RIVERSIDE COUNTY OFFICE OF EDUCATION
EDWIN GOMEZ, Ed.D. | County Superintendent of Schools

2025–2026 RIVERSIDE COUNTY SCIENCE AND ENGINEERING FAIR (RCSEF)

Regulations Handbook

For fair information, contact:
Yadira Chavelas, Administrator
ychavelas@rcoe.us
(951) 826-6570

For technical/SRC/IRB information, contact:
Yamileth Shimojyo, Administrator
sciencefair@rcoe.us
(951) 249-8800

The RCSEF is an affiliate of the California Science and Engineering Fair (CSEF) and the International Science and Engineering Fair (ISEF). These RCSEF rules and regulations are in accordance with the CSEF, ISEF Rules and Regulations, and California Education Code.

Revision date:
November 2025

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AFFILIATED FAIR COORDINATOR TIMELINE

DATE	TIMELINE
Wednesday, September 3, 2025	Intent to Participate Form Deadline
Monday, February 2, 2026	Registration Materials Deadline Includes: zFairs Account Creation, Affiliate/District Summary Sheet, Allocation Sheet, and Registration Fee Form Due
Monday, February 9, 2026	Projects due in zFairs
Friday, February 27, 2026	**Riverside County Science and Engineering Fair** RCSEF Project Set-up and Interviews/Judging | 7:00 a.m. - 5:00 p.m. Riverside Convention Center, 3637 Fifth Street, Riverside
Saturday, February 28, 2026	**Riverside County Science and Engineering Fair** RCSEF Public Viewing | 9:00 a.m. - 12:00 p.m. Awards Ceremony | 12:00 p.m. Riverside Convention Center, 3637 Fifth Street, Riverside
TBD	California Science and Engineering Fair Location TBD
Saturday-Friday, May 9-15, 2026	International Science and Engineering Fair Phoenix, Arizona

AFFILIATED FAIR ALLOCATIONS

- The RCSEF 2025–2026 Affiliated Fair Allocations is based on the California Basic Educational Data System (CBEDS) total district enrollment by grade level number. The allocation information for the 2026 RCSEF competition is from CBEDS data available from the previous 2024–2025 school year indicating the total student population per affiliate fair.
- The formula used to calculate affiliate fair allocations is as follows:
    - 1 allocation per 1,000 students (school districts that have an enrollment of more than 7,001 students).
    - Allocation for student enrollment from 7,000 - 3,001 students is 7.
    - Allocation for student enrollment for 3,000 - 1 student(s) is 5.
- Each Affiliated Fair of the RCSEF has an additional (+2) allocation to support Riverside County (RC) home school students and RC students whose home local educational school district (LEA) does not participate in the RCSEF as a registered affiliate fair.

If a school district requests additional allocation allotments based upon CDE posted Data Quest enrollment numbers, or chooses to decrease its allotments for any reason, a request must be submitted via email to Yadira Chavelas, ychavelas@rcoe.us, no later than Friday, December 5, 2025.

Allocations 2025–2026

Source: CA Department of Education, DataQuest Enrollment

https://dq.cde.ca.gov/dataquest/page2.asp?level=District&subject=Enrollment&submit1=Submit

RCSEF DIVISION	ALLOCATION FORMULA	AFFILIATED FAIR	ALLOCATIONS
Division 1	1 allocation per 1,000 students with school enrollment of more than 7,001 students.	• Corona-Norco Unified School District • Riverside Unified School District • Moreno Valley Unified School District • Temecula Valley Unified School District • Desert Sands Unified School District • Hemet Unified School District • Murrieta Valley Unified School District • Palm Springs Unified School District • Lake Elsinore Unified School District	49 38 30 27 25 22 21 20 21
Division 2	1 per 1,000 students with school enrollment of more than 7,001 students.	• Val Verde Unified School District • Jurupa Unified School District • Alvord Unified School District • Beaumont Unified School District • Coachella Valley Unified School District • Menifee Union School District • Perris Union High School District • San Jacinto Unified School District • Springs Charter School	19 17 16 19 16 13 11 11 7
Division 3	Fairs with student enrollment from 7,000 – 3,001 students are allotted 7 projects.	• Banning Unified School District • Mission Vista Academy • Palo Verde Unified School District • Perris Elementary School District • Romoland School District	7 7 7 7 7
Division 4	Fairs with student enrollment from 3,000 – 1 student(s) are allotted 5 projects	• California School of the Deaf • Chammakilawish Pechanga School • Christian Heritage • Crossroads Christian • Desert Center Unified School District • Desert Christian Academy • Highland Academy Charter School • Hillcrest Academy • Immanuel Lutheran • Notre Dame High School • Nuview Union School District • Our Lady of Perpetual Help • Rancho Christian School • RCOE High School • REACH Leadership STEAM Academy • Sacred Heart School • San Jacinto Valley Academy • Santa Rosa Academy • St. Catherine's of Alexandria • St. Edward Catholic School • St. Francis de Sales School • St. Hyacinth Academy • St. James Catholic School • St. Jeanne de Lestonnac School • St. Theresa School • Sycamore Academy of Science and Cultural Arts • Temecula Preparatory Academy • Learning Tree Center • Woodcrest Christian School	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

RCSEF reserves the right to combine divisions, if the number of enrolled projects is less than 50% of the projected enrollment.

GENERAL REQUIREMENTS FOR ALL PROJECTS

APPLICATION DEADLINE

zFairs student registration will be open from Monday, December 1, 2025 – Monday, February 2, 2026.

All information must be completed accurately. Please include all applicable forms for your project.

Project forms and applications must be uploaded to zFairs by Monday, February 2, 2026.

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. Divisions are 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 represent the same affiliated fair.

PROJECT TITLES

Do not abbreviate your title unless necessary and write in title case (i.e.,- **Affects of Music and Mood**). Please avoid extremely long titles. Project titles can be different from your qualifying fair.

CERTIFICATIONS/FORMS

If your project involves the use of human or animal tissue(s), live vertebrate animals, or human subjects, you must complete the appropriate certification form(s) and include it in your application.

SIGNATURES

Both the student and parent/guardian must digitally sign and date the forms. The Affiliate Science and Engineering Fair District Coordinator must digitally sign and date, 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 ETHICS STATEMENT

Student researchers, as well as adults who take a role in the student project completion, 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 the project. The project should reflect independent research done by the student(s) and be presented in their own words with proper citations. The presentation of fraudulent data, the evidence of plagiarism, or the inappropriate use of AI are prohibited and grounds for the project to fail to qualify.

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).

PLAGIARISM, RESPECT FOR CONFIDENTIALITY AND INTELLECTUAL PROPERTY

Confidential communication, 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 student researcher(s) and the adults involved to protect the environment and its organisms from harm.

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 Rs: replace, reduce, refine, respect.

HUMAN PARTICIPANT PROTECTION

The highest priority is the health and well-being of the student researchers and human participants.

POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS (PHBAS)

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.

SAFETY

All projects involve some amount of risk. Everyone is expected to recognize the hazards, assess the risks, minimize them, and prepare for emergencies.

**Scientific fraud and misconduct are not condoned at any level of research or competition. This includes plagiarism, forgery, use or presentation of other researchers' work as one's own, and fabrication of data. A violation of this ethics statement may result in disqualification from participating in ISEF and ISEF-affiliated fairs and forfeiture of any awards, prizes, and acknowledgment received.

RCSEF officials reserve the right to revoke recognition of a project subsequently found to have been fraudulent.

RCSEF CODE OF CONDUCT

Attending the Riverside County Science and Engineering Fair is an opportunity to be part of a regionally diverse community. The ability to ask questions, share ideas, exchange thoughts, and provide feedback is integral to the experience and must be done within the following guidelines. The Riverside County Office of Education is dedicated to providing a positive and harassment-free experience for everyone regardless of age, gender, gender identity and expression, sexual orientation, disability, personal appearance, ethnicity, race, religion, nationality, or level of scientific knowledge. We will not tolerate harassment of event participants in any form.

As a participant of the RCSEF, I agree to:

- Be respectful of differing viewpoints and experiences and to be collegial and respectful in any questions or comments I post or share.
- Be responsible in listening, viewing, or reading carefully before commenting.
- Be thoughtful and civil and will provide constructive feedback.
- Be in compliance with the RCSEF harassment policy (above).
- Accept the judging process, student project interpretations, and award decisions of our RCSEF volunteer judges as final.
- In this format, I recognize that harassment includes cyberbullying, trolling, the use of bad language, sexually explicit language or imagery, political attacks, racist language or imagery, personal attacks, and posts that demean, insult, threaten or belittle you/your work. I recognize my responsibility to report any such harassment by others in good faith of healthy discourse. Report any incident to the RCSEF staff by emailing Yadira Chavelas, ychavelas@rcoe.us.

I have read and understand the above rules and agree to adhere to them to the best of my ability. I understand that failure to meet these standards may result in being removed from the event and banned from future events.

Disclaimer

1. The RCSEF does not claim to monitor every communication or the conduct of every attendee.
2. The RCSEF will work swiftly to promptly remove content which is reported as being in breach of this Code of Conduct.
3. The RCSEF does not endorse any opinions expressed by attendees.
4. The RCSEF reserves the right, at its sole discretion, to remove material at any time.

RCSEF ELIGIBILITY/LIMITATIONS

1. Each affiliated fair may send to the RCSEF the number of projects provided by their affiliation agreement.

2. A student must be selected by an affiliated fair, and meet the grade criteria:
   a. Grades 4-5 to participate in the Elementary Division.
   b. Grades 6-8 to participate in the Junior Division.
   c. Grades 9-12 to participate in the High School Division.

3. Each student is only allowed to enter one project. That project may include no more than 12 months of continuous research and may not include research performed before 2025.

4. Team projects must have no more than three members. Teams competing at RCSEF must be composed of members who all meet RCSEF eligibility.

5. Students may only compete in one affiliated fair.

6. Projects that are demonstrations, 'library' research or informational projects, 'explanation' models, or kit building are not appropriate for the RCSEF.

7. All STEM disciplines are represented at the RCSEF and projects compete in one of the 22 categories.

8. A research project may be a part of a larger study performed by professional scientists, but the project presented by the student must be only their own portion of the complete study.

9. Only affiliated fairs whose main campus resides within Riverside County, has a current legal charter approved by a Riverside County local educational agency (LEA), or has an RCOE supported charter are eligible to participate in the RCSEF competition.

10. Students may participate in the RCSEF if their home address is within Riverside County, CA, and attend a registered affiliate fair within Riverside County, CA.

11. Students currently registered and attending a Riverside County, CA public school, charter school, or private school are eligible to participate in the RCSEF competition.

REQUIREMENTS

GENERAL

1. All students competing in the RCSEF-affiliated fair must adhere to all rules as set forth in this document.
2. All projects must adhere to the Ethics Statement on page 5.
3. It is the responsibility of the student and the Adult Sponsor to evaluate the study to determine if the research will require forms and/or review and approval prior to experimentation.
4. Projects must adhere to local, state, and U.S. federal laws, regulations, and permitting conditions. In addition, projects conducted outside the U.S. must also adhere to the laws of the country and jurisdiction in which the project was performed.
5. The use of non-animal research methods and alternatives to animal research are strongly encouraged and must be explored before conducting a vertebrate animal project.
6. Introduction or disposal of non-native, genetically-altered, and/or invasive species (e.g., insects, plants, invertebrates, vertebrates), pathogens, toxic chemicals, or foreign substances into the environment is prohibited. It is recommended that students reference their local, state, or national regulations and quarantine lists.
7. Projects competing at the RCSEF must have an exhibit that adheres to RCSEF Display & Safety requirements and is visible during all operable hours of the exhibit hall without reliance on electricity or internet connections.
8. All projects must adhere to the requirements of the affiliated fair(s) in which it competes to qualify for participation in RCSEF. Affiliated fairs may have additional restrictions or requirements. Knowledge of these requirements is the responsibility of the student and Adult Sponsor.

APPROVAL AND DOCUMENTATION

1. Project documentation should begin before experimentation with the current forms available. Projects involving human participants, vertebrate animals, and potentially hazardous biological agents must be reviewed and approved by a local or regional Institutional Review Board (IRB) or Scientific Review Committee (SRC) prior to the start of experimentation. At the start of the project, which may in some cases be prior to experimentation begins, a local or regional Institutional Review Board (IRB) or Scientific Review Committee (SRC) with the RCSEF-affiliated fair must review and approve most projects involving human participants, vertebrate animals, and potentially hazardous biological agents. Note: If a project involves the testing of a student designed invention, prototype, or concept by a human, an IRB review and approval may be required prior to experimentation. See Human Participants Rules for details.
2. Every student must complete the RCOE Student Application Form, Student Checklist (Form 1A)/Research Plan, and Approval (Form 1B) and review the project with the Adult Sponsor in coordination with completion by the Adult Sponsor of the Checklist for Adult Sponsor (Form 1).
3. A Qualified Scientist (Form 2) is required for all studies involving Biosafety Lab-2 (BSL-2) potentially hazardous biological agents and DEA-controlled substances and is also required for many human participant studies and many vertebrate animal studies.
4. After initial IRB/SRC approval (if required), any proposed changes in the Student Checklist (Form 1A)/Research Plan must be approved before laboratory experimentation/data collection resumes.
5. Projects which are continuations of a previous year's work and which require IRB/SRC approval must undergo the review process with the current year Research Plan prior to experimentation/data collection for the current year.

6. Any continuing project must document that the additional research is new and different. [Continuation Projects (Form 7)].
7. 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 Regulated Research Institutional/Industrial Setting (Form 1C) must be completed and displayed at the project booth.
8. After experimentation, each student or team must submit a (maximum) 250-word, one-page Abstract Template which summarizes the current year's work. The Abstract is located in the zFairs portal.
9. A project research notebook is required and research papers are not required, but are strongly recommended for judging purposes. Local fairs may require a research notebook.
10. All signed forms, certifications, and permits must be available for review by all regional, state, national, and international affiliated fair SRCs in which the student(s) participate. This review must occur after experimentation and before competition.
11. Digital signatures must have a verification system via login and have a time and date stamp to indicate this authentication.
12. Paperwork submitted to the Riverside County Office of Education for the RCSEF must be submitted via the online zFairs portal.

CONTINUATION OF RESEARCH PROJECTS

1. As in the professional world, research projects may build on work performed previously. A valid continuation project is a sound scientific endeavor. Students will be judged only on laboratory experiment/data collection performed over 12 continuous months beginning no earlier than January 2025 and ending May 2026.
2. Any project based on the student's prior research could be considered a continuation/ research progression project. These projects must document that the additional research is a substantive expansion from prior work (e.g., testing a new variable or new line of investigation). Repetition of previous experimentation with the same methodology and research question, even with an increased sample size, is an example of an unacceptable continuation.
3. The display board and abstract must reflect the current year's work only. The project title displayed in the finalist's booth may mention years (for example, "Year Two of an Ongoing Study"). Previous year's data books, research papers, and supporting documents may be at the booth if properly labeled as such.
4. Longitudinal studies are permitted as an acceptable continuation under the following conditions:
   a. The study is a multi-year study testing or documenting the same variables in which time is a critical variable. Examples: Effect of high rain or drought on soil in a given basin, return of flora and fauna in a burned area over time.
   b. Each consecutive year must demonstrate time-based change.
   c. The display board must be based on collective past conclusionary data and its comparison to the current year data set. No raw data from previous years may be displayed.
5. All projects must be reviewed and approved each year and forms must be completed for the new year.
6. NOTE: For competition in the RCSEF, the Continuation Projects (Form 7) is required for projects in the same field of study as a previous project. This form must be displayed at the project booth. Retention of all prior years' paperwork is required and must be presented to the RCSEF SRC upon request.

