of Greater than Minimal Physical Risk

b. Exercise other than ordinarily encountered in everyday life
c. Ingestion, tasting, smelling, or application of a substance. However, ingestion or tasting projects that involve commonly available food or drink will be evaluated by the IRB which determines risk level based upon the nature of the study and local norms.
d. Exposure to any potentially hazardous material.

2) Examples of Greater than Minimal Psychological Risk - A research activity (e.g. survey, questionnaire, viewing of stimuli) or experimental condition that could potentially result in emotional stress. Some examples include: answering questions related to personal experiences such as sexual or physical abuse, divorce, depression, anxiety; answering questions that could result in feelings of depression, anxiety, or low self esteem; or viewing violent or distressing video images.

3) Privacy Concerns

a. The student researcher and IRB must consider whether an activity could potentially result in negative consequences for the participant due to invasion of privacy or breach of confidentiality. Protecting confidentiality requires measures to ensure that identifiable research data are not disclosed to the public or unauthorized individuals.
b. Risk level can be reduced by protecting confidentiality or collecting data that is strictly anonymous. This requires the collection of research in such a way that it is impossible to connect research data with the individual who provided the data.

4) Risk Groups - If the research study includes participants from any of the following groups, the IRB and student research must consider whether the nature of the study requires special protections or accommodations:

a. Any member of a group that is naturally at-risk (e.g. pregnant women, developmentally disabled persons, economically or educationally disadvantaged persons, individuals with diseases such as cancer, asthma, diabetes, AIDS, dyslexia, cardiac disorders, psychiatric disorders, learning disorders, etc.)
b. Special groups that are protected by federal regulations or guidelines (e.g. children/minors, prisoners, pregnant women, students receiving services under the Individuals with Disabilities Education Act (IDEA).

See the online Risk Assessment Guide and Online Survey Consent Procedures for more detailed information on risk assessment.
https://sspcdn.blob.core.windows.net/files/documents/SEP/ISEF/Resources/Risk-Assessment-Guide.pdf
https://sspcdn.blob.core.windows.net/files/documents/SEP/ISEF/Resources/Online-Survey-Consent-Procedures.pdf

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Sources of Information: Human Participants

Code of Federal Regulation (CFR), Title 45 (Public Welfare), Part 46 – Protection of Human Subjects (45CFR46)
http://ohsr.od.nih.gov/guidelines/45cfr46.html

Dunn, C.M. and Chadwick, G.L, Protecting Study Volunteers in Research, 3rd Edition (2004). Boston, MA: Thompson Centerwatch. ISBN 1-930624-44-1. Can be purchased from Amazon.

NIH tutorial, "Protecting Human Research Participants"
http://phrp.nihtraining.com/users/PHRP.pdf

Belmont Report, April 18, 1979
www.hhs.gov.ohrp/humansubjects/guidance/belmont.html

Standards for Educational and Psychological Testing. (1999). Washington, DC: AERA, APA, NCME.
www.apa.org/science/programs/testing/standards.aspx

American Psychological Association, 750 First Street, NE, Washington, DC 20002-4242, (202) 336-5500; 800-374-2721, **www.apa.org**
Information for students: **www.apa.org/science/leadership/students/information.aspx**
Information regarding publications: **www.apa.org.pubs/index.aspx**

Educational and Psychological Testing, Testing Office for the APA Science Directorate, 202-336-6000, **testing@apa.org**
www.apa.org/science/programs/testing/index.aspx

The Children's Online Privacy Protection Act of 1998 (COPPA) (15 U.S.C. subsections 6501-6506)
www.ftc.gov/privacy/coppafaqs.shtm

Guidance for Risk Assessment

Please find below guidance on conducting risk assessment when using the following:

1. **Hazardous Chemicals**

   A proper risk assessment of chemicals must include review of the following factors:

   a. Toxicity – the tendency of a chemical to be hazardous to health when inhaled, swallowed, injected or in contact with the skin.
   b. Reactivity - the tendency of a chemical to undergo chemical change.
   c. Flammability - the tendency of a chemical to give off vapors which readily ignite when used under normal working conditions.
   d. Corrosiveness - the tendency of a chemical, upon physical contact, to harm or destroy living tissues or physical equipment.