TEAM PROJECTS

1. Team projects compete and are judged in the category of their research at the RCSEF. All team members must meet the eligibility requirements for the RCSEF.
2. Teams must have no more than three members. A team with members from different geographic regions/affiliated fairs may compete at an affiliated fair of one of its members, but not at multiple fairs. However, each affiliated fair holds the authority to determine whether teams with members outside of a fair's geographic territory are eligible to compete, understanding that if the team wins the right to attend the RCSEF, all team members' expenses must be supported by the fair.
   a. Team membership cannot be changed during a given research year unless there are extenuating circumstances and the local SRC reviews and approves the change, including converting a team project to an individual project or vice versa. Such conversions must address rationale for the change and include a clear delineation between research preceding the change and that which will follow. A memorandum documenting this review and approval should be attached to Form 1A.
   b. Once a project has competed in a science fair at any level, team membership cannot change and the project cannot be converted from an individual project to a team project or vice versa.
   c. In a future research year, any project may be converted from an individual to a team project, from a team to an individual project and/or have a change in team membership.
3. Each member of the team should be able to serve as spokesperson, be fully involved with the project, and be familiar with all aspects of the project. The final work should reflect the coordinated efforts of all team members and will be evaluated using the same judging criteria as individual projects.
4. Each team member must submit an RCOE Student Application Form and Approval (Form 1B). Team members must jointly submit the Checklist for Adult Sponsor (Form 1), one Abstract, a Student Checklist (Form 1A)/ Research Plan and other required forms.
5. Full names of all team members must appear on the Abstract and Forms.

RESTRICTED/PROHIBITED PROJECTS BY DIVISION

R Restricted Project Pre-Approval Required **X Prohibited Project**

A restricted and/or prohibited project is deemed so by state and federal safety laws.
Red font denotes SRC/IRB pre-approval.

PROJECT CONSIDERATION	ELEMENTARY DIVISION Grades 4-5	JUNIOR DIVISION Grades 6-8	SENIOR DIVISION Grades 9-12	RESTRICTED DETAILS
Blood Products	X	X	R	*Student does not physically handle blood of another person or vertebrate animal. *Student may handle their own blood, tissue or other bodily fluids.
Fresh Human Tissue	X	R	R	*Student may work with a medical professional/ expert who can physically handle blood or bodily fluids of other individuals or vertebrate animals and run the needed analysis to PROVIDE the data to the student researcher. *Fresh human tissue/bodily fluids from unknown origin are not recommended for use. *Fresh human tissue/bodily fluids should be free from disease.
Bodily Fluids	X	R	R	
Pathogenic Agents (Fungi/Mold/Bacteria/ Viruses/Parasites)	X	R	R	*Projects involving bacteria/mold growth are allowed only at school sites under supervision or under the supervision of a Qualified Scientist at a Regulated Research Institution (RRI).
Recombinant DNA	X	X	R	*Senior Division investigation under the supervision of a Qualified Scientist at a Regulated Research Institution (RRI) only. *All Recombinant DNA research must be carried out in accordance with the latest NIH Guidelines for Research Involving Recombinant DNA Molecules. The facilities to be used must be described in the research proposal.
Carcinogenic, Mutagenic and Potentially Toxic Chemicals and Fumes	X	X	R	*Senior Division investigation under the supervision of a Qualified Scientist at a Regulated Research Institution (RRI) only.

PROJECT CONSIDERATION	ELEMENTARY DIVISION Grades 4-5	JUNIOR DIVISION Grades 6-8	SENIOR DIVISION Grades 9-12	RESTRICTED DETAILS
Flammable Chemicals OR Gases	X	R	R	*Student researcher may work with a Qualified Scientist to handle and complete the investigation/ chemical analysis to PROVIDE the raw data to the student researcher. *For help on chemical use, "The Science Safety Handbook for California Public Schools" (2014 edition) downloadable at: https://drive.google.com/file/d/18-pZQ-b4zgomTyM-IQs4wLQ2fzJOi1aW/view?usp=sharing.
Controlled Substances	X	R	R	*Controlled substances (drugs, chemicals, anesthetics, narcotics, etc., the use of which is regulated by the Comprehensive Drug Abuse Preventionand Control Act of 1970) must be acquired and used in accordance with existing local, state and federal laws. Contact a pharmacist or write the State Department of Health for information about these laws.
Consumable Alcohol	X	X	X	*Research projects may not 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). *Research projects involving vaping products or any aspect of the product are prohibited. *Research projects involving smokeless powder or black powder are prohibited.
Tobacco or Tobacco Products	X	X	X	*Research projects may not 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). *Research projects involving vaping products or any aspect of the product are prohibited. *Research projects involving smokeless powder or black powder are prohibited.
Vaping or Any Vaping Products	X	X	X	
Smokeless Powder or Black Powder	X	X	X	
Explosives	X	X	X	*The manufacture of rocket fuel and/or alcohol/ other intoxicants or gasohol (or the production of these) are prohibited. * Projects involving firearms and/or explosives are not allowed.

ENGINEERING AND INVENTION PROJECTS

Use this information to help determine the requirements of Engineering Projects and potential areas that will require pre-approval and/or extra safety precautions. This guide to Engineering & Invention Projects has been developed as an additional resource and provides a series of questions to consider as you begin and design an engineering or invention project.

ENGINEERING AND INVENTION PROJECT CHECKLIST

Consider the answers to the questions below. If the response is yes, then the project may fall under more specific rules and those sections of the Rules & Guidelines.

Hazardous Chemicals, Activities, and Devices
Will your project involve any of the following:

- DEA-Controlled Substances
- Firearms and Explosives
- Prescription Drugs
- Alcohol & Tobacco
- Regulated Drones
- Radiation

Device Testing With Human Participants

- Are you going to test your projects (device, app, invention, prototype, etc.)? If yes, does it require persons to interact with it other than yourself or adult sponsor/supervisor?
- Do you intend to gather background knowledge through a survey or interviews to understand the potential use and needs for your project design?
- Are you going to ask for opinions or suggestions on your project design at any point of the project?
- Does your project intend to gather personal data or have a health benefit to the user?

Vertebrate Animals

- Does your project include any interaction with vertebrate animals in any phase of the project? If yes, please refer to the full Vertebrate Animal Rules.

Potentially Hazardous Biological Agents

- Does your project include any collection, examination, or handling of microorganisms and/or fresh or frozen tissue, primary cell cultures, blood, blood products, or body fluids?
- Are you going to culture or isolate any substance, known or unknown? If yes, please refer to the full Potentially Hazardous Biological Agent Rules.

2026 RCSEF JUDGING CRITERIA

The following evaluation criteria are used for judging at the RCSEF. As shown below, science, engineering and robotics/mathematics/computer science projects have different criteria. Each has five sections as well as scoring elements for each section. Each section includes key items to consider for evaluation both before and after the interview.

Students are encouraged to design their posters in a clear and informative manner to allow pre-interview evaluation and to enable the interview to become an in-depth discussion. Judges should examine the student documentation and, if present, any special forms such as Form 1C (Regulated Research Institutional/ Industrial Setting) and Form 7 (Continuation of Projects). Considerable emphasis is placed on two areas: ***Creativity and Presentation***, especially in the ***Interview*** section, and are discussed in more detail below.

Creativity: A creative project demonstrates imagination and inventiveness. Such projects often offer different perspectives that open up new possibilities or new alternatives. Judges should place emphasis on research outcomes when evaluating creativity.

Presentation/Interview: The interview provides the opportunity to interact with the finalists and evaluate their understanding of the project's basic science, interpretation and limitations of the results and conclusions.

- If the project was done at a research or industrial facility, the judge should determine the degree of independence of the finalist in conducting the project, which is documented on Form 1C.
- If the project was completed at home or in a school laboratory, the judge should determine if the finalist received any mentoring or professional guidance.
- If the project is a multi-year effort, the interview should focus ONLY on the current year's work. Judges should review the project's abstract and Form 7 (ISEF Continuation Projects) to clarify what progress was completed this year.
- Please note that both team and individual projects are judged together, and projects should be judged only on the basis of their quality. However, all team members should demonstrate significant contributions to and an understanding of the project.

To Judge at the RCSEF

Students finalists overwhelmingly say that the most significant interactions that they have at the fair are with the judges. Likewise, judges find their discussions with these outstanding students to be positive and uplifting experiences. We encourage you to volunteer your time to support these young scientists and engineers and to be inspired!

By volunteering, you can play an important role in encouraging these students to become the future science and engineering leaders of tomorrow.
A RCSEF Judge must have one of the following qualifications:

- Have a minimum of six years related /field experience beyond receiving their B.A., B.S., or Master's degree, **OR**
- Have a Ph.D., M.D., or equivalent (D.O., Ed.D., D.D.S., D.V.M., etc.), **OR**
- Is a current graduate student with more than four years of doctoral-level research experience or who is within one year of doctoral dissertation defense.
- Is a current graduate student who has been recommended by their major professor/faculty member.
- Judges may include university faculty and scientists, industrial engineers and scientists, representatives of private and federal research centers and agencies, medical researchers, post-doctoral fellows, and graduate students.

Affiliated science fair coordinators and elementary or secondary school teachers are NOT eligible to serve as RCSEF judges.

2026 RCSEF AWARDS FOR PARTICIPATION

The most valuable aspect of the Riverside County Science and Engineering Fair provides the opportunity for students to meet and share experience with judges possessing similar interests.

Merit-based awards: A maximum of two gold champion medals, a maximum of five silver medals, and a maximum of 5 bronze medals will be awarded in each category for grade 4 and 5 (combined), junior division, and senior division projects.

One sweepstakes trophy will be awarded to a student in grades 4 and 5 (combined), junior division, and senior division.

Certificates of participation will be provided to every student.

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.

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 RCSEF judging process.

1. In keeping with state and county criteria, add will determine a recommendation for advancement to advanced levels of competition in other fairs including:
   - California Science and Engineering Fair (CSEF) for grades 6-12.
   - Thermo Fisher Scientific Junior Innovators Challenge for grades 6-8.
   - International Science and Engineering Fair (ISEF) for grades 9-12.

   Projects to receive a recommendation for advancement to the next level of competition and/or medal winners will be announced during the awards ceremony.

2. Judges of the RCSEF shall select projects.

3. All judging decisions are final and are not subject for appeal.

ADVANCING COMPETITIONS

Advancing to the California Science & Engineering Fair: Students with entries advancing to the state competition will need to attend the County-to-State Meeting to receive information regarding the California Science & Engineering Fair. The meeting will be held immediately following the awards ceremony. The Riverside County Office of Education will pay the registration fee for students advancing from the Riverside County Science & Engineering Fair to the California Science & Engineering Fair. Students advancing to a State or National competition must contact their district coordinator regarding travel and lodging arrangements.

Advancing to the Thermo Fisher Scientific Junior Innovators Challenge - Students with entries advancing to the Thermo Fisher Scientific Junior Innovators Challenge will need to attend a County meeting to receive information regarding the Thermo Fisher Scientific Junior Innovators Challenge. The meeting information will be provided immediately following the awards ceremony. The Riverside County Office of Education will pay the registration fee for students advancing to the Thermo Fisher Scientific Junior Innovators Challenge. Students advancing to the Thermo Fisher Scientific Junior Innovators Challenge competition must contact their district coordinator regarding travel and lodging arrangements.

Advancing to the International Science and Engineering Fair - Students representing the Riverside County Office of Education at the International Science & Engineering Fair will be provided a $2,000.00 stipend to the district of the Regional winner, to be used for the winner and chaperone's travel to attend the ISEF. Travel arrangements will be arranged by the winning student's school/school district.

THE STUDENT RESEARCHER(S)

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

- Completing all required forms.
- Enlisting the aid of any required supervisory adults (Adult Sponsor, Qualified Scientist, etc.).
- Following the rules and guidelines of the RCSEF, 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 protocols, data analysis, proper safe disposal, and any other process or procedures related to the project.
- Understanding and abiding by the Ethics Statement and attesting to this understanding of the RCSEF Student Application Form.

To avoid conflict of interest, no Adult Sponsor, parent, or other relatives 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

QUALIFICATIONS

- An Adult Sponsor may be a teacher, parent, professor, and/or other professional scientist.
- Should be knowledgeable in the area of student 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.
- Should have close contact with the student throughout the timeline of the project.

RESPONSIBILITIES

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 Student Checklist (Form 1A)/Research Plan to ensure that:
  - » Experimentation follows local, state, and federal laws and RCSEF rules.
  - » Forms are completed by other required adults.
  - » Any required Qualified Scientist meets the criteria as set forth in the RCSEF Rules and Guidelines.
  - » The student's research is eligible for entry in the RCSEF.

THE QUALIFIED SCIENTIST

QUALIFICATIONS

- Earned a doctoral/professional degree in a scientific discipline related to a student's area of research **and/or**:
  - » Individual with extensive experience and expertise in the student's area of research.
  - » Must be thoroughly familiar with the following regulations that govern the student's area of research including all local, state, federal and if applicable, non-U.S. national 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.

RESPONSIBILITIES

The Qualified Scientist is responsible for:

- 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 which may include the Regulated Research Institutional Setting (Form 1C), the Qualified Scientist (Form 2) and the Risk Assessment Form (Form 3), when applicable.

THE DESIGNATED SUPERVISOR

QUALIFICATIONS

- 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 for the project.
- If the project involves the use of vertebrate animals (where behavior/habitat is influenced by humans), must be knowledgeable about the humane care and handling of the animals.

RESPONSIBILITIES

- Providing direct supervision of the student experimentation.
- Completing the required documentation — the Designated Supervisor box on the Qualified Scientist (Form 2) when applicable.
- Reviewing and completing the Risk Assessment (Form 3) when needed.

THE INSTITUTIONAL REVIEW BOARD (IRB) AND THE SCIENTIFIC REVIEW COMMITTEE (SRC)

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 review 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 local affiliated fair level to evaluate human research projects. If necessary, the RCSEF 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 Human Participants (Form 4) 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 centers, 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 pre-college student and adheres to RCSEF rules.

An IRB is responsible for assessing risk and documenting the determination of risk level on Human Participants (Form 4). However, in reviewing projects just prior to a fair, if the SRC serving at that level of competition judges an IRB's decision as 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.

REGULATED RESEARCH INSTITUTIONS/ INDUSTRIAL SETTINGS REVIEW COMMITTEES (RRI)

Regulated Research Institution: A Regulated Research Institution within the U.S. is defined as a professional research/teaching institution that is regularly inspected by the USDA and is licensed to use animals covered by the Animal Welfare Act and may also be subject to U.S. Public Health Service Policy. Also included are all federal laboratories such as National Institutes of Health, Veteran's Affairs Medical Centers, and the Centers for Disease Control. In addition, pharmaceutical and biotechnology companies and research institutions that utilize research animals that are not covered by the Animal Welfare Act but have an operational Institutional Animal Care and Use Committee and are in compliance with U.S. federal laws are included in this definition. For projects conducted outside of the United States, a Regulated Research Institution would be a comparable research institution that adheres to country laws governing the care and use of vertebrate animals.

Certain areas of research conducted in a regulated research institution or an industrial setting require review and approval by federally mandated committees that have been established at that institution.
These committees include:

- Institutional Animal Care and Use Committee (IACUC); Animal Care and Use Committee (ACUC); Animal Ethics Committee
- Institutional Review Board (IRB); Human Subjects Participant Program (HSPP)
- Institutional Biosafety Committee (IBC)
- Embryonic Stem Cell Research Oversight Committee (ESCRO)
- Safety Review Committee

THE RCSEF SCIENTIFIC REVIEW COMMITTEE (RCSEF SRC)

All projects are reviewed by the RCSEF Scientific Review Committee prior to competition. The RCSEF SRC is the final arbiter of the qualification of students to participate in the RCSEF. Before the fair, committee members review research plans and all required forms to confirm that applicable RCSEF rules have been followed. The RCSEF SRC may request additional information from students prior to the fair or may interview potential RCSEF participants to ensure that they qualify to compete.

The RCSEF SRC, like an Affiliated Fair SRC, is made up of adults knowledgeable about research regulations. In addition to the review of all projects at the RCSEF, committee members answer questions about the rules throughout the year from students and teachers. The RCSEF SRC can be contacted at sciencefair@rcoe.us.

COMBINED SRC/IRB COMMITTEE

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

RCSEF 2026 FORMS

These forms serve as written documentation of what will occur-or, in some cases, what has already occurred-in a student research project. They are designed to provide key information needed to review each project for compliance with RCSEF rules, as well as applicable laws and safety regulations.

New in 2026: Elementary Division-specific forms are now available to better support young student researchers. These age-appropriate planning tools help guide students through the research process while ensuring their projects meet all safety requirements and rule compliance.

All students must complete the following forms:

- RCSEF Student Application
- Form 1: Checklist for Adult Sponsor
- Form lA: Student Checklist/Research Plan
- Form 1B: Approval
- RCSEF Abstract
- Form 3: Risk Assessment (recommended)

Junior & Senior Division only: additional forms may be required depending on the scope of the project:

- Form lC: Regulated Research Institutional/Industrial Setting
- Form 2: Qualified Scientist
- Form 3: Risk Assessment
- Form 4: Human Participants
- Sample Informed Consent Form
- Form SA: Vertebrate Animal (school, home, or field site)
- Form SB: Vertebrate Animal (regulated research institution)
- Form 6A: Potentially Hazardous Biological Agents
- Form 6B: Human and Vertebrate Animal Tissue
- Form 7: Continuation Projects

Forms can be accessed here: Science & Engineering Fair or here:
Local SRC/IRB in Support of the RCSEF I Riverside County Office of Education

Rules Wizard
ruleswizard.societyforscience.org

All forms are integrated into zFairs. When a student account is created, questions about the project will determine and prompt the necessary forms on the student's dashboard.

2026 RCSEF FORM SUMMARY TABLE

FORM NAME	FORM NUMBER	FORM DESCRIPTOR
RCOE Student Application Form		Application to participate in the Riverside County Science and Engineering Fair.
Student Checklist/ Research Plan Instructions	1A	This form is required for ALL projects. A complete Research Plan is required for ALL projects and must accompany Student Checklist (1A).
Approval	1B	A completed form is required for each student, including all team members.
Checklist for Adult Sponsor	1	This completed form is required for ALL projects.
Regulated Research Institutional/Industrial Setting	1C	This form must be completed AFTER experimentation by the adult supervising the student research either virtually or on site, conducted in a regular research institution, industrial setting or any work site other than home, school or field.
Qualified Scientist	2	May be required for research involving human participants, vertebrate animals, potentially hazardous biological agents, and hazardous substances and devices. Must be completed and signed before the start of student experimentation.
Risk Assessment	3	Must be completed before experimentation. May be required for projects involving Hazardous Chemicals, Materials or Devices or Potentially Hazardous Biological Agents; recommended for all projects.
Human Participants	4	Required for all research involving human participants not at a Regulated Research Institution. If at a Regulated Research Institution, use institutional approval forms for documentation or prior review and approval. (IRB approval required before recruitment or data collection.)
Vertebrate Animal	5A	Required for all research involving vertebrate animals that is conducted in a school/ home/field research site. (SRC approval required before experimentation.)
Vertebrate Animal	5B	Required for all research involving vertebrate animals that is conducted at a Regulated Research Institution. (IACUC approval required before experimentation. Form must be completed and signed after experimentation.)
Potentially Hazardous Biological Agents	6A	Required for research involving microorganisms, rDNA, fresh/frozen tissue (including primary cell lines, human and other primate established cell lines and tissue cultures), blood, blood products and body fluids. SRC/IACUC/IBC approval required before experimentation.
Human and Vertebrate Animal Tissue	6B	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 ensure that the proper human or animal forms are completed. All projects using any tissue listed above must also complete form 6A.
Continuation Projects	7	Required for projects that are a continuation/progression in the same field of study as a previous project. This form must be accompanied by the previous year's abstract and Research Plan.

HUMAN PARTICIPANTS

The following rules were developed to help 6th–12th grade student researchers adhere to the 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, educational, 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, birth date, 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., day care setting, doctor's office).
  - » Involve the recording of personally identifiable information.

1. Student researchers must complete ALL elements of the Human Participants portion of the Research Plan Instructions and evaluate and minimize the physical, psychological, and privacy risks to their human participants. Students are prohibited from disclosing results or data from their study to the human participants.
2. Student research involving human participants must be reviewed and approved by an Institutional Review Board (IRB) before any interaction (e.g., recruitment, data collection) with human participants may begin. It is the responsibility of the IRB 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. All human participant studies involving minors (students under 18 years of age) must receive assent from the student participant and written parental permission from a legal guardian.
   a. Projects that are conducted at school, at home or in the community that are not affiliated with a Regulated Research Institution (RRI) must be reviewed and approved by the school/local IRB before the student may begin recruiting and/or interacting with human participants. The school/local IRB must assess the risk and document its determination of risk on Human Participants (Form 4).
   b. 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.
   c. When working with a facility where participants live or attend programming (e.g. retirement home, daycare, prison, etc.) written approval from the facility must be obtained as well as informed consent for the individual participants.
3. The student must comply with all determinations made by the school or RRI IRB before beginning any interaction with human participants (e.g., recruitment, data collection).
   a. If the IRB requires a Qualified Scientist (Form 2), it must be completed by the QS before any interaction with human participants. The school/local IRB will review this completed form before approving the project.
   b. If the IRB requires a Human Participants (Form 4), it must be completed before any interaction with human participants. The school/local IRB will review this completed form before approving the project.
   c. See rule #4 below regarding required procedures for obtaining informed consent/assent and/or parental permission.
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.

   The school/local IRB will determine whether the consent/assent/ parental permission may be a) verbal or implicit or b) must be written.
   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 on page 19.

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. 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.

   b. This healthcare provider/professional must be named in the research plan/ protocol approved by the 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 (Form 2) 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.

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 SRC will review for compliance with all rules.

12. The following forms are required:

    a. RCOE Student Application Form.

    b. Checklist for Adult Sponsor (Form 1), Student Checklist (Form 1A)/Research Plan, and Approval (Form 1B).

    c. Human Participants (Form 4) or IRB approval form from an RRI and all applicable consents and survey(s).

    d. Regulated Research Institution (Form 1C), when applicable.

    e. Qualified Scientist (Form 2), when applicable.

    f. Risk Assessment (Form 3), when applicable.

IRB WAIVER OF WRITTEN INFORMED CONSENT/ PARENTAL PERMISSION

The IRB may waive the requirement for documentation of written informed consent/assent/parental permission if the research involves only minimal risk and anonymous data collection and if it is one of the following:

1. Research involving normal educational practices.
2. Research on individual or group behavior or characteristics of individuals where the researcher does not manipulate the participants' behavior and the study does not involve more than minimal risk.
3. Surveys, questionnaires, or activities that are determined by the IRB to involve perception, cognition, or game theory, etc. and that do NOT involve gathering personal information, invasion of privacy, or potential for emotional distress.
4. Studies involving physical activity where the IRB determines that no more than minimal risk exists and where the probability and magnitude of harm or discomfort anticipated in the research are not greater than those ordinarily encountered in DAILY LIFE or during performance of routine physical activities.

If there is any uncertainty regarding the appropriateness of waiving written informed consent/assent/ parental permission, it is strongly recommended that documentation of written informed consent/assent/ parental permission be obtained.

HUMAN PARTICIPANT INVOLVEMENT IN STUDENT-DESIGNED INVENTION, PROTOTYPE, COMPUTER APPLICATION, ENGINEERING/DESIGN PROJECTS, & PRODUCT TESTING

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

1. IRB review and pre-approval is required when the student-designed invention, prototype, application, etc. is tested by human participants other than the student researcher(s) or single adult guardian/ adult sponsor/QS/DS when the testing requires an adult tester. This includes surveys conducted regarding potential use, review of the invention or consumer product, and/or opinions regarding the project/product.
2. Human participants testing of an invention, prototype, or project that involves a medical diagnosis or intervention (as defined by the FDA or Medical Practices Act) must adhere to Rule 6 of the Human Participant Rules regarding prohibition of medical procedures and must be supervised by a health care professional with appropriate credentials and specialization in the area of medical diagnosis or intervention being studied.
3. A Risk Assessment (Form 3) is required for all projects that involve human participant testing of any project involving student-designed inventions, prototypes, or consumer products.

EXEMPT STUDIES/PROJECTS
(DO NOT REQUIRE IRB PRE-APPROVAL OR HUMAN PARTICIPANTS 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 3) 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.
    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 has been appropriately de-identified before being given to the student researcher and are in compliance with all privacy and HIPAA laws.
    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 & IRB RESOURCES

Use this information to determine the level of risk involved in a study involving human participants.

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 by a potential participant 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**
    a. Exercise other than ordinarily encountered in everyday life.
    b. The 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.
    c. Exposure to any potentially hazardous material.

2. **Examples of Greater Than Minimal Psychological Risk**
    a. 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**
    a. 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:
        i. 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.).
        ii. 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.

GUIDELINES FOR ONLINE SURVEY CONSENT PROCEDURES

Online surveys require an Informed Consent (from human research participants age 18 and older) and Minor Assent (from participants under age 18). Additionally, minor participants will require documentation of Parental Permission.

1. All information required in a consent form (e.g., voluntary nature of participation, what participation entails, risks, etc.) must be presented to the participants before they begin the survey.

   Due to privacy risks inherent in online research, the following statement or something similar should be included:

   a. *There is always the possibility of tampering from an outside source when using the internet for collecting information. While the confidentiality of your responses will be protected once the data are downloaded from the internet, there is always a possibility of hacking or other security breaches that could threaten the confidentiality of your responses. Please know that you are free to decide not to answer any question.*

2. The survey should be set up in a way that the potential participant must click on a 'button' or type in a response indicating that he/she/they has read the consent/assent information (as described in 1 above) and agrees to participate. Once the 'button' is selected, the potential participant will be directed to the research survey questionnaire. That is, the survey questions are not viewed by the participant until he/she/they clicks on or types in a response to indicate his/her/their voluntary participation.

3. The following procedures should be used to protect confidentiality of downloaded data:
   a. If IP addresses are collected by the survey tool, the addresses should be deleted from the downloaded data file. All responses should then be deleted from the online survey. The resulting data file that is used for data analysis should be free of any identifiers, including IP addresses or other electronic identifiers.
   b. The data file should be stored on a password protected computer. Any back up data files should also be stored in a secure location.

Documented Parental Permission

The following are several ways to obtain documented/written parental permission prior to a minor participant completing a survey online after recruiting participants in person.

1. A traditional, hard copy of the parental permission/consent form may be sent to or brought to the parent who will review and possibly sign it, if giving permission for a minor child to participate. This permission form will be returned to the researcher and the participant may complete the survey online with a computer provided by the researcher (such as at school).
2. A traditional, hard copy of the parental permission/consent form may be sent to or brought to the parent for review. If the parent signs the form and returns it, the parent will be given a link for the minor participant to complete the online survey,
3. Parental consent may be obtained using valid electronic signatures and emailed to the researcher, after which the researcher can email the link to the parent for the online survey.
4. A copy of a signed permission document may be scanned and emailed back to the researcher, after which the researcher can email the link to the parent for the online survey.

If the recruiting of participants is going to be done online, it is recommended that an existing survey platform be utilized that can contact potential participants anonymously. It should have an informed consent embedded in the survey and that will restrict participants to those 18 years of age and older.

BEHAVIORAL & SOCIAL SCIENCES RESEARCH INVOLVING HUMAN PARTICIPANTS: GUIDANCE IN RISK ASSESSMENT & RISK REDUCTION

The purpose of this guide is to assist student researchers, teachers/mentors and local School IRBs to assess and reduce risk as they design and review research projects so that the rights and welfare of human participants are protected. The complete human participants rules and guidelines can be found in the International Rules and Guidelines or on the Society for Science & the Public's website at www.societyforscience.org/isef/international-rules.

This document contains information on the following topics:

A. Introduction to Risk Assessment and Risk Reduction
B. Types of Risks and Suggestions for Reducing Risk
1. Physical Risks
2. Psychological Risks
3. Risks Due to Invasion of Privacy & Breach of Confidentiality
4. Risk Groups

C. Informed Consent
D. Online Studies
E. Examples of Research Studies with Suggested IRB Decisions
F. Additional Resources

A. Introduction to Risk Assessment and Reduction and the Role of the IRB

Risk Assessment involves the consideration of **physical** and **psychological** risks along with the **protection of privacy**. The student researcher, adult sponsor and qualified scientist must develop procedures that reduce and minimize any risks to human participants.

It is the responsibility of the members of the IRB to thoroughly review the Research Plan and collectively decide whether to approve the project, request revisions to the methodology/require more oversight (e.g., QS) to reduce risk to participants, or to determine that the project is not appropriate for student research. Members of the IRB will collaboratively make the following determinations which are documented on Human Participants Form 4:

- Whether the study contains no more than minimal risk or more than minimal risk (see definitions below) to potential participants. The IRB will consider characteristics (e.g., age, health status, vulnerability to coercion) of the study population, the specific risks (e.g., physical, psychological, social, privacy) associated with the research activity and local norms when making a risk level determination.
- Whether documentation of informed consent can be waived.
- Whether a qualified scientist is required.
- Finally, whether the study is a) approved as it is written, b) must be revised or c) is not appropriate for a student research project (due to level of risk to the student researcher and/or participants). **The IRB will sign Form 4 only if the project is approved.**

No more than minimal risk exists when the probability and magnitude of harm or discomfort anticipated in the research are not greater than those ordinarily encountered in daily life or during performance of routine physical or psychological examinations or tests. Research projects considered no more than minimal risk typically involve anonymous data collection (i.e., the data/responses cannot be linked to a particular person). In summary, physical, psychological or possibility of sharing a person's private information must be very small to be considered no more than minimal risk.

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.

B. Types of Risk

1) Physical Risks

a. **Exercise** other than ordinarily encountered in daily life by that participant would be considered more than minimal risk. One must consider characteristics of potential research participants as well as the type of exercise involved in the study.

Examples:

- Walking the length of standard hallway.
  - For most healthy participants, this activity could be considered "minimal risk."
  - For the elderly or someone recovering from knee surgery, this might be considered "more than minimal risk."
- Swimming 500 meters.
  - For the general population, this activity would be considered "more than minimal risk."
  - For members of the varsity high school swim team, some IRBs may consider this activity to be "no more than minimal risk."

b. **Ingestion, tasting, smelling, application of a substance** that pose any health risk are considered "more than minimal risk." Ingestion or tasting projects that involve commonly available food or drink will be evaluated by the IRB who will determine risk level based upon the nature of study and local norms around food typically encountered in the research setting. For example:
   - Some school IRBs may consider a tasting study minimal risk based on the fact that the food being studied is commonly available to all students in their school.
   - Conversely, an IRB at another school may deem the same study more than minimal risk if the food being studied is not commonly available to students or they believe that parents in their community would want to provide parental permission before their minor child could participate in the study.

2) Psychological Risks

A research activity (e.g., survey, questionnaire, viewing of stimuli) or experimental condition that could potentially result in **emotional stress** would be considered **more than minimal risk.** For example, answering questions related to personal experiences such as sexual or physical abuse, experiences of trauma and/or psychological well-being (e.g., depression, anxiety, suicide) must be considered more than minimal risk and should have documented informed consent/minor assent/parental permission (as applicable). **A licensed mental health professional must be on the IRB reviewing these types of projects.**

Additionally, research activities that involve exposing participants to stimuli or experimental conditions that could potentially result in emotional stress must also be considered more than minimal risk. Examples include violent or distressing video images, distressing questions, materials or activities that could potentially result in feelings of depression, anxiety, or low self-esteem in participants.

Reducing Risk Associated with Emotional Distress: Care must be taken to try to reduce potential emotional distress. For example, to reduce risk in a study involving a survey about depression and suicide, a mental health professional should be made available to talk with students while they are completing the survey.

3) Risks Due to Invasion of Privacy & Breach of Confidentiality

The student researcher and the IRB must consider whether any activity could potentially result in negative consequences for the participant due to **invasion of privacy or breach of confidentiality**. For example, if the study involved collecting a student's GPA and the data were accidentally made available to unauthorized persons, the research participant could suffer embarrassment and feelings of distress related to the invasion of his privacy. Research projects that collect information of a personal nature (e.g., weight, private family information such as divorce, income, opinions about sensitive topics, sexual or gender, orientation, thoughts about suicide) put research participants at risk related to possible disclosure of personal information to others. Adults and student researchers must consider the ramifications of anyone (including the student researcher) becoming aware of a research participant's personal information. Breach of confidentiality can be especially complicated and problematic when a student researcher is collecting data from his/her peers at school. Adults and student researchers need to anticipate the possibility of inadvertent breach of confidentiality in the context of collecting data from known peers.