   When assessing risk, the type and amount of exposure to a chemical must be considered. For example, an individual's allergic and genetic disposition may have an influence on the overall effect of the chemical. The student researcher must refer to Safety Data Sheets provided by the vendor (SDS) to ensure that proper safety precautions are taken. Some SDS sheets (e.g., Flinn) rank the degree of hazard associated with a chemical. This rating may assist students and adult sponsors in determining risk associated with the use of a chemical.

   A risk assessment (RCSEF Form 8) must include proper disposal methods for the chemicals used in an experiment. The Flinn Catalog (referenced in the Sources of Information section on the ISEF website) provides information for the proper disposal of chemicals. If applicable, the student researcher must incorporate in the research plan disposal procedure required by federal and state guidelines.

2. **Hazardous Devices**

   The documentation of risk assessment (RCSEF Form 8) is required when a student researcher works with potentially hazardous/ dangerous equipment and/or other devices, in or outside a laboratory setting that require a moderate to high level of expertise to ensure their safe usage. Some commonly used devices (Bunsen burners, hot plates, saws, drills, etc.) may not require a documented risk assessment, assuming that the student researcher has experience working with the device. Use of other potentially dangerous devices such as high vacuum equipment, heated oil baths, NMR equipment, and high temperature ovens must have documentation of a risk assessment. It is recommended that all student-designed inventions also have documentation of a risk assessment.

3. **Radiation**

   A risk assessment (RCSEF Form 8) must be conducted when a student's project involves radiation beyond that normally encountered in everyday life. Nonionizing radiation includes the spectrum of ultraviolet (UV), visible light, infrared (IR), microwave (NW), radiofrequency (RF) and extremely low frequency (ELF).

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 photographs 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*
    - Participant Informed Consent Form (RCSEF Form 6) must be kept with student researcher. It does not need to be submitted to RCSEF officials.

- 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.

<u>Prohibited Research and Disclosure on Human Subjects</u>

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, 6A, and 6B*

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.

Regulations for Research Involving Human Subjects, Tissue Sample Sources (including DNA Source Materials) and Humane Treatment of Live Vertebrate Animals

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 4, 5A, 5B, 6B)*

The following codes apply to all student research projects. Project advisors must acknowledge on the certification forms that the student has complied with all research regulations.

For All Projects Involving Humans as the Subject of Research

The Code of Federal Regulations 45 CFR 46 §46.102 defines

- "Human Subject" means a living individual about whom an investigator (whether professional or student) conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information. In order for the obtaining of private information to constitute research involving human subjects, the identity of the subject must be readily associated with the information.

- "Minimal Risk" means that the risks of harm anticipated in the research are not greater, considering probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

Examples of unacceptable risk include: (1) ingestion or physical contact with any potentially hazardous materials including toxic chemicals, known or suspected pathogens or carcinogens, or exposure to ionizing radiation; (2) intentionally inducing emotional stress through questioning or invasion of privacy; (3) physical stress to pregnant women or anyone suffering debilitating physical illness; and (4) psychological stress to the mentally handicapped or those suffering psychiatric disorders. This list is intended to be illustrative, not exhaustive.

The regulations of the Fair are intended to protect human subjects, both physically and psychologically. The regulations supplement, and do not supplant, relevant State and Federal regulations dealing with such protection.

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 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.

All category assignments requested on student applications will be honored. The review committee will not make any category changes so it is important the correct category is selected so the project is judged appropriateLY. If you need assistance selecting the category, contact Kevin Goodly, **kgoodly@rcoe.us**.

If a project application does not have a category listed, the review committee will make the assignment based on the project abstract.