Reducing Risk:

Risk level can be reduced by appropriately protecting confidentiality or collecting data that is anonymous and uses data collection procedures that make it impossible to link any identifying information with his/her responses or data.

a. **Anonymity** involves collecting research data in such a way that it is impossible to connect research data (e.g., responses, questionnaires) with the individual who provided the data. That is, personal identifiers (e.g., names, birthdates, student ID number, social security numbers) are not collected. **Whenever possible, student researchers should collect data anonymously.** While collecting data anonymously does reduce risk, not all anonymous studies are considered minimal risk.
   - To collect data anonymously, student researchers must not require participants to give their name or any other identifiable information (birthdate, email address, etc.).
   - Adults and student researchers need to anticipate challenges to anonymous data collection. For example, if a student researcher collects data from known peers that includes both personal, sensitive information and demographic, personal information (e.g., sports they are involved in, favorite band), it is possible that the student researcher could inadvertently deduce who a given participant is based on the demographic data, even if names are not collected. It is recommended that a professional researcher with experience in the field research be consulted and named as a qualified scientist when data collection involves sensitive and personal topics.
   - If documented informed consent, assent, and/or parental permission is/are required, the forms must always be kept in a secure location separate from the data.

b. **Confidentiality** is necessary when personal identifiers such as name, birthdate, telephone number, photograph, email address or mailing/street address are collected.
   - Protecting confidentiality involves taking careful measures to ensure that the research data and/or responses are not disclosed to the public or unauthorized individuals with identifiable information.
   - Confidentiality must also be considered when research activities involve collection of personal information (e.g., history of abuse, drug use, opinions, fingerprints, emotional functioning, grades) or health-related data (genetic material, blood, urine, tissue). The IRB reviewing a project involving sensitive mental or physical health issues, must consider the appropriateness of the study as a student research project with regards to the mental welfare of the human participants, especially if minors are involved.

If the research involves data from the same participant on multiple occurrences, the data or survey would need to be labeled with an identifier to be linked with the data collected at a later date. In this case, confidentiality could be maintained by labeling the surveys or data with a participant number and keeping a list of names and participant numbers in a separate and secure (e.g., locked file cabinet, password protected computer) location. Once the second round of data is collected, the surveys/data may be matched using the participant number and any identifiers should be removed from the data/surveys. At this point, the list of names and participant numbers should be securely discarded (e.g., shred). If documented informed consent, assent, and/or parental permission is/are required, the forms must be kept in a secure location separate from the data.

Special Considerations:

Threats to Anonymity

- If the number of participants is relatively small and/or all participants are from an identifiable source (e.g., an English class, softball team), the anonymity of the data could be threatened. That is the student researcher or anyone with access to the data could potentially link the survey responses to an individual. In addition, presenting the results of the study (even in aggregate) could threaten the participants' privacy or result in negative consequences for the participants.
- If informed consent/assent/parental permission forms (which include names) are collected and the sample is relatively small, it could be possible for the student researcher or an unauthorized person to link the survey responses with participants.

Making Data Anonymous

- Sometimes data may not be collected anonymously, but can be made anonymous after data collection. For example, if the student researcher uses interviews or observations to collect the data, the data would not be anonymous at the time of collection. However, if names are not collected or are removed from the data soon after collection, the data set would then be anonymous.

Risks Related to Threats to Anonymity

- Be sure to consider any ramifications of the student researcher being able to link responses with participants. Most importantly, would there be any negative consequences for the research participants if the student researcher could link responses with the participants. This is especially important when the research participants are peers to the researcher. When the participants are peers of the student researcher, the researcher/QS/IRB should give extra consideration to any potential risks related to the student researcher having knowledge of his/her peers' data (e.g., grades, body weight, etc.). To eliminate such risks, it may be prudent to have an adult collect the data and hand it over to the student research after identifiers are removed and it is anonymous.
- Be sure to consider the possibility of and ramifications of an unauthorized person (e.g., another student, parent, teacher, administrator) getting access to the data and being able to link responses to individual participants or groups of participants (e.g., softball team).
- Consider the nature of the study/data collected. Issues of anonymity and confidentiality are most salient for studies involving sensitive and personal information. Examples of data that should receive special consideration include grades, health/mental health information, experiences of child abuse, illegal behavior, socially unaccepted behavior, anything that could cause the participant embarrassment or legal or disciplinary negative consequences.

4) Risk Groups

As noted above, the physical, psychological and other risks of participation in a study may depend on the specific sample of participants involved. The physical risk of an activity such as jumping roping will be much higher for an elderly (or even middle-aged participant) than for a middle or high school participant. In contrast, the risks of a breach of confidentiality or anonymity would be greater for a group of high school students answering questions about alcohol use than for a group of older adults for whom it would be easier to collect the data in an anonymous fashion.

Some groups deserve special consideration. If the research study includes participants from any of the following groups described below, the student researcher and the IRB must consider whether the nature of the study requires consider special protections or accommodations for participants in these risk groups.

- Any member of a group that is naturally at-risk (e.g., pregnant women, mentally disabled persons, economically or educationally disadvantaged persons, individuals who suffer from a medical condition or disability such as cancer, asthma, diabetes, cardiac disorders, psychiatric disorders, learning disorders, etc.). The nature of the study is an important consideration when determining if special protections are required. For example, special protections would not typically be necessary to include pregnant women in a study involving performance on a cognitive test or completion of a simple survey.
- Special vulnerable groups that are covered by federal regulations (e.g., children/minors, prisoners, pregnant women, students receiving services under the Individuals with Disabilities Education Act). Specifically, the IRB and the student researcher should consider whether potential study participants who are receiving services under the Individual Disabilities Education Act need special accommodations and/or are appropriate for inclusion in the study as research participants. For example, an IRB may choose to require parental permission for minor participants receiving special education services even when parental permission has been waived for general education students. Confidentiality must be maintained so as not to identify/isolate students.

C. Informed Consent

Informed consent refers to the process of ensuring that potential human participants understand that they may choose whether or not to participate in a study. Individuals should never be forced or coerced to participate in a research study. A teacher, school administrator or anyone requiring students to participate in a research study as a human participant would be considered a serious violation of informed consent principles. That is, the research participant must freely decide to participate and not feel coerced or forced into doing so.

To make an informed decision about whether an individual wants to participate, the human participants must be informed about what they will be asked to do and if there are any risks or benefits involved. For example, if the participant will be asked to complete an interview or a survey, the nature of the survey should be described (e.g., questions about emotional functioning, students' experiences around divorce, grades and SAT scores). The informed consent process should include a description of the purpose of the study. The IRB may require a QS to help develop appropriate informed consent procedures which respect the rights of human participants but do not threaten the validity of the study.

Participants 18 years and older **must** be provided with all of the information mentioned above and give their **Informed Consent** before participating in a research study. If participants are under the age of 18, a parent or legal guardian must be presented with all of the information described above before giving **Parental Permission** for their minor child to participate. **Minor Assent** refers to procedures giving developmentally appropriate information to children and to adolescents about the study and giving them a choice as to whether or not they will participate. **High school students should be supplied with ALL of the information mentioned above and give their verbal and/or written assent to participate.**

Obtaining Written Informed Consent, Parental Permission or Minor Assent

An informed consent form is typically used to provide written information to the human participant or parent/guardian and to document written informed consent/parental permission/minor assent. This form typically includes the purpose of the study, what the participant will be asked to do, the nature of any surveys, questionnaires or interviews, any risks and any benefits to the participant. The form should also contain information that explains to the potential research participant or parent/guardian that participation in the study is voluntary and that the participant is free to stop participating at any time. The Informed Consent Form in the International Rules provides an example of how this information can be presented.

If a study involves a survey or a questionnaire, the Informed Consent process should include attaching a copy of the survey or questionnaire to the form. This process allows the parent to review the material to which their child will be exposed and make an informed decision about whether they want their child to participate. If sharing the survey is a violation of a copyrighted test publisher's regulations or has other consequences that will invalidate the study, the IRB will need to determine if a description of the survey to the parents is enough or if this will not properly inform the parents and the study will need to be deemed inappropriate for student research.

Waiver of Written Informed Consent/Parental Permission/Minor Assent

Obtaining informed consent from an adult or minor assent is always required. However, the IRB may waive the requirement for documentation of written informed consent if the research involves **only minimal risk and anonymous data collection and if it is one of the following:**

a) Research involving normal educational practices.

b) Research on individual or group behavior or characteristics of individuals where the researcher does not manipulate the participants' behavior and the study does not involve more than minimal risk.

c) Surveys and questionnaires that are determined by the IRB to involve perception, cognition, or game theory and do NOT involve gathering personal information, invasion of privacy or potential for emotional distress.

d) Studies involving physical activity where the IRB determines that no more than minimal risk exists and where the probability and magnitude of harm or discomfort anticipated in the research are not greater than those ordinarily encountered in DAILY LIFE or during performance of routine physical activities.

As explained above, informed consent/minor assent or parental permission is always required. It is merely the process of obtaining a signature to document informed consent/minor assent or parental permission that can be waived in the circumstances mentioned above. **If there is any uncertainty regarding the appropriateness of waiving written informed consent/assent or parental permission, it is strongly recommended that documentation of written informed consent/ parental permission be obtained. In addition, it is recommended that parental permission not be waived for minor participants who are younger than high school age.**

D. Examples of Research Studies with suggested IRB decisions.

Note: School IRBs have the prerogative to make more conservative decisions.

1) Student researcher wants to compare career choices between 10th, 11th and 12th graders.
    - *Minimal risk study:* Parental permission not required if data are collected anonymously and if participants are informed of voluntary nature and right to withdraw at any time.
2) Student wants to compare the amount of television and type of television shows viewed by boys and girls.
    - *Minimal risk study:* Parental permission not required if data are collected anonymously and if participants informed of voluntary nature and right to withdraw at any time.
3) Student researcher wants to examine the relationship between favorite restaurant and weight in high school students.
    - *More than minimal risk study:* Parental permission required because of emotional risks and impact on self-esteem associated with a student reporting on his/her weight. Even with parental permission, procedures for anonymous data collection should be used. Care should be taken to ensure that the student researcher is not able to link data with a particular participant.
4) Correlate television viewing with mood.
    - *Potentially more than minimal risk study:* Parental permission may be required depending on the nature of questions regarding mood. The IRB would want to consider how to handle participant reports of depressed or anxious mood. The IRB would also consider whether completing a questionnaire asking questions about mood is detrimental to participants who might be prone to depression? If so, parental permission would be required. The IRB might also require a school psychologist or counselor to be present to respond to any negative reactions by participants. Participants would then be told that a counselor is available to help participants deal with any negative reactions to the study.
5) A student wants to show his classmates an optical illusion graphic and compare the responses of boys and girls.
    - *Minimal risk study:* The IRB would want to consider the nature of the optical illusion. Would anyone find it offensive? If not and the data are collected anonymously, parental permission could be waived.
    - The student researcher must provide information to the research participants about what they will be asked to do, the voluntary nature of participation and their right to withdraw at any time.
6) Do students do better memorizing words while listening to Mozart or rock music?
    - *Potentially more than minimal risk study:* The IRB would first want to know exactly what music was to be used. What if the rock music had profanity? Who determines the definition of profanity - the most conservative parent?
    - If the IRB determines that the music might be offensive (even slightly) to someone, parental permission should be required. The consent form should describe the music to be presented and give parents the opportunity to hear the music if he or she requests.
    - If the IRB determines that the music would not be offensive to anyone and the data are collected anonymously, they may waive the requirement of documentation of informed consent. However, the student researcher must provide information to the research participants about what they will be asked to do, the voluntary nature of participation and their right to withdraw at any time.

7) Do students who have math class in the morning do better on a test of "simple" math problems than those who have math class in the afternoon?
    - *Potentially more than minimal risk study:* The IRB must determine the stress level associated with a "simple" math test. The committee might consult with both math teachers regarding the level of stress associated with the test for all students. If math teachers and IRB are comfortable with the "simple" math test not resulting in stress, the data are collected anonymously and the potential participants are not at risk for negative feelings related to the findings, the IRB could waive need for documentation of parental permission. However, some IRBs may require documentation of parental permission in this situation.
    - The student researcher must develop recruiting procedures that highlight that participation in the study is voluntary and that students can withdraw from the study at any time. Efforts must also be taken to ensure that students that do not want to participate must be able to decline participation inconspicuously.
8) Do children do better on a spelling test after listening to a certain type of music?
    - *Minimal risk:* The IRB should consider potential risks associated with whether some might find the music "offensive," or whether there is stress associated with taking a spelling test. Are there privacy and confidentiality issues?
    - If the music was deemed to be innocuous, parental permission could be waived.
    - *More than minimal risk:* The IRB, school principal or teacher should require parental permission due to any reservations they have about the impact of the project on the participants or parents' reaction to their child being part of a research project.
9) Student researcher wants to know how fast boys and girls can run upstairs. More than minimal risk: Documented parental informed consent required due to risk of injury. IRB might require safety precautions (e.g., a school nurse must be present, limit the distance of stairs to one flight).
10) Student researcher goes to the swim practice and times the swimmers as they are engaged in their regular swim practice (supervised by an adult coach).
    - *Minimal risk:* Student researcher is only observing. IRB may waive the need for parental permission because the swimmers are not being asked to do anything by the student researcher.
11) Student researcher asks members of the swim team to participate in her study in which they have to swim two laps. This occurs after swim practice or on a day in which there is not practice.
    - *Potentially more than minimal risk:* two possible options for IRB: 1) Require parental informed consent and require that a lifeguard present, 2) Instead of parental permission, the swim coach verifies that swim team members are capable and the coach and/or lifeguard are present. In either case, the research participant must be informed directly that participation is completely voluntary and that he/she is free to stop participating in the project at any time.
12) Student researcher wants to know if listening to rock music affects driving ability. He plans to test driving ability in the school parking lot with students driving their own cars around cones.
    - *More than minimal risk:* Requires documentation of parental permission for participants and multiple safety precautions, including direct supervision of the methodology by an adult. The IRB may also require documentation that the school principal is aware of and approved the study. While some school IRBs might approve this type of project, other IRBs (and school administrators) may not allow this project to be conducted because of safety and school liability issues.

13) Student researcher wants to know if listening to rock music affects driving ability. He plans to test driving ability with a video game.
    - *No more than minimal risk:* The IRB should listen to the proposed music and consider whether any parents would be take offense to the music. IRB would also want to consider the nature of the video game. IRB action may depend on the age of potential participants (e.g., 6th versus 12th graders).
    - Different IRBs may come to different conclusions or different courses of action. IRBs that decide to waive parental permission in such situations may wish to document that the study was reviewed and approved by a principal or administrator.

Additional Resources

https://research.medicine.umich.edu/our-units/institutional-review-boards-irbmed
Code of federal regulations for the protection of human participants.

http://www.hhs.gov/ohrp/irb/irb_guidebook.htm
A guide produced by Office for Protection of Research Risk (OPRR) of the US Department of Health and Human Services (HHS). This resource can be used by IRBs to help them with their review. Includes an extensive appendix of additional resources.

https://www.nih.gov/research-training/training-opportunities
A computer-based training course for new IRB members.

https://www.fda.gov/regulatory-information/search-fda-guidance-documents/informed-consent
A guide to informed consent from the Food and Drug Administration.

VERTEBRATE ANIMALS

The following rules were developed to help 6th–12th grade student researchers adhere to the federal regulations governing professional scientists and to protect the welfare of both animal subjects and the student researcher. Health and well-being is of high priority when students conduct research with animal subjects.

The society strongly endorses the use of non-animal research methods and encourages students to use alternatives to animal research, which must be explored and discussed in the research plan. The guiding principles for the use of animals in research include the following "Four Rs":

- Replace vertebrate animals with invertebrates, lower life forms, tissue/cell cultures, and/or computer simulations where possible.
- Reduce the number of animals without compromising statistical validity.
- Refine the experimental protocol to minimize pain or distress to the animals.
- Respect animals and their contribution to research. If the use of vertebrate animals is necessary, students must consider additional alternatives to reduce and refine the use of animals.

A project is considered a tissue study and not a vertebrate animal study if tissue is obtained from an animal that was euthanized for a purpose other than the student's project. (Use of tissues obtained from research conducted at a Regulated Research Institution requires a copy of an IACUC certification with the name of the research institution, the title of the study, the IACUC approval number, and date of IACUC approval.) In tissue studies, a student may observe the vertebrate study, but may not manipulate or have any direct involvement in the vertebrate animal experimental procedures.