Select the appropriate category based on 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 2020 Riverside County Science and Engineering Fair.

RCSEF Project Categories – All Grade Levels/Divisions

Category Number	Category	Description
01	Animal Sciences	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. (*Animal Behavior; Cellular Studies; Development; Ecology; Genetics; Nutrition and Growth; Physiology; Systematics and Evolution)*
02	Behavioral and Social Sciences	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. *(Clinical and Developmental Psychology; Cognitive Psychology; Neuroscience; Physiological Psychology; Sociology and Social Psychology)*
03	Biochemistry	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. *(Analytical Biochemistry; General Biochemistry; Medicinal Biochemistry; Structural Biochemistry)*
04	Health and Biomedical Sciences	This category includes studies designed to address issues of human health and disease, the application of engineering principles and design concepts to medicine and biology for healthcare purposes including diagnosis, monitoring, and therapy. As well as 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. *(Biomaterials and Regenerative Medicine; Biomechanics; Biomedical Devices; Biomedical Imaging; Cell and Tissue Engineering; Synthetic Biology)*
05	Cellular and Molecular Biology	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. *(Cell Physiology; Cellular Immunology; Genetics; Molecular Biology; Neurobiology)*

Category Number	Category	Description
06	Chemistry	Studies exploring the science of the composition, structure, properties, and reactions of matter not involving biochemical systems. *(Analytical Chemistry; Computational Chemistry; Environmental Chemistry; Inorganic Chemistry; Materials Chemistry; Organic Chemistry; Physical Chemistry)*
07	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. *(Computational Biomodeling; Computational Epidemiology; Computational Evolutionary Biology; Computational Neuroscience; Computational Pharmacology; Genomics)*
08	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. *(Atmospheric Science; Climate Science; Environmental Effects on Ecosystems; Geoscience; Water Science)*
09	Embedded Systems	Studies involving electrical systems in which information is conveyed via signals and waveforms for purposes of enhancing communications, control and/or sensing. *(Circuits; Internet of Things; Microcontrollers; Networking and Data Communications; Optics; Sensors; Signal Processing)*
10	Energy: Chemical and Physical	Chemical Energy: Studies involving biological and chemical processes of renewable energy sources, clean transport, and alternative fuels. *(Alternative Fuels; Computational Energy Science; Fossil Fuel Energy; Fuel Cells and Battery Development; Microbial Fuel Cells; Solar Materials)* Physical Energy: Studies of renewable energy structures/processes including energy production and efficiency. *(Hydro Power; Nuclear Power; Solar; Sustainable Design; Thermal Power; Wind)*
11	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. *(Civil Engineering; Computational Mechanics; Control Theory; Ground Vehicle Systems; Industrial Engineering-Processing; Mechanical Engineering; Naval Systems)*
12	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. *(Bioremediation; Land Reclamation; Pollution Control; Recycling and Waste Management; Water Resources Management)*

Category Number	Category	Description
13	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. *(Biomaterial; Ceramic and Glasses; Composite Materials; Computation and Theory; Electronic, Optical, and Magnetic Materials; Nanomaterials; Polymers)*
14	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. *(Algebra; Analysis; Combinatorics, Graph Theory, and Game Theory; Geometry and Topology; Number Theory; Probability and Statistics)*
15	Microbiology	The study of micro-organisms, including bacteria, viruses, fungi, prokaryotes, and simple eukaryotes as well as antimicrobial and antibiotic substances. *(Antimicrobial and Antibiotics; Applied Microbiology; Bacteriology; Environmental Microbiology; Microbial Genetics; Virology)*
16	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. *(Atomic, Molecular, and Optical Physics; Astronomy and Cosmology; Biological Physics;* *Condensed Matter and Materials; Mechanics; Nuclear and Particle Physics; Theoretical, Computational, and Quantum Physics)*
17	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. *(Agriculture and Agronomy; Ecology; Genetics and Breeding; Growth and Development; Pathology; Plant Physiology; Systematics and Evolution)*
18	Robotics and Intelligent Machines	Studies in which the use of machine intelligence is paramount to reducing the reliance on human intervention. *(Biomechanics; Cognitive Systems; Control Theory; Machine Learning; Robot Kinematics)*
19	Systems Software	The study or development of software, information processes or methodologies to demonstrate, analyze, or control a process/solution. *(Algorithms; Cybersecurity; Databases; Human/Machine Interface; Languages and Operating Systems; Mobile Apps; Online Learning)*