Vertebrate animals, as covered by these rules, are defined as:

1. Live, nonhuman vertebrate mammalian embryos or fetuses.
2. Tadpoles.
3. Bird and reptile eggs within three days (72 hours) of hatching.
4. All other nonhuman vertebrates (including fish) at hatching or birth.
5. Cephalopods are to be treated as vertebrate animals. NOTE: A project is not considered a vertebrate animal study if tissue is obtained from an animal that was euthanized for a purpose other than the student's project. (See Tissue & Body Fluid Rules)
6. Students are prohibited from fishing with barbed hooks, live bait, or from performing electrofishing.

Exception: Because of their delayed cognitive neural development, zebrafish embryos are not considered vertebrate animals until 7 days (168 hours) post-fertilization.

RULES FOR ALL VERTEBRATE ANIMAL STUDIES

1. All vertebrate animal studies must have a research plan that includes:
    a. Justification why animals must be used, including the reasons for the choice of species, the source of animals, and the number of animals to be used; description, explanation, or identification of alternatives to animal use that were considered, and the reasons these alternatives were unacceptable; explanation of the potential impact or contribution this research may have on the broad fields of biology or medicine.
    b. Description of how the animals will be used. Include methods and procedures, such as experimental design and data analysis; description of the procedures that will minimize the potential for discomfort, distress, pain, and injury to the animals during the course of experimentation; identification of the species, strain, sex, age, weight, source, and number of animals proposed for use.
2. All vertebrate animal studies must be reviewed and approved before experimentation begins. An Institutional Animal Care and Use Committee, known as an IACUC, is the institutional animal oversight review and approval body for all animal studies at a Regulated Research Institution. The local or affiliated fair SRC serves in this capacity for vertebrate animal studies performed in a school, home, or field. Any SRC serving in this capacity must include a veterinarian or an animal care provider with training and/or experience in the species being studied.
3. Students performing vertebrate animal research must satisfy U.S. federal law as well as local, state, and country laws and regulations of the jurisdiction in which research is performed.
4. Research projects which cause more than momentary or slight pain or distress are prohibited. Any illness or unexpected weight loss must be investigated and a veterinarian consulted to receive required medical care. This investigation must be documented by the Qualified Scientist OR the Designated Supervisor, who is qualified to determine the illness. If the illness or distress is caused by the study, the experiment must be terminated immediately.
5. No vertebrate animal deaths due to the experimental procedures are permitted in any group or subgroup.
    a. Studies that are designed or anticipated to cause vertebrate animal death are prohibited.
    b. Any death that occurs must be investigated by a veterinarian, the Qualified Scientist, or the Designated Supervisor who is qualified to determine if the cause of death was incidental or due to the experimental procedures. The project must be suspended until the cause is determined and then the results must be documented in writing.
    c. If death was the result of the experimental procedure, the study must be terminated, and the study will not qualify for competition.
6. All animals must be monitored for signs of distress. Because significant weight loss is one sign of stress, weight must be recorded at least weekly with 15% being the maximum permissible weight loss or growth retardation (compared to controls) of any experimental or control animal. If weighing of animals cannot be done in a fashion that is safe for both the researcher and the animal, then an explanation and approval by an SRC or IACUC needs to be included in the research plan, as well as an alternative method(s) to address signs of distress. Additionally, body conditioning scoring (BCS) systems are available for most species of animals utilized in research and agriculture and are an objective method for assessing the overall health status of the research subject, with or without weight loss. A BCS system should be

included in the design of any study utilizing live vertebrate animals and results regularly recorded.

7. Students are prohibited from designing or participating in an experiment associated with the following types of studies on vertebrate animals:
    a. Induced toxicity studies with known toxic substances that could cause pain, distress, or death, including but not limited to, alcohol, acid rain, pesticides, or heavy metals or studies with the intent to study toxic effects of a substance on a vertebrate animal.
    b. Behavioral experiments using conditioning with aversive stimuli, mother/infant separation, or induced helplessness.
    c. Studies of pain.
    d. Predator/vertebrate prey experiments.
8. Justification is required for an experimental design that involves food or fluid restriction and must be appropriate to the species. If the restriction exceeds 18 hours, the project must be reviewed and approved by an IACUC and conducted at a Regulated Research Institution.
9. Animals may not be captured from or released into the wild without approval of authorized wildlife or other regulatory officials. All appropriate methods and precautions must be used to decrease stress. Fish may be obtained from the wild only if the researcher releases the fish unharmed, has the proper license, and adheres to state, local, and national fishing laws and regulations. The use of electrofishing is permissible only if conducted by a trained supervisor; students are prohibited from performing electrofishing.
10. A Qualified Scientist or Designated Supervisor must directly supervise all research involving vertebrate animals, except for observational studies.
11. After initial SRC approval, a student with any proposed changes in the Research Plan of the project must repeat the approval process before laboratory experimentation/data collection resumes.

ADDITIONAL RULES FOR PROJECTS CONDUCTED AT SCHOOL/HOME/FIELD

Vertebrate animal studies may be conducted at a home, school, farm, ranch, in the field, etc. This includes:

- Studies of animals in their natural environment.
- Studies of animals in zoological parks.
- Studies of livestock that use standard agricultural practices.
- Studies of fish that use standard aquaculture practices.

These projects must be reviewed and approved by an SRC in which one member is either a veterinarian and/or an animal care provider/expert with training and/or experience in the species being studied.

1. These projects must adhere to BOTH of the following guidelines:
   - » The research involves only agricultural, behavioral, observational, or supplemental nutritional studies on animals.

   AND

   - » The research involves only non-invasive and non-intrusive methods that do not negatively affect an animal's health or well-being.

   All vertebrate animal studies that do not meet the above guidelines must be conducted in a Regulated Research Institutions. See page 28.
2. Animals must be treated kindly and cared for properly. Animals must be housed in a clean, ventilated, comfortable environment appropriate for the species. They must be given a continuous, clean (uncontaminated) water and food supply. Cages, pens, and fish tanks must be cleaned frequently. Proper care must be provided at all times, including weekends, holidays, and vacation periods. Animals must be observed daily to assess their health and well-being. A Designated Supervisor is required to oversee the daily husbandry of the animals. Any of the following U.S. documents provide further guidance for animal husbandry:
   - Federal Animal Welfare Regulation
   - Guide for the Care and Use of Laboratory Animals
   - Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (Ag-Guide)
   - Quality Assurance Manuals (for the appropriate species)
3. The local or affiliated fair Scientific Review Committee must determine if a veterinarian's certification of the research plan and animal husbandry plans is required. This certification, as well as SRC approval, is required before experimentation and is documented on Vertebrate Animal (Form 5A). A veterinarian must certify experiments that involve supplemental nutrition, administration of prescription drugs, and/or activities that would not be ordinarily encountered in the animal's daily life.
4. If an illness or emergency occurs, the affected animal(s) must receive proper medical or nursing care that is directed by a veterinarian. A student researcher must stop experimentation if there is unexpected weight loss or death in the experimental subjects. The experiment can only be resumed if the cause of illness or death is not related to the experimental procedures and if appropriate steps are taken to eliminate the causal factors. If death is the result of the experimental procedure, the study must be terminated, and the study will not qualify for competition.
5. The final disposition of the animals must be described on Vertebrate Animal (Form 5A).
6. Euthanasia for tissue removal and/or pathological analysis is not permitted for a project conducted in a school/home/field site. Livestock or fish raised for food using standard agricultural/aquacultural production practices may be euthanized by a qualified adult for carcass evaluation.
7. The following forms are required:
   - RCOE Student Application Form.
   - Checklist for Adult Sponsor (Form 1), Student Checklist (Form 1A)/Research Plan, and Approval (Form 1B).
   - Vertebrate Animal (Form 5A).
   - Qualified Scientist (Form 2) when applicable.

ADDITIONAL RULES FOR PROJECTS CONDUCTED IN A REGULATED RESEARCH INSTITUTION

All studies not meeting the criteria on page 25 that are otherwise permissible under the RCSEF rules must be conducted in a Regulated Research Institution (RRI). A Regulated Research Institution within the U.S. is defined as a professional research/teaching institution that is regularly inspected by the USDA and is licensed to use animals covered by the Animal Welfare Act and may also be subject to U.S. Public Health Service Policy. Also included are all federal laboratories such as National Institutes of Health, Veteran's Affairs Medical Centers, and the Centers for Disease Control. In addition, pharmaceutical and biotechnology companies and research institutions that utilize research animals that are not covered by the Animal Welfare Act but have an operational Institutional Animal Care and Use Committee and are in compliance with U.S. federal laws are included in this definition. For projects conducted outside of the United States, a Regulated Research Institution would be a comparable research institution that adheres to country laws governing the care and use of vertebrate animals.

Some protocols permitted in a Regulated Research Institution are not permitted for participation in the RCSEF; adherence to RRI rules is necessary but may not be sufficient.

1. The Institutional Animal Care and Use Committee (IACUC) or the comparable animal oversight committee must approve all student research projects before experimentation begins. Such research projects must be conducted under the responsibility of a principal investigator. The local and regional SRC must also review the project to certify that the research project complies with the RCSEF Rules. This local and regional SRC review should occur before experimentation begins, if possible.
2. Student researchers are prohibited from performing euthanasia. Euthanasia at the end of experimentation for tissue removal and/or pathological analysis is permitted. All methods of euthanasia must adhere to current American Veterinarian Medical Association (AVMA) Guidelines.
3. Research projects that cause more than momentary or slight pain or distress to vertebrate animals that are not mitigated by approved anesthetics, analgesics, and/or tranquilizers are prohibited.
4. Research in nutritional deficiency or research involving substances or drugs of unknown effect is permitted to the point that any clinical sign of distress is noted. In the case that distress is observed, the project must be suspended and measures must be taken to correct the deficiency or drug effect. A project can only be resumed if appropriate steps are taken to correct the causal factors.
5. The following forms are required:
    a. RCOE Student Application Form.
    b. Checklist for Adult Sponsor (Form 1), Student Checklist (Form 1A /Research Plan, and Approval (Form 1B).
    c. Regulated Research Institution (Form 1C).
    d. Qualified Scientist (Form 2).
    e. Vertebrate Animal (Form 5B).
    f. Potentially Hazardous Biological Agents (Form 6A) – for all studies involving tissues and body fluids.
    g. Human and Vertebrate Animal Tissue (Form 6B) – for all studies involving tissues and body fluids.

Exempt Studies (Do Not Require SRC Pre-Approval)

1. Studies involving behavioral observations of animals are exempt from prior SRC review if ALL of the following apply:
    - There is no interaction with the animals being observed.
    - There is no manipulation of the animal environment in any way.
    - The study meets all federal and state agriculture, fish, game, and wildlife laws and regulations.

POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS

Students are permitted to do research projects with potentially hazardous biological agents meeting the conditions and rules described on the following pages which were designed to protect students and to ensure adherence to federal and international biosafety regulations and guidelines.

When dealing with potentially hazardous biological agents, it is the responsibility of the student and all of the adults involved in a research project to conduct and document a risk assessment on Form (6A) to define the potential level of harm, injury or disease to plants, animals, and humans that may occur when working with biological agents. The risk assessment determines a biosafety level which in turn determines if the project can proceed, and if so, the laboratory facilities, equipment, training, and supervision required.

All projects involving microorganisms, recombinant DNA technologies, and human or animal fresh/frozen tissues, blood, or body fluids must adhere to the rules below AND, depending on the study, to the additional rules in Section A, B, or C.

RULES FOR ALL STUDIES WITH 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. All studies involving the use of prions or prion-like proteins are prohibited. This includes studies working with amyloid-b (Ab), tau, a-synuclein, transactive response DNA-binding protein of 43 kDa, and amyloid fibrils.

2. An affiliated fair SRC, an IBC, or 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, and 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 at Biosafety Level 1 (BSL-1) must be conducted in a BSL-1 or higher laboratory. The research must be supervised by a trained 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. Research determined to be a Biosafety Level 2 (BSL-2) must be conducted in a laboratory rated BSL-2 or above and follow BSL-2 safety conditions throughout the study. (Commonly limited to a RRI).

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) must have a written justification for usage and be conducted at a Regulated Research Institution laboratory with a minimum of BSL-2 containment and documented IBC review and approval. Representative examples include, but are not limited to the following known agents: MRSA (Methicillin-Resistant *Staphylococcus aureus*), VISA/VRSA (Vancomycin Intermediate or Resistant *Staphylococcus aureus*), VRE (Vancomycin-Resistant *Enterococci*), CRE (Carbapenem Resistant *Enterobacteriaceae*), ESBLs (Extended Spectrum Beta-Lactamase producing gram negative organisms), and fungi (yeasts or molds) with known resistance to antifungal agents. Projects involving water samples collected from active Harmful Algal Blooms are considered BSL- 2 studies. Insect and arthropod vector-borne pathogens such as Malaria, Lyme, etc. are considered BSL-2 studies.

8. Insertion of antibiotic resistance markers for the clonal selection of bioengineered organisms is permitted, with the following exceptions:
    - Students are prohibited from the insertion of antibiotic-resistant traits or selection of organisms expressing traits that may affect the ability to provide effective treatment of infections acquired by humans, animals, or plants.
    - Students are prohibited from designing or selecting multiple drug resistant organisms (MDROs) to investigate the pathology, development, or treatment of antibiotic-resistant infections.

9. Extreme caution must be exercised when selecting and sub-culturing antibiotic-resistant organisms. Studies using such organisms, including BSL-1 organisms that may have originally been exempt from prior SRC approval, require at least BSL-2 containment.
10. The culturing of human or animal waste, including sewage sludge, is considered a BSL-2 study.
11. Naturally-occurring plant pathogens may be studied (not cultured) at home, but may not be introduced into a home/garden environment.
12. All potentially hazardous biological agents must be properly disposed of 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.
13. Any proposed changes in the Research Plan by the student after initial local or affiliated fair SRC approval must undergo subsequent SRC or IBC review and approval before such changes are made and before experimentation resumes.
14. The following forms are required:
    - RCOE Student Application Form.
    - Checklist for Adult Sponsor (Form 1), Student Checklist (Form 1A)/Research Plan, and Approval (Form 1B).
    - Regulated Research Institution (Form 1C) – when applicable.
    - Qualified Scientist (Form 2), when applicable.
    - Risk Assessment (Form 3), when applicable.
    - Potentially Hazardous Biological Agents (Form 6A), when applicable.
    - Human and Vertebrate Animal Tissue (Form 6B) – for all studies involving tissues and body fluids.

A. ADDITIONAL RULES FOR PROJECTS INVOLVING UNKNOWN MICROORGANISMS

Studies involving unknown microorganisms present a challenge because the presence, concentration, and pathogenicity of possible agents are unknown. In research projects, these studies typically involve the collection and culturing of microorganisms from the environment (e.g., soil, household surfaces, skin).

1. Research with unknown microorganisms can be treated as a BSL-1 study under the following conditions:
    - Organism is cultured in a plastic petri dish (or other standard non-breakable container) and sealed.
    - Experiment involves only procedures in which the petri dish remains sealed throughout the experiment (e.g., counting presence of organisms or colonies).
    - The sealed petri dish is disposed of via autoclaving or disinfection under the supervision of the Designated Supervisor.
2. If a culture container with unknown microorganisms is opened for any purpose, (except for disinfection for disposal), it must be treated as a BSL-2 study and involve BSL-2 laboratory precautions.

B. ADDITIONAL RULES FOR PROJECTS INVOLVING RECOMBINANT DNA (RDNA) TECHNOLOGIES

Studies involving rDNA technologies in which microorganisms, plants, and/or animals have been genetically modified require close review to assess the risk level assignment. Some rDNA studies can be safely conducted in a BSL-1 high school laboratory with prior review by a SRC.