RCSEF Writing Your Abstract

The project abstract is very important. The project abstract provides a brief summary of the research conducted by the student. The RCSEF SRC will use the abstract for final safety screening. The abstract will help prepare you for the interview with judges.

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

Projects in Grades 4-5:

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.

Projects in Junior and Senior Divisions (Grades 6-12):

In addition to the information above, projects in the junior and senior divisions (grades 6-12) should also include:

- **Rationale.** Include a brief synopsis of the background that supports the research problem and explain why the research is important. If applicable, explain any societal impact of the research.
- **Research Questions(s), Hypothesis(es), Engineering Goal(s), Expected Outcomes.** Provide details based on the rationale described above.
- **Describe the following in detail:**
    - **Procedures.** Detail all procedures and experimental design, including methods for data collection. Describe only the project. Do not include work done by mentor or others.
    - **Risk and Safety.** Identify any potential risks and safety precautions needed.
    - **Data Analysis.** Describe the procedures you will use to analyze the data/results.
- **Bibliography.** List major references (e.g, science journal articles, books, internet sites) from the project's literature review. If vertebrate animals are used, one of the references must be an animal care reference.

RCSEF Project Abstract Examples

Experimental Project Abstract Example for Students in Grades 4 and 5:

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 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 Project Abstract Example for Students in Grades 4 and 5:

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.

Experimental Project Abstract Example for Students in the Junior and Senior Divisions (Grades 6-12):

SPLASH! The Effect of Size of Blades and Number of Blades on the Voltage Output of Waterwheels

Objectives/Goals
The purpose of this project is to investigate to see if the size of blades and number of blades affect the voltage output of a water wheel. Based on my research, the hypothesis I formed is by increasing the number of blades up to a certain point and increasing the size of blades up to a certain point will increase the voltage output of a waterwheel.

Methods/Materials
First I built the waterwheel stand (part with the generator). Then I constructed six waterwheels. Three were for testing the effect of blade size on voltage and the other three the effect of number of blades on voltage output. Three wheels had different sizes of blades (7.5cm, 15cm, and 22.5cm). The other three wheels had different number of blades (8 blades,12 blades, and 16 blades). I connected these wheels to the stand and after attaching the voltmeter ran each of them under water for 30 seconds. I watched the reading of the voltmeter and recorded the highest voltage that I saw. I then repeated this 4 times for each wheel.

Results
The results for the (blade size) were that the 7.5cm blade waterwheel produced an average of 2.0mV. The 15cm blade waterwheel produced an average of 4.6mV. The 22.5cm blade waterwheel produced an average of 7.5mV. The results for the (number of blades) were that the 8 blade waterwheel produced an average of 3.8mV. The 12 blade waterwheel produced an average of 4.7mV. The 16 blade waterwheel produced an average of 6.5mV.

Conclusions/Discussion
My hypotheses of the waterwheel producing more voltage when there are more blades up to a certain point and of the waterwheel producing more voltage when the blades are bigger up to a certain point were supported. The reason for the waterwheel producing more voltage than the wheels with fewer blades is that when it had fewer blades the water strikes each blade and between each strike is a delay. This delay allows the wheel to slow down so less voltage is produced. But when there were more blades there is less time between each strike so less speed was lost. Since less speed was lost the waterwheel could produce more energy as the magnet turned faster moving the electrons faster producing more energy. The longer blades had more torque and therefore the waterwheel produced more voltage. With this information waterwheels can be constructed to produce energy more efficiently and by doing this we are a step closer to getting away from our dependency on oil.

Summary
My project is about investigating the effect of blade size and number of blades on the voltage output of a water wheel.

Mathematics Project Abstract Example for Students in the Junior and Senior Divisions (Grades 6-12):

An Algorithm to Minimize Memory Usage in Graph-based Applications

Objectives/Goals
The objective of this project was to invent an efficient algorithm to minimize the memory usage of software applications that use graph data structures. Based on analysis of possible approaches to solving the problem, it was hypothesized that an optimum algorithm could run in approximately O (S^2*E) time, S and E being the number of sources and number of edges in an input graph, respectively. A heuristic algorithm was considered an acceptable solution if its runtime benefits over optimum algorithms outweighed its lack of consistent optimality.

Methods/Materials
To minimize its memory usage, a graph-based application must dynamically free memory used by graph edges and vertices that are no longer reachable by any sources yet to be traversed. In this context, the weight of a graph edge is assumed to indicate the amount of memory being used by data stored as part of the edge. A graph's average weight is defined as the average of S graph weights, the total weight of the graph being taken after each source traversal. An algorithm that optimally frees memory used by graph edges is defined as one that produces for any input graph a source ordering that enables minimization of the graph's average weight. Use of the average weight system allows early elimination of significant graph weight to be valued highly, an important factor in producing optimum results. A brute force algorithm that checks all possible orderings of a graph's sources was developed to verify algorithm optimality.

Results
The proposed algorithm uses recursion to find the optimum source ordering of an input graph; it divides the graph into smaller and smaller subgraphs until it reaches a base case and then works its way back up, eventually returning to and solving for the original input graph. The algorithm is a heuristic that produced optimum results for most tested graphs; it has sizable runtime benefits over considered optimum algorithms. Analysis shows that the algorithm runs in approximately O (S^4*V*log E) time.

Conclusions/Discussion
The major contributions of this work to the field of graph theory are the definition and implementation of the concepts of average graph weight and optimum source ordering for dynamic graph weight minimization. In addition to its applications in improving software efficiency, the proposed algorithm has numerous other practical uses. Most notable among them is its ability to minimize energy usage in factories.

Summary
The purpose of this project was to develop an algorithm that would enable minimization of an input graph's weight by producing an optimum source ordering by which to traverse its sources.

Engineering Project Abstract Example for Students in the Junior and Senior Divisions (Grades 6-12):

A Comparison of Different Water Purification Methods

The purpose of this study is to compare the efficiencies of ancient water purification methods against the efficiencies of modern water purification methods. It was hypothesized that modern water purification methods would be more effective in removing bacteria, dissolved solids, salts, and turbidity.

The ancient methods that were tested: the Hippocrates Sleeve (straining water through a conical fabric bag before boiling it); Susruta Samhita (coarse gravel and sand filtration before boiling the water); simply boiling the water; the Scottish Water Treatment (charcoal and sand filtration); and the Lucas Antonius Portius method (sand filtration). The modern purification methods were Reverse Osmosis (membrane purification), and UV light purification (agitating the water with a UV Light bulb). A large water sample was collected from a local river to be purified. After the methods were performed on the river water, the water was collected and frozen in individual, sterilized containers. Then, five tests (Conductivity, TDS, pH, Optical Density, and APC) were run on each of the samples to determine the presence and concentrations of salts, dissolved solids, pH, turbidity, and bacteria.

The experiment refuted the notion that Reverse Osmosis can remove all impurities from the water sample as it removed relatively little bacteria from the river water. The hypothesis that modern purification methods were more effective than ancient methods was not entirely correct because UV light was second to boiling in reducing the most bacteria. Reverse Osmosis however did remove the most salts, dissolved solids, and reduced turbidity. The Susruta Samhita method and the Hippocrates Sleeve method performed relatively well in all areas.