1. All rDNA technology studies involving BSL-1 organisms and BSL-1 host vector systems must be conducted in a BSL-1 laboratory under the supervision of a Qualified Scientist or Designated Supervisor and must be approved by the SRC prior to experimentation. Examples include cloning of DNA in E. coli K-12, S. cerevisiae, and B. subtilis host-vector systems.
2. An rDNA technology study using BSL-1 agents that may convert to BSL-2 agents during the course of experimentation must be conducted entirely in a BSL-2 facility.
3. All rDNA technology studies involving BSL-2 organisms and/or BSL-2 host vector systems must be conducted in a Regulated Research Institution and approved by the IBC prior to experimentation.
4. Propagation of recombinants containing DNA coding for human, plant, or animal toxins (including viruses) is prohibited.
5. All genome editing studies that include alteration of germline cells, insertion of gene drives, use of rapid trait development systems (RTDS®), etc. should be categorized as a BSL-2 study and must be conducted at an RRI and approved by the IBC from the institution. Qualified scientists are expected to ensure that student research protocols address appropriate intrinsic and extrinsic containment precautions.
6. Introduction or disposal of non-native, genetically-altered, and/or invasive species (e.g., insects, plants, invertebrates, vertebrates), pathogens, toxic chemicals, or foreign substances into the environment is prohibited. Students and adult sponsors should reference their local, state, and national regulations and quarantine lists.

C. ADDITIONAL RULES FOR PROJECTS WITH TISSUES AND BODY FLUIDS, INCLUDING BLOOD AND BLOOD PRODUCTS

Studies involving fresh/frozen tissue, blood, or body fluids obtained from humans and/or vertebrates may contain microorganisms and have the potential of causing disease. Therefore, a proper risk assessment is required.

1. Research involving human and/or non-human primate established cell lines and tissue culture collections (e.g., obtained from the American Type Culture Collection) must be considered a BSL-1 or BSL-2 level organism as indicated by source information and treated accordingly. The source and/or catalog number of the cultures must be identified in the Research Plan.
2. If tissues are obtained from an animal that was euthanized for a purpose other than the student's project, it may be considered a tissue study.
    - Use of the tissues obtained from research at a Regulated Research Institution requires documentation of the IACUC approval for the original animal study.
    - Use of tissues obtained from agricultural/aquacultural studies require prior SRC approval.
3. If the animal was euthanized solely for the student's project, the study must be considered a vertebrate animal project and is subject to the vertebrate animal rules for studies conducted at a Regulated Research Institution. (See vertebrate animal rules.)
4. The collection and examination of fresh/frozen tissue and/or body fluids, (not including blood or blood products; see rule 7) from a non-infectious source with little likelihood of microorganisms present must be considered Biosafety level 1 studies and must be conducted in a BSL-1 laboratory or higher and must be supervised by a Qualified Scientist or trained Designated Supervisor.
5. The collection and examination of fresh/frozen tissues or body fluids or meat, meat byproducts, pasteurized milk, or eggs NOT obtained from food stores, restaurants, or packing houses may contain microorganisms. Because of the increased risk from unknown potentially hazardous agents, these studies must be considered biosafety level 2 studies conducted in a BSL-2 laboratory under the supervision of a Qualified Scientist.
6. Human breast milk of unknown origin, unless certified free of HIV and Hepatitis C, and domestic unpasteurized animal milk are considered BSL-2.
7. All studies involving human or wild animal blood or blood products should be considered at a minimum a BSL-2 study and must be conducted in a BSL-2 laboratory under the supervision of a Qualified Scientist. Known BSL-3 or BSL-4 blood is prohibited. Studies involving domestic animal blood may be considered a BSL-1 level study. All blood must be handled in accordance with standards and guidelines set forth in the OSHA, 29 CFR, Subpart Z. Any tissue or instruments with the potential of containing blood-borne pathogens (e.g., blood, blood products, tissues that release blood when compressed, blood contaminated instruments) must be properly disposed of after experimentation.
8. Studies of human body fluids, where the sample can be identified with a specific person, must have IRB review and approval, and informed consent.
9. Any study involving the collection and examination of body fluids which may contain biological agents belonging to BSL-3 or 4 is prohibited.

10. A project involving a student researcher using their own body fluids (if not cultured):
    - Can be considered a BSL-1 study.
    - May be conducted in a home setting.
    - Must have IRB review if the body fluid is serving as a measure of an effect of an experimental procedure on the student researcher (e.g., student manipulates diet and takes a blood or urine sample). An example of a project not needing IRB review would be collecting urine to serve as a deer repellent.
    - Must receive prior SRC review and approval prior to experimentation.
11. Studies involving embryonic human stem cells must be conducted in a Regulated Research Institution and reviewed and approved by the Embryonic Stem Cell Research Oversight (ESCRO) Committee.

Exempt Studies (no SRC pre-approval required)

The following types of studies are exempt from requiring SRC pre-approval as listed below, but may be subject to additional rules dependent upon the design of the project. Student researchers and adult sponsors are required to refer to sections A, B, and C of this section to review additional rules for projects that involve unknown organisms, recombinant DNA (rDNA) technologies, tissues, fluids, blood, or blood products before deciding upon a final biosafety level (BSL) designation for projects.

1. The following types of studies are exempt from prior SRC review, but require a Risk Assessment (Form 3):
    - Studies involving protists and archaea.
    - Research using manure for composting, fuel production, or other non-culturing experiments.
    - Commercially-available color change coliform water test kits. These kits must remain sealed and must be properly disposed of.
    - Studies involving decomposition of vertebrate organisms (such as in forensic projects).
    - Studies with microbial fuel cells.
2. The following types of studies involve BSL-1 organisms and are exempt from prior SRC review and require no additional forms:
    - Studies involving baker's yeast and brewer's yeast, except in rDNA studies.
    - Studies involving Lactobacillus, Bacillus thuringiensis, nitrogen-fixing, oil-eating bacteria, and algae-eating bacteria introduced into their natural environment. (Not exempt if cultured in a petri dish environment.)
    - Studies involving water or soil microbes not concentrated in media conducive to their microbial growth.
    - Studies of mold growth on food items if the experiment is terminated at the first evidence of mold.
    - Studies of slime molds and edible mushrooms.
    - Studies involving E. coli k-12 (and other strains of E. coli used solely as a food source for C. elegans) that are performed at school and are not subject to additional rules for recombinant DNA studies or use of antibiotic resistant organisms.

Exempt Tissues (no SRC pre-approval required)

1. The following types of tissue do not need to be treated as potentially hazardous biological agents:
    a. Plant tissue (except those known to be toxic or hazardous).
    b. Plant and non-primate established cell lines and tissue culture collections (e.g., obtained from the American Type Culture Collection). The source and/or catalog number of the cultures must be identified in the Research Plan.
    c. Human capillary/blood collection (i.e., finger stick) of the student researcher to themself; blood collection from any other human participants must be reviewed and approved by an IRB.
    d. Fresh or frozen meat, meat by-products, pasteurized milk, or eggs obtained from food stores, restaurants, or packing houses.
    e. Hair, hooves, nails, and feathers.
    f. Teeth that have been sterilized to kill any blood-borne pathogen that may be present.
    g. Fossilized tissue or archeological specimens.
    h. Prepared fixed tissue.

POTENTIALLY HAZARDOUS BIOLOGICAL AGENTS

Use this information to complete Potentially Hazardous Biological Agents (Form 6A).
Risk assessment defines the potential level of harm, injury, or disease to plants, animals, and humans that may occur when working with biological agents. The end result of a risk assessment is the assignment of a biosafety level which then determines the laboratory facilities, equipment, training, and supervision required.

Risk assessment involves:

1. Assignment of the biological agent to a risk group.
2. Studies involving a known microorganism must begin with an initial assignment of the microorganism to a biosafety level risk group based on information available through a literature search.
3. The study of unknown microorganisms and the use of fresh tissues relies on the expertise of the supervising adult(s).
4. Determination of the level of biological containment available to the student researcher to conduct the experimentation. (See “Levels of Biological Containment”, page 36, for details.)
5. Assessment of the experience and expertise of the adult(s) supervising the student.
6. Assignment of a biosafety level for the study based on risk group of biological agent, level of biological containment available, and the expertise of the Qualified Scientist or Designated Supervisor who will be supervising the project.
7. Documentation of review and approval of study prior to experimentation:
    a. If a study is conducted at a non-regulated site (e.g., school), the SRC reviews the Research Plan.
    b. If the study was conducted at a Regulated Research Institution, and was approved by the appropriate institutional board (e.g., IBC, IACUC), the SRC reviews the institutional forms provided and documents SRC approval Potentially Hazardous Biological Agents (Form 6A).
    c. If a PHBA study was conducted at a Regulated Research Institution but the institution does not require review for this type of study, the SRC must review the study and document approval on Potentially Hazardous Biological Agents (Form 6A) that the student received appropriate training and the project complies with the RCSEF rules.

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 contain 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 luteus, Neurospora crassa, and Bacillus subtilis.*

BSL-2 risk group contain 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, and Salmonella choleraesuis.*

BSL-3 risk group contain 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 contain 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.

TISSUE & BODY FLUID

Fresh/frozen tissue (including primary cell lines, human and other primate established cell lines and tissue cultures), blood, blood products and body fluids.

Studies involving fresh/frozen tissue, blood or body fluids obtained from humans and/or vertebrates may contain microorganisms and have the potential of causing disease and must receive the same considerations as potentially hazardous biological agents.

PROHIBITED STUDIES

1. Research projects involving known BSL-3 and BSL-4 blood are prohibited.
2. Any study involving the collection and examination of body fluids that may contain biological agents belonging to BSL-3 or BSL-4 is prohibited.

RULES

1. Research involving human and/or non-human primate established cell lines and tissue culture collections (e.g., obtained from the American Type Culture Collection) must be considered a BSL-1 or BSL-2 level organism as indicated by source information and treated accordingly.
2. If tissues are obtained from an animal that was euthanized for a purpose other than the student's project, it may be considered a tissue study.
    a. Use of tissues obtained from research conducted at a Regulated Research Institution requires a copy of the IACUC certification with the name of the research institution, the title of the study, the IACUC approval number and date of IACUC approval.
    b. Use of tissues obtained from agricultural/aquacultural studies require prior SRC approval.
3. If the animal was euthanized solely for the student's project, the study must be considered a vertebrate animal project and is subject to the vertebrate animal rules. (See vertebrate animal rules.:)
4. The collection and examination of fresh/frozen tissue and/or body fluids, (not including blood or blood products; see rule 7) from a non-infectious source with little likelihood of microorganisms present must be considered biosafety Level 1 studies and must be conducted in a BSL-1 laboratory or higher and must be supervised by a Qualified Scientist or trained Direct Supervisor.
5. The collection and examination of fresh/frozen tissues or body fluids or meat and meat by-products NOT obtained from food stores, restaurants, or packing houses may contain microorganisms. Because of the increased risk from unknown potentially hazardous agents, these studies must be considered biosafety level 2 studies conducted in a BSL-2 laboratory under the supervision of a Qualified Scientist.
6. Human breast milk of unknown origin, unless certified free of HIV and Hepatitis C, and domestic unpasteurized animal milk are considered BSL-2.
7. All studies involving human or wild animal blood or blood products, except those that only involve blood from student researcher(s) should be at a minimum a BSL-2 study done under the supervision of a Qualified Scientist. Studies involving domestic animal blood may be considered a BSL-1 level study. All blood must be handled in accordance with standards and guidelines set forth in the OSHA, 29CFR, Subpart Z. Any tissue or instruments with the potential of containing blood-borne pathogens (e.g. blood, blood products, tissues that release blood when compressed, blood contaminated instruments) must be properly disposed of after experimentation.
8. Studies of human body fluids, where the sample can be identified with a specific person, must have IRB review and approval, and informed consent.
9. A project involving a student researcher using their own body fluids (if not cultured)
    a. must receive prior SRC review and approval prior to experimentation
    b. can be considered a BSL-1 study
    c. may be conducted in a home setting

d. must have IRB review if the body fluid is serving as a measure of an effect of an experimental procedure on the student researcher (e.g. student manipulates diet and takes a blood or urine sample). An example of a project not needing IRB review would be collecting urine to serve as a deer repellent.

10. Studies involving embryonic human stem cells must be conducted in a Registered Research Institution and reviewed and approved by the ESCRO (Embryonic Stem Cell Research Oversight) Committee.

APPROVAL & DOCUMENTATION

1. Student researchers must have a Research Plan that includes all of the standard elements as well as the following areas specific to tissue research:
    a. Give source of the organism and describe BSL assessment process and BSL determination.
    b. Detail safety precautions and discuss methods of disposal.
2. The source and/ or catalog number of the cultures must be identified in the Research Plan/Project Summary, even if the project is exempt from IRB approval. If catalog number is unavailable, student can provide a receipt and/or letter from mentor regarding the origin of the items.
    a. If the tissue is obtained from a private/ noncommercial source (public or private laboratory, museum, etc.), documentation from the supplier must be uploaded in the application, including IACUC approvals for the original study. This includes samples from blood banks or human breast milk.
    b. If obtained from mentor's study or another lab's study, upload original study's IACUC approval OR reference to the original study's publication.
3. Prior review and approval is required for the use of human or animal fresh/frozen tissues, blood, or body fluids.
    a. An affiliated fair SRC, an IBC or an IACUC must approve all research before experimentation begins.
    b. The initial risk assessment determined by the student researcher and adults supervising the project must be confirmed by the SRC, IBC or IACUC.
4. Any proposed changes in the Research Plan/ Project Summary by the student after initial local or affiliated fair SRC approval must undergo subsequent SRC or IBC review and approval before such changes are made and before experimentation resumes.
5. The following forms are required:
    » Checklist for Adult Sponsor (1)
    » Student Checklist (1A)
    » Research Plan/Project Summary
    » Approval Form (1B)
    » Regulated Research Institution Form (1C) - when applicable
    » Qualified Scientist (2), when applicable
    » Risk Assessment (3), when applicable
    » PHBA Risk Assessment Form (6A)
    » Human and Vertebrate Animal Tissue Form (68)
    » The BSL-2 Checklist when a BSL-2 facility is used that is not at a Regulated Research Institution.

EXEMPT TISSUES (NO SRC PRE-APPROVAL REQUIRED)

1. The following types of tissue do not need to be treated as potentially hazardous biological agents:
    a. Plant tissue (except those known to be toxic or hazardous)
    b. Plant and non-primate established cell lines and tissue culture collections (e.g., obtained from the American Type Culture Collection). The source and/or catalog number of the cultures must be identified in the Research Plan/Project Summary
    c. Human capillary/blood collection (i.e. finger stick) of the student researcher to themself; blood collection from any other human participants must be reviewed and approved by an IRB
    d. Fresh or frozen meat, meat by-products obtained from food stores, restaurants, or packing houses and eggs or pasteurized milk
    e. Hair, hooves, nails and feathers
    f. Teeth that have been sterilized to kill any bloodborne pathogen that may be present

g. Fossilized tissue or archeological specimens.

1. Projects utilizing only data or images are exempt from IACUC pre-approval ONLY if the originating study is published in a peer-reviewed journal or the data is available in a publicly available database. In this case, the student must provide a reference to the original study OR link to the database.
2. If the data or images were obtained from another scientist (mentor or not a mentor) or source AND the research is not yet published (not publicly available), then IACUC approval of the original study must be provided by the ISEF participant.

HAZARDOUS CHEMICALS, ACTIVITIES, OR DEVICES

The following rules apply to research using hazardous chemicals, devices, and activities. These include substances and devices that are regulated by local, state, country, or international law, most often with restrictions of their use by minors such as DEA-controlled substances, prescription drugs, alcohol, tobacco, firearms, and explosives. Hazardous activities are those that involve a level of risk above and beyond that encountered in the student's everyday life.

These rules are intended to protect the student researcher by ensuring proper supervision and the consideration of all potential risks so that the appropriate safety precautions are taken. Students are required to meet all standards imposed by the RCSEF, school, and the local fair(s).

The following rules apply to projects using hazardous chemicals, devices and activities. These include substances and devices that are regulated by local, state, country, or international law. Hazardous activities are those that involve a level of risk above and beyond that encountered in the student's everyday life. The student researcher must minimize the impact of an experiment on the environment.

RULES FOR ALL PROJECTS INVOLVING HAZARDOUS CHEMICALS, ACTIVITIES AND DEVICES

1. The student researcher must conduct a risk assessment in collaboration with a Designated Supervisor or Qualified Scientist prior to experimentation. This risk assessment should be documented in the research plan to include the risk assessment process, supervision, safety precautions and appropriate methods of disposal. This risk assessment is also documented on Risk Assessment (Form 3).