The results indicated that many of these methods such as boiling, the Hippocrates Sleeve, and the Susruta Samhita method are very plausible choices for inexpensive water purification in the modern day. In areas that have poor infrastructure, the use of these methods is ideal.

This project studied how ancient water purification methods compare to modern ones.

Project Abstract examples were extracted from the Santa Clara Valley Science and Engineering Fair Association website (**https://science-fair.org/students-parents/writing-abstracts/sample-jr-high/**)

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. See the following recommendations:

1. You should prepare an oral summary of the important points of your project that 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. 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 think the judges might ask.

3. If yours is a team project, one person should act as the team spokesperson 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 discuss his/her part.

4. Category award judges will place a check mark on a form by your project during the Fair. Special award judges may also judge your project. 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
Research Question (10 pts.) a. Clear and focused purpose b. Identifies contribution to field of study c. Testable using scientific methods	**Research Problem (10 pts.)** a. Description of a practical need or problem to be solved b. Definition of criteria for proposed solution c. Explanation of constraints
Design and Methodology (15 pts.) a. Well-designed plan and data collection methods b. Variables and controls defined, appropriate and complete	**Design and Methodology (15 pts.)** a. Exploration of alternatives to answer a need or problem b. Identification of a solution. c. Development of a prototype/model
Execution: Data Collection, Analysis and Interpretation (20 pts.) 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	**Execution: Construction and Testing (20 pts.)** a. Prototype demonstrates intended design b. Prototype has been tested in multiple conditions/trials c. Prototype demonstrates engineering skill and completeness
Creativity (20 pts.) a. Project demonstrates significant creativity in one or more of the above criteria	**Creativity (20 pts.)** a. Project demonstrates significant creativity in one or more of the above criteria
Presentation Display (35 pts.) **Poster – 10 pts.** a. Logical organization of material b. Clarity of graphics and legends c. Supporting documentation displayed **Interview - 25 pts.** NOTE: *not applicable for Elementary (Grades 4 and 5) Division as those students are not interviewed* 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	**Presentation Display (35 pts.)** **Poster – 10 pts.** a. Logical organization of material b. Clarity of graphics and legends c. Supporting documentation displayed **Interview - 25 pts.** NOTE: *not applicable for Elementary (Grades 4 and 5) Division as those students are not interviewed* a. Clear, concise thoughtful response to questions b. Understanding of basic engineering 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

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.

1. Merit-based awards: A maximum of two gold champion medals and a maximum of five silver runner up medals will be awarded in each category for grade 4, grade 5, junior division, and senior division projects. One sweepstakes trophy will be awarded, as deemed appropriate by the judges, to a student in grades 4 and 5 (combined), junior division, and senior division. Certificates of participation will be provided to every student. Students will pick up their certificates when they place their projects on March 2. The medals and sweepstakes trophies will be presented during the awards ceremony on March 3. 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.

2. 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 SEF judging process.

3. Judges of the Riverside County SEF shall select projects, in keeping with state and county criteria, determine a recommendation for advancement to advanced levels of competition in other fairs including:
   - California State Science and Engineering Fair (CSSEF) for grades 6-12
   - National Broadcom Masters competition for grades 6-8
   - 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 3.

4. **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 the 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 and a copy should be brought with student to the RCSEF.

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 non-human 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 submitted with student application packet.

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 kept on file with student researcher, rather than submitted with student application packet. Information is not to be shared unless requested by Fair officials.

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.

Risk Assessment Form (RCSEF Form 8)

- Required for projects involving potentially hazardous biological agents, chemicals, hazardous devices, drones, firearms, explosives and projectiles, radiation, biofuels, tobacco, alcohol, and controlled substances.
- Required for projects involving live vertebrate animals (dogs, cats, fish, rats, hamsters, horses, and birds are a few common examples of vertebrate animals).
- Required for projects involving human subjects and/or interviewees.
- Required for projects involving human and other vertebrate animal tissue (including teeth and hair roots), blood, blood products, and body fluids.

Appendix

2020 Riverside County Science and Engineering Fair Student Application
Page 1 of 3 *(RCSEF Form 1)*

I, (student name, please print) _____, now a student at
First MI Last

_____in grade_____, (_____)_____
School Name Parent/Guardian Phone Number

_____
Parent E-Mail Address Student E-Mail Address

Phonetic Spelling of Student's Name _____

Division (check one): ☐ Elementary (Gr. 4-5) ☐ Junior (Gr. 6-8) ☐ Senior (Gr. 9-12)

hereby requests participation in the 2019 Riverside County Science and Engineering Fair to be held:

March 2-3, 2020 – Riverside Convention Center, 3637 Fifth Street, Riverside
Judging – March 2, 2020; Awards Ceremony, Project Removal – March 3, 2020

My parent or guardian, whose signature is shown below, and I, hereby agree to follow the competition rules and will accept the interpretations and decisions made by the Riverside County Science and Engineering officials. By signing this request, this student and parent/guardian expressly grant authority to, and indicate consent to, the release of educational information about, or relative to, the participation of this student in county, state, or national competition activities. Such information shall include, but not be limited to, the release of photographs, competition results, the reproduction of sound, motion pictures, or videotape recordings, etc. The Riverside County Superintendent of Schools shall have the right to reproduce, use, display, and disseminate in such manner as it sees fit, without obligation of any kind to any person, the efforts resulting from competition activities.

As stated in California Education Code Section 35330, my parent or guardian and I understand that we waive all claims against the Riverside County Superintendent of Schools ("Superintendent"), Riverside County Office of Education, Riverside County Board of Education, its officers, agents and employees for any injury, accident, illness, or death occurring during or by reason of this field trip or excursion, including acts of negligence by the Superintendent, its officers, agents or employees.

I have read the Riverside County Science and Engineering Fair Regulations and Information packet and confirm that all work submitted is the result of the current academic school year. I understand that if rules are violated, I will be disqualified.
I understand that projects not removed on March 3 prior to or immediately following the awards ceremony will be discarded.

_____ _____
Signature of Student Date

_____ _____
Name of Parent Signature of Parent/Guardian *(if student under age 18)*

_____ _____
Name of Teacher Teacher E-Mail Address

_____ _____
Name of District/Affiliate Fair Coordinator Signature of District/Affiliate Fair Coordinator

Student Name:

Is your project a continuation of a previous year's study?

☐ No ☐ Yes *If yes, complete Continuation of Research Form (RCSEF Form 2) and submit with registration.*

Did you complete your project with a university, hospital, or outside institution other than your school?

☐ No ☐ Yes *If yes, complete Certification of Professional Research Support Form (RCSEF Form 3) and submit with registration.*

Does project involve live vertebrate animals?

☐ No ☐ Yes *If yes, complete Certification of Humane Treatment of Live Vertebrate Animals Form (RCSEF Form 4) and submit with registration.*

Does project involve human subjects?

☐ No ☐ Yes *If yes, complete Certification of Compliance of Research Involving Human Subjects Form (RCSEF Form 5) and submit with registration. Participant Informed Consent Form (RCSEF Form 6) are not submitted but kept on file with student throughout course of Fair. Information is not to be shared unless requested by Fair officials.*

Does project involve human or other vertebrate animal tissue?

☐ No ☐ Yes *If yes, complete Human and Vertebrate Animal Tissue Form (RCSEF Form 7) and submit with registration.*

Does your project display require electricity?

☐ No ☐ Yes

Does your project display require more height than the standard table?