2. The use of hazardous chemicals and devices and involvement in hazardous activities require direct supervision by a Designated Supervisor, except those involving DEA-controlled substances, which require supervision by a Qualified Scientist.

3. Student researchers must acquire and use regulated substances in accordance with all local, state, U.S. federal, and country laws. For further information or classification for these laws and regulations, contact the appropriate regulatory agencies.

4. For all chemicals, devices or activities requiring a federal and/or state permit, the student/supervisor must obtain the permit prior to the onset of experimentation. A copy of the permit must be available for review by adults supervising the project and the local, affiliated, and RCSEF SRCs in their review prior to competition.

5. The student researcher must minimize the impact of an experiment on the environment. Examples include using minimal quantities of chemicals that will require subsequent disposal; ensuring that all disposal is done in an environmentally safe manner and in accordance with good laboratory practices. (Proper chemical, sharps, and other hazardous materials disposal must follow local, state, federal guidelines.)

6. Projects using chemicals with a Globally Harmonized System of Classification and Labelling of Chemicals (GHS) safety rating of 1, 2 or 3 or National Fire Protection Association (NFPA) safety rating of 3 or 4 must be conducted in a school or laboratory setting. Projects conducted with chemicals outside these ratings may be conducted in a home setting under the following conditions:
    a. Projects in a home setting must follow standard lab practices for chemical handling, safety, ventilation, and specific disposal procedures used as outlined in the Safety Data Sheets (SDS).
    b. Any cookware, utensils, and/or equipment used during the experimentation cannot be reused for food preparation.
    c. Be conducted with a Direct Supervisor with proper training and knowledge of the chemicals being used

7. Disposal procedures shall be described in sufficient detail to ensure compliance with EPA Guidelines as outlined in the appropriate Safety Data Sheets. Examples include minimal quantities of chemicals that will require subsequent disposal; ensuring that all disposal is done in an environmentally safe manner. Proper chemical, sharps and other hazardous materials disposal must follow local, state, and federal guidelines.

ADDITIONAL RULES FOR SPECIFIC REGULATED SUBSTANCES

There are additional rules for the following regulated substances:

A. DEA-Controlled Substances
B. Prescription Drugs
C. Alcohol & Tobacco
D. Firearms and Explosives
E. Regulated Drones
F. Radiation

A. DEA-Controlled Substances

The U.S. Drug Enforcement Administration (DEA) regulates chemicals that can be diverted from their intended use to make illegal drugs. Other countries may have similar regulatory bodies; students outside of the U.S. must adhere to their own country's drug regulatory agency requirements in addition to U.S. DEA regulations. DEA-controlled substances and their schedule number are at the DEA website under "Sources of Information." It is the responsibility of the student to consult this list if there is a possibility that substances used in experimentation could be regulated.

- All studies using DEA-controlled substances must be supervised by a Qualified Scientist who is licensed by the DEA (or other international regulatory body) for use of the controlled substance.

All studies using DEA Schedule 1 substances (including marijuana) must have the research protocol approved by DEA before research begins. Schedule 2, 3 and 4 (www.dea.gov/drug-information/drug-scheduling) substances do not require protocol approval by DEA.

B. Prescription Drugs

Prescription drugs are drugs regulated by federal or country laws to protect against inappropriate or unsafe use. Special precautions must be taken in their use for a research project as follows:

- Students are prohibited from administering prescription drugs to human participants.
- A veterinarian must supervise student administration of any prescription drugs to vertebrate animals.

C. Alcohol and Tobacco

The U.S. Alcohol and Tobacco Tax and Trade Bureau (TTB) regulates the production of alcohol and distribution of alcohol and tobacco products. Many such products are restricted by age for purchase, possession, and consumption.

- Fermentation studies in which minute quantities of ethyl alcohol are produced are permitted.
- The Designated Supervisor is responsible for the acquisition, usage, and appropriate disposal of the alcohol or tobacco used in the study.
- Production of wine or beer by adults is allowable in the home and must meet TTB home production regulations. Students are allowed to design and conduct a research project, under direct parental supervision, involving the legal production of the wine or beer.
- Students are prohibited from conducting experiments where consumable ethyl alcohol is produced by distillation. However, students are allowed to distill alcohol for fuel or other non-consumable products. To do so, the work must be conducted at school or a Regulated Research Institution and follow all local and country laws. See the "Alcohol and Tobacco Tax and Trade Bureau (TTB)" website for details.

D. Firearms and Explosives

The U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), along with state agencies, regulates the purchase and use of firearms and explosives. A firearm is defined as a small arms weapon from which a projectile is fired by gunpowder. An explosive is any chemical compound, mixture, or device, the primary purpose of which is to function by explosion. Explosives include, but are not limited to, dynamite, black powder, pellet powder, detonators, and igniters.

The purchase of a firearm by a minor is generally unlawful. The use of a firearm, without proper state certification, is illegal. Students should check the training and certification requirements of individual states and countries.

- Projects involving firearms and explosives are not allowed.
- A fully assembled rocket motor, reload kit, or propellant modules containing more than 62.5 grams of propellant are subject to the permitting, storage, and other requirements of federal explosive laws and regulations.
- Potato guns and paintball guns are not firearms unless they are intended to be used as weapons. However, they must be treated as hazardous devices.

E. Regulated Drones

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

F. Radiation

Projects involving radionuclides (radioisotopes) and X-rays must involve a careful examination of the risks associated with the study and appropriate safety precautions must be taken. Depending upon the level of exposure, radiation released from these sources can be a health hazard.

- All studies may not exceed the dose limits set by the Nuclear Regulatory Commission of 0.5 mrem/hr or 100 mrem/year of exposure.
- If the voltage needed in the study is <10 kvolts, a risk assessment must be conducted. The study may be done at home or school, and SRC pre-approval is not required.
- A study using 10-25 kvolts must have a risk assessment conducted and must be pre-approved by the SRC to assess safety. Such a study must be conducted in a metal chamber using a camera only, not direct view through glass. A dosimeter or radiation survey meter is required to measure radiation exposure.
- All studies using > 25 kvolts must be conducted at an institution with a Licensed Radiation Program and must be pre-approved by the Institutions' Radiation Safety Officer or the Committee which oversees the use of ionizing radiation to ensure compliance with state and federal regulations.

Hazardous Chemicals

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

- Toxicity – the tendency of a chemical to be hazardous to health when inhaled, swallowed, injected, or in contact with the skin.
- Reactivity – the tendency of a chemical to undergo chemical change.

ENVIRONMENTALLY RESPONSIBLE CHEMISTRY

The mission of environmentally responsible (green) chemistry is to avoid the use or production of hazardous substances during the chemical process. The principles of green chemistry are described on the EPA website in the "Sources of Information" section. Whenever possible the following principles should be incorporated into the research plan.

- Waste prevention.
- Use of the safest possible chemicals and products.
- Design of the least possible hazardous chemical syntheses.
- Use renewable materials.
- Use catalysts in order to minimize chemical usage.
- Use of solvents and reaction conditions that are as safe as possible.
- Maximization of energy efficiency.
- Minimization of accident potential:
    - » Flammability — the tendency of a chemical to give off vapors which readily ignite when used under normal working conditions.
    - » 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 (Form 3) must include proper disposal methods for the chemicals used in an experiment. The Flinn Catalog (referenced in the Sources of Information section) 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.

Hazardous Devices

The documentation of Risk Assessment (Form 3) 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.

Radiation

A Risk Assessment (Form 3) 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).

RCSEF DISPLAY & SAFETY REGULATIONS

The mission of this committee is to ensure that all competitors display their research projects in compliance and conjunction with the RCSEF SRC.

The RCSEF Display & Safety inspection process can be initiated only when all items are present at the display. The Display & Safety Committee will offer guidance on display & safety issues for projects approved by the SRC to compete in the RCSEF. Occasionally, the RCSEF Display & Safety Committee may require students to make revisions to conform to display & safety regulations. Persistent issues will be directed to a committee of individuals which may include RCSEF personnel, Display & Safety (D&S), and/or Scientific Review Committee (SRC) committee members.

The following regulations must be adhered to when a finalist exhibits a project at the RCSEF. All projects must adhere to the Display & Safety requirements of the affiliated fair(s) in which they compete to qualify for participation in the RCSEF. Affiliated fairs may have additional restrictions or requirements. Knowledge of these requirements is the responsibility of the Finalist, Adult Sponsor, and Affiliated Fair Coordinator.

DISPLAY REGULATIONS

1. Depth (front to back): 30 inches or 76 centimeters

   Width (side to side): 48 inches or 122 centimeters

   Height (floor to top): 108 inches or 274 centimeters Fair-provided tables at the RCSEF will not exceed a height of 36 inches (91 centimeters).
2. Fair-provided tables at the RCSEF will not exceed a height of 36 inches (91 centimeters).
3. If a table is used it becomes part of the project and must not exceed the allowed dimensions.
4. All demonstrations must be done within the confines of the finalist's booth space. When not being demonstrated, all project components must be returned to the project display and must fit within allowable dimensions as defined above.
5. Display & Safety inspections will include recording photographic evidence of the approved Project Display.
6. Finalists who do not adhere to the RCSEF Project Set-up Approval Form regarding Display and Safety regulations may fail to qualify for competition.

RCSEF Project Set-up Approval Form (received on-site at the fair)

a. This form documents the project as approved by the Scientific Review Committee and is used to document the Display & Safety Committee's review process and final approval.

b. This form must be signed by the finalist and the Display & Safety Committee member at the time of inspection.

Forms Required and Displayed at Project Booth (only when applicable)

1. Regulated Research Institutional/Industrial Setting (Form 1C)

   a. 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 Regulated Research Institutional/Industrial Setting Form (1C) must be completed and vertically displayed at the project booth.

   b. The information provided by the mentor on Form 1C may be referenced to confirm that the information provided on the project board is that of the finalist. Only minimal reference to a mentor's or another researcher's work is allowable and must only reflect background information or be used to clarify differences between finalist's and others' work.

Continuation Projects

a. If a study is a continuation/research progression, the Continuation Projects (Form 7) must be completed and vertically displayed at the project booth.

b. The display board and abstract must reflect only the current year's work. The project title displayed in the finalist's

booth may mention years of continuing research (for example, "Year Two of an Ongoing Study").

c. 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 at Project But Not Displayed

- Forms, excluding those listed above, that were required for the Scientific Review Committee approval should not be vertically displayed, but must be available in the booth in case asked for by a judge or other RCSEF official. These forms include, but are not limited to: Checklist for Adult Sponsor (Form 1), Student Checklist (Form 1A)/ Research Plan, Approval (Form 1B), and a photograph/video release form.
- A photograph/video release form signed by the subject is required for visual images of humans (other than the finalist) displayed as part of the project.

Forms NOT to Be at the Project Display Booth or in the Exhibit Hall

Completed informed consent/assent forms for a human participant study are NOT to be displayed and should NOT be present at the project display. The finalist may include a sample (incomplete) form in their logbook or research notebook but under NO CIRCUMSTANCE should the completed informed consent/assent forms for a human participant be in the Exhibit Hall.

Photograph/Image Display Requirements

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

- 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 Scientific Review Committee, the Display & Safety Committee, or Society for Science & the Public.
- It has a credit line of origin ("Photograph taken by…" or "Image taken from…" or "Graph/Chart/Table taken from…"). If all images, etc. displayed were created by the finalist or are from the same source, one credit line prominently and vertically displayed on the backboard/poster or tabletop is sufficient. All images MUST BE properly cited. This includes background graphics, photographs, and/or visual depictions of the finalist or photographs and/or visual depictions of others for which a signed photo/ video release form is in a notebook or logbook at the project booth. These signed release forms must be available upon request during the set-up and inspection process, but may not be displayed.
- Sample release text: "I consent to the use of visual images (photos, videos, etc.) involving my participation/my child's participation in this research."

Finalists using any presentation or demonstration outside of a project board must be prepared to show the entire presentation to the Display & Safety Inspectors before the project is approved. All aforementioned rules apply to this presentation and the presentation may not be altered in any way after the final Display & Safety inspection. Examples of presentations that require approval include, but are not limited to PowerPoint, Prezi, Keynote, software program/simulation, and other images and/or graphics displayed on a computer screen or other non-print delivery method.

Items/Materials Not Allowed on Display or at Project Booth

Any information on the project display or items that are acknowledgments, self-promotions, or external endorsements are not allowed in the project booth.

- The use of logos including known commercial brands, institutional crests or trademarks, or flags unless integral to the project and approved by the SRC via inclusion in the Official Abstract and Certification.
- Personalized graphic/logos that are developed to indicate a commercial purpose or viability of an established or proposed business associated with the project. The only exception is a student-created logo may be displayed at the project once.
- Any reference to an institution or mentor that supported the finalist's research except as provided in the official RCSEF paperwork, most notably the Regulated Research Institutional/ Industrial Setting Form (1C).

- Any reference to patent status of the project.
- Any items intended for distribution such as disks, CDs, flash drives, brochures, booklets, endorsements, give-away items, business cards, printed materials, or food items designed to be distributed to judges or the public. Once again, handouts to judges and to the public are limited to UNALTERED photocopies of the official abstract and certification.
- Postal addresses, World Wide Web, email and/or social media addresses, QR codes, telephone, and/or fax numbers of a project or finalist. Note: The only personal information that is permissible to include on the display is information that is also included on the Official Abstract and Certification (finalist name, school, city, state, country). Information regarding a finalist's age and grade are not permitted.
- Active internet or email connections as part of displaying or operating the project at the RCSEF.
- Any changes, modifications, or additions to projects including any attempt to uncover, replenish, or return removed language or items after the approval by the Display & Safety Committee and the Scientific Review Committee has been received is prohibited.

SAFETY REGULATIONS

Not Allowed at Project or Booth

Note: In the case in which a Finalist's Project includes an item that is prohibited from display, please consider taking photographs and/or documenting the significance of the prohibited item through video.

- Living organisms, including plants.
- Glass.
- Soil, sand, rock, cement and/or waste samples, even if permanently encased in a slab of acrylic.
- Taxidermy specimens or parts.
- Preserved vertebrate or invertebrate animals.
- Human or animal food.
- Human/animal parts or body fluids (for example, blood, urine).
- Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state.
- All chemicals including water. Absolutely no liquids can be utilized in the Project Display.
- All hazardous substances or devices (Example: poisons, drugs, firearms, weapons, ammunition, reloading devices, grease/oil, and sublimating solids such as dry ice).
- Items that may have contained or been in contact with hazardous chemicals (exception: item may be permitted if professionally cleaned and documentation for such cleaning is available). Filters (including microbial) may not be displayed unless the Display & Safety Committee can reasonably determine that the device was cleaned or was never used.
- Sharp items (for example, syringes, needles, pipettes, and knives).
- Flames and highly flammable materials.
- Batteries with open-top cells or wet cells.
- Drones or any flight-capable apparatus unless the propulsion power source is removed.
- 3D Printers unless the power source is removed.
- Inadequately insulated apparatus capable of producing dangerous temperatures are not permitted.
- Any apparatus with belts, pulleys, chains, or moving parts with tension or pinch points that are not appropriately shielded.
- Any display items that are deemed distracting (i.e., sounds, lights, odors, etc.).
- Personal items or packaging materials stored underneath the booth.
- Any apparatus or project material deemed unsafe by the Scientific Review Committee, the Display & Safety Committee, or the RCSEF event organizers.

ELECTRICAL REGULATIONS

1. For all electrical regulations, "120 Volt AC" is intended to encompass the corresponding range of voltage as supplied by the facility in which the RCSEF is being held.
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 finalist. Exposed electrical equipment or metal that 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. Incandescent and fluorescent light bulbs are prohibited. When a student is not at the exhibit, all electrical power must be disconnected, or power bars must be switched off (exception: during pre-judging audio visual displays may be available.)

5. No exposed live circuits over 36 volts are allowed.
6. There must be an accessible and clearly visible on/off switch or other means of quickly disconnecting from the 120 Volt power source.

LASER/LASER POINTER REGULATIONS

Any Class 1, Class 2, Class 3A, or Class 3R lasers are allowed to be used responsibly. No other lasers may be used or displayed.