☐ No ☐ Yes *(if yes, a suitable floor area will be provided, but out of numeric sequence and may not be placed with the category table projects.)*

Type of Entry (check one)

☐ Individual ☐ Group *(if group, list all group member names)*

_____
Name

_____
Name

_____
Name

Project Title *(limit of 120 characters)*

Preferred Category

Project category MUST be included. If assistance is needed selecting appropriate category, contact kgoodly@rcoe.us. It is important correct category is identified so that project is judged by appropriate judges. If category is left blank, student and parent agree that the review committee will make the category assignment based on the abstract provided. Please check appropriate category.

Indicate with check mark (√) which category you are selecting.

Check √	Project Category
	01 – Animal Sciences
	02 – Behavioral & Social Sciences
	03 – Biochemistry
	04 – Health & Biomedical Sciences
	05 – Cellular & Molecular Biology
	06 – Chemistry
	07 – Computational Biology & Bioinformatics
	08 – Earth & Environmental Sciences
	09 – Embedded Systems
	10 – Energy: Chemical & Physical
	11 – Engineering Mechanics
	12 – Environmental Engineering
	13 – Materials Science
	14 – Mathematics
	15 – Microbiology
	16 – Physics & Astronomy
	17 – Plant Sciences
	18 – Robotics & Intelligent Machines
	19 – Systems Software

Abstract *(Must include Objectives/Goal, Methods/Materials, Results, Conclusions/Discussion – use additional sheet if necessary. Refer to page in rulebook for guidance of what must be included – 450 words maximum.)*

Summary Statement *(in one sentence, state what your project is about)*

Help Received Doing Project *(e.g., used lab equipment at university X under the supervision of Dr. Y; participant in NSF Young Scholars Program) (see regulation)*

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

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 that 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

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 *(leave blank if home address)*		
Institution Phone *(leave blank if home phone)*		

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 *(leave blank if home address)*		
Institution Phone *(leave blank if home phone)*		

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

THIS FORM IS TO BE COMPLETED BY STUDENT AND CERTIFIED BY TEACHER/ADVISOR.
Form should be submitted with student registration packet.

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 that 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 much 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 *(explain why human subjects are proposed for the experimentation):*	
Describe and assess any potential risk *(physical, psychological, social, legal, or other):*	
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)

This form must be kept on file by student. Every participant involved in the research must complete Form 6. Students should keep forms throughout the course of the Fair. Information is not to be shared unless requested by Fair officials.

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

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

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 listed 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

RCSEF Risk Assessment Form
(RCSEF Form 8)

The purpose of the Risk Assessment Form is to determine the level of risk a student researcher(s) will encounter during the experiment. Every study has risks – many of them are minimal. Any study that uses human subjects, animals, bacteria, or other microorganisms, or involves dangerous chemicals, activities, or devices must have a very detailed risk assessment section. Complete the questions below explaining how you will conduct your experiment. This form will determine what further forms or safety precautions will need to be met to move forward with your project.

Name of Student:_____

Project Title: _____

To be completed by the Student Researcher(s) in collaboration with Teacher/Advisor/Qualified Scientist:
(All questions must be answered; additional page(s) may be attached.)

List all chemicals, activities, or devices that will be used; identify any use of microorganisms, humans, and animals.
Identify and assess the risks involved in this project.
Describe the safety precautions and procedures that will be used to reduce the risks.
Describe the disposal procedures that will be used (when applicable).
List the source(s) of safety information.

Student Signature _____
Parent Signature _____
Teacher Signature _____

This sheet to be submitted by Affiliate Fair Coordinator.

RCSEF ALLOCATION SHEET MUST ACCOMPANY THE SUMMARY SHEET.

For your affiliate fair allocation sheet,
contact Kevin Goodly, kgoodly@rcoe.us

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					

This form may be duplicated, retyped giving the same information. Submit with all student registration forms. Deadline for submission: February 5, 2020

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: *(If group, include all student names)*	
Project Title:	
School:	
District:	
Division:	☐ Elementary (Gr. 4-5) ☐ Junior Division (Gr. 6-8) ☐ Senior Division (Gr. 9-12)