- Laser beams may not pass through magnifying optics such as microscopes and telescopes.
- Lasers must be labeled by the manufacturer so that power output can be inspected.
- Lasers without labels will NOT be permitted.
- Handheld lasers are NOT permitted.
- Lasers will be confiscated with no warning if not used in a safe manner.

RCSEF PROJECT CATEGORIES

Please read the category descriptions carefully.

These definitions may be different from those used in your school or district affiliated 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 that you thoughtfully choose your category so your project is judged appropriately.

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 2026 Riverside County Science and Engineering Fair.

If you need assistance selecting the category, contact the RCSEF Scientific Review Committee (SRC), sciencefair@rcoe.us.

Project category assignments are final once submitted, and no category changes may be made on the day of the event.

RCSEF PROJECT CATEGORIES – ALL DIVISIONS, 1 - 5

Please visit https://www.societyforscience.org/isef/categories-and-subcategories for a full description and definition of categories.

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.
02	Behavioral and Social Sciences	The study of cognitions (thought processes), emotions, behavior, and/or learning of humans and animals. BEHA may include the study of individuals, groups and/or cultures through observational and experimental methods.
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.
04	Biomedical and Health Sciences	This category focuses on studies specifically designed to address issues of human health and disease. It includes studies on the diagnosis, treatment, prevention or epidemiology of disease and other damage to the human body or mental systems. Includes studies of normal functioning and may investigate internal as well as external factors such as feedback mechanisms, stress or environmental impact on human health and disease.
05	Biomedical Engineering	Projects that involve the application of engineering principles and design concepts to medicine and biology for healthcare purposes including diagnosis, monitoring and therapy. Prominent biomedical engineering applications include the development of biocompatible prostheses, various diagnostic and therapeutic medical devices ranging from clinical equipment to micro-implants, common imaging equipment such as MRIs and EEGs, regenerative tissue growth, pharmaceutical drugs and therapeutic biologicals.

RCSEF PROJECT CATEGORIES – ALL DIVISIONS, 6 - 15

CATEGORY NUMBER	CATEGORY	DESCRIPTION
06	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.
07	Chemistry	Studies exploring the science of the composition, structure, properties, and reactions of matter not involving biochemical systems.
08	Computational Biology and Bioinformatics	Studies that primarily focus on the discipline and techniques of computer science and mathematics as they relate to biological systems. This includes the development and application of data-analytical and theoretical methods, mathematical modeling and computational simulation techniques to the study of biological, behavior, and social systems.
09	Earth and Environmental Sciences	Studies of the environment and its effect on organisms/systems, including investigations of biological processes such as growth and life span, as well as studies of Earth systems and their evolution.
10	Embedded Systems	Studies involving electrical systems in which information is conveyed via signals and waveforms for purposes of enhancing communications, control and/or sensing.
11	Energy: Sustainable Materials and Design	Studies/processes involving the production and/or storage of energy.
12	Engineering Technology: Statics and Dynamics	Studies that focus on the science and engineering that involve movement or structure. The movement will be a result of forces; the structure will be stable due to the equilibrium of forces.
13	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.
14	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.
15	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.

RCSEF PROJECT CATEGORIES – ALL DIVISIONS, 16 - 22

CATEGORY NUMBER	CATEGORY	DESCRIPTION
16	Microbiology	The study of micro-organisms, including bacteria, viruses, fungi, prokaryotes, and simple eukaryotes as well as antimicrobial and antibiotic substances.
17	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.
18	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.
19	Robotics and Intelligent Machines	Studies in which the use of machine intelligence is paramount to reducing the reliance on human intervention.
20	Systems Software	The study or development of software, information processes or methodologies to demonstrate, analyze, or control a process/solution.
21	Technology Enhances the Arts	The use of technology to ignite new concepts, visualization tools and/or media to enhance our enjoyment of the arts.
21	Technology Enhances the Arts	The use of technology to ignite new concepts, visualization tools and/or media to enhance our enjoyment of the arts.
22	Translational Medical Science	Projects that aim to improve human health and longevity by translating novel discoveries in the biomedical sciences into effective activities and tools for clinical and public health use. Bi-directional in concept, projects can be those developed through basic research moving toward clinical testing (bench-to-bedside) or projects that provide feedback about the applications of new treatments and how they can be improved (bedside-to-bench).

EDUCATIONAL RESOURCES

**CA Standards in support of Student Research are listed below.
The references are from the Next Generation Science Standards,
the Standards for Literacy in Science and Technical Subject, 6-12 and
the California Common Core standards in Mathematics.**

The California Next Generation Science Standards (CA NGSS) can be viewed by using this link CA NGSS Standards.

a. CCCs - Students need to look for these "themes" in their research.

b. SEPs - Students use these practices to engage in the process of research.

CCSS Language Arts: Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6–12 (pp. 80 - 860)

- College and Career Readiness Anchor Standards for Reading
- Reading Standards for Literacy in Science and Technical Subjects 6–12
- College and Career Readiness Anchor Standards for Writing
- Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6–12

California Common Core State Standards: Mathematics

The standards call for learning mathematical content in the context of real-world situations, using mathematics to solve problems, and developing "habits of mind" that foster a deep understanding of mathematics content. In addition, the standards of mathematical practice help to build these "habits of mind" that students will use to develop expertise and skills and knowledge applicable across all content areas. The standards for mathematical practices are the following:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

TYPES OF RESEARCH PROJECTS

Research Projects are varied and may be of the following type:

- Experimental Design: Innovation or Replication
- Engineering
- Computer Science
- Robotics/Mathematics
- Product Testing
- Human Subjects/Surveys

Research Project: Experimental Design

1. These projects can be innovation projects OR replication projects. The Student Researcher must identify the type of experimental project they have completed.
    a. **An innovation project is a project where a novel concept of idea is explored.**
    b. **A replication project is a project that confirms for oneself the data set or claim.**
2. The bibliography/citations includes references from your literature research.
3. Include a research notebook as evidence of the project with dated entries describing project events, observations, data tables and graphs, drawings, pictures, and other important evidence from the project.
4. Experimental Design
    - Student Researcher defines a testable question that explores relationships between variables. "What is the effect of a change in *X* on *Y*? For example, "What is the effect of the amount of sunlight on the growth of tomato plants?"
    - The hypothesis is based on library research, background knowledge and observations.
    - The control (a "standard") group to which all test groups will be compared.
    - Test groups where only one variable in each test group differs from the "control" group. Each test group can use different test variable such as a different % concentration. Each variable should be decided upon using good logic.
    - Each test group should contain a minimum of 10 of the same type of objects being tested (seeds, plants, worms, etc.).
    - For projects with human participants, a group size of at least 20 is recommended.
    - Change one variable in each test cycle (trial). Change the variable in several ways (several concentrations of a chemical (1%, 3%, etc.), several temperatures, or several time points (5 minutes, 10 minutes, etc.).
    - Quantitative data is numerical. Qualitative (descriptions e.g., color, smell, etc.) can be added to support other components of the experiment.
    - Report measurements in metric units.
    - Repeat the test a minimum of 5 times to see if your results are reproducible and increase the credibility claims/conclusions.

Research Project: Engineering

1. Clearly define the problem the engineering/computer science project will solve.
2. Establish criteria and design constraints. Design constraints/limitations can be: cost, time, available materials, etc.
3. Research, and evaluate alternatives, test the plan.
4. Construct a prototype or computer model, etc.
5. Test against established criteria.
6. Failure analysis, tweak, and re-test as many times as possible.
7. Final documentation.
8. Include bibliography from your literature research.
9. Include a research notebook as evidence of the project with dated entries describing project events, observations, data tables and graphs, drawings, pictures and other important evidence from the project.

Research Project: Mathematics/Robotics/Computer Science

1. Clearly define the problem the mathematics project will solve.
    a. The potential applications of the project are clearly presented for theoretical mathematics projects.
    b. Understanding of the underlying mathematical theory is evident for applied mathematics projects.
2. Clarity of proofs, graphs, formulas, etc.
3. Final documentation.
4. Include bibliography from your literature research.
5. Include a research notebook as evidence of the project with dated entries describing project events, observations, data tables and graphs, drawings, pictures and other important evidence from the project.
6. ***Math Projects for Science Fairs (MPSF)*** offers a list of ideas for math-based science projects for middle and high school students to use at their local, regional, or national science fairs. These project ideas were first compiled in 1996 by various CMS contributors. (https://cms.math.ca/education/math-projects-for-science-fairs/)

Research Project: Product Testing Project

1. Clearly identify what kind of item (candles, hair products, etc.) you plan to test.
2. Define a test group of at least five (5) similar items.
3. Include test criteria that:
    a. Defines what will be measured.
    b. Describes how you will take measurements.
    c. Define criteria for changing qualitative measurements into quantitative measurements. Such as “on a scale of 10 = (cleanest is 10, moderately clean is 8, less than moderately clean is 6, not clean at all is 1).
    d. An important first step in qualitative analysis is to discover patterns. Try to find frequencies, magnitudes, structures, processes, causes, and effects which can be changed to numerical data.
4. Report measurements in metric units.
5. Repeat the testing a minimum of 10+ times to see if the results are reproducible.
6. Include a research notebook as evidence of the project with dated entries describing project events, observations, data tables and graphs, drawings, pictures and other important evidence from the project.

Research Project: Human Participants/Surveys

The RCSEF has the authority to make its rules more stringent than the CSEF as well as ISEF for the safety of researchers, participants, others and the environment.

****Human subjects may not be asked to ingest foods of any type or to ingest stimulant inducing drinks or any type of medications and may not be given any type food item (including candy) or drink items as a reward for participation.**

1. Human subject projects are acceptable research projects.
2. A minimum of 20 human participants is recommended.
3. Every attempt has been made to reduce random variables for the experimental design having a quantifiable, measurable endpoint.
4. Projects need to specifically address issues of randomization of trials (not mixing up treatments, or ignoring learning from participating previously).
5. All human subject projects require IRB approval BEFORE experimentation.
6. All human subjects research projects require the following:
    a. Detailed Research plan. See Student Checklist/Research Plan (Form 1A), pg 2.
    b. An explanation and copy of ALL testing methods being used on the test subjects. These items must be added as additional pages to the application packet immediately following the research plan. This includes a complete sample of all tests or surveys being used (given on paper, via computer or online). See Human Participants (Form 4).
    c. Providing a copy of the required Human Participants (Form 4) to the IRB **BEFORE** the use of form with the test subjects to sign/date.

Demonstration Projects

Demonstration Projects are NOT accepted at the RCSEF.
To consider: What interests you about the demonstration project? Can you channel your interest into an Experiment, Engineering, Human Subjects or Product Testing project?

For instance, if you were planning to build a robot from a kit that when built according to the directions will be able to bounce a ball. Instead, you could change this idea and turn it into a research project by building the robot BUT reprogram it so instead of bouncing a ball it does something else not intended by the kit. Ask your teacher/adult sponsor for help in converting a demonstration project into a science or engineering project.

A Note About Vertebrate Animal Projects

The RCSEF reserves the right to make its rules more stringent for the safety of participants, others and the environment. Student Researcher must provide the RRI's laboratory vertebrate animal research approval by the RRI's own SRC or equivalent along with their application packet to the RCSEF SRC/IRB.

Vertebrate animal subjects may not have their behavior, diet or habitat altered through experimentation UNLESS the project is performed at a Regulated Research Institution (RRI: college or professional lab) under the guidance of a qualified scientist/laboratory mentor.

HOW TO WRITE A RESEARCH PLAN

Use this as a template or model as you are writing your research plan.
Please make sure you refer back to this for each of the 6 sections.

1. Rationale

- Your rationale should be several paragraphs, about 2 pages, double-spaced, and should include background information explaining why your research is important. It must include supported and cited information. **IT SHOULD BE WRITTEN IN FUTURE TENSE.** Background information should provide context of your topic, and then elaborate further with more details to give the reader a greater sense of understanding. When writing background information, include a funnel approach, which begins broadly and progressively narrows the subject matter of greatest importance to research objectives. Make sure to and create a smooth transition from the background information to why the research is important. Also, there should be an explanation as to why you're going to do this project, which explains why the research is important and why the reader should care. If applicable, explain any societal impact of your research.

2. Research Question(s), Hypothesis(es), Engineering Goal(s), Expected Outcomes

Research Question

- First, create a transition from your rationale to your research questions. Your research questions should address any gaps or unasked questions from your rationale. For example, if your topic is environmental research and your background knowledge includes information on an invasive species and why it is bad, use your research questions to address what you specifically are looking at. They should inform the reader of the problem you will be solving and address whatever gap in knowledge/literature that exists in the topic.

Hypothesis(es)

- Your hypotheses should be one sentence each and should answer each of your research questions. You should have the same number of hypotheses as the research question and each should be specific. For example, if one research question is, "How does the presence of MacroH2A effect the growth of cancer cells?" the hypothesis should specifically state what you think the answer to the question will be. Use "If… then…" format.

Engineering Goal(s)

- Here, if you are conducting an engineering project, state what you want to achieve. If you want to engineer a way to convert sunlight into energy or create or improve some sort of technology, specifically state what your goals are for creating it. Include if you want to create a machine with a limited amount of resources, or if it uses a certain amount/type of energy.

Expected Outcomes

- Your expected outcomes are almost like your hypothesis, but in paragraph form. You can briefly explain why you expect the outcomes, but make sure your expected outcomes address both your hypotheses and your research questions "It is expected that…"

Procedure

- Detail the role of the mentor and the role of the student. This section should be titled "Role of Mentor and Role of Student." Include if your mentor will be providing materials for you (which they most likely did), what guidance they provided with you, and any steps that they did for you in the experiment that you are not allowed to do (e.g., If they sacrificed mice in your experiment, if they handled vertebrate mammals in ways that you were not allowed to, etc.).

- Write, in detail, all the steps of YOUR experiment. Do not include the work that will be done by your mentor or others. This includes any designs you will make, how you will collect your data, and how you will analyze data. Don't describe work that will be done by others or your mentor, only the work that you will do. Be specific. The goal is to describe the experiment in detail as if someone will copy it. Be specific enough so someone could redo your experiment and get the same results. Include dosages and materials that will be used. Separate phases of research from other phases of research, and use titles for each phase to differentiate.
- Do not write this section in paragraph form but rather using bullets, in the order of the steps you will/did take in your experiment.

Risk and Safety

- Detail potential risks. For example, if you handled chemicals, identify the chemicals, and explain why it was necessary for you to use the chemicals. Explain safety precautions that you had in place. Make it seem like you planned for everything that could've caused any harm to you.

Data Analysis

- Describe how you analyzed your data. This also includes statistics. Again, go into detail, so that someone could perfectly replicate your experiment. Keep in mind that if someone were to replicate your experiment, but didn't replicate your data analysis the same way, it's likely they would get different results than you. In other words, be clear so your data analysis process could be duplicated. If this includes watching videos, detail how you watched them and what you recorded when you watched the videos.

3. Bibliography (Written in APA format)

- List major references; (e.g., science journal articles, books, internet sites). Include sources that helped shape your own project, especially sources with methodology similar to your own or sources that gave you ideas for your project. They should also be sources that provided information for your background.
- If you used vertebrate animals in your project, make sure to include a reference to an animal care guide.
- Do NOT use links to cite. Instead, format all citations in APA format. The format should include but not limited to: Authors (last name, first initial), date/year of publish, title and source. Check how different source materials would be formatted in APA style.
- Please use at least 5 reputable sources, and follow APA formatting.

4. Subject-Specific Guidelines as Applicable (This information is specific to research involving human participants and vertebrate research.)

4.1 Human Participant Research

- You must include this section if you have human participants or vertebrate animals in your research. If not, go to section 5.

Participants

- Describe the participants that will be used. Describe age range, gender, racial/ethnic composition.
- Identify 'vulnerable' populations, e.g., minors, pregnant women, prisoners, mentally disabled or economically disadvantaged.
- Remember: you want someone to be able to read this and be able to replicate your experiments in order to get your similar results. If you only used participants aged 13-18, include that so someone wouldn't attempt to replicate the experiment using participants aged 25-30.

Recruitment

- Include where you will find your participants. Will you send out a survey to all high school students? How will you invite them to participate? How will you reach out to them?

Methods

- Describe what your participants will be asked to do. Did they take a survey, questionnaire or test? If they used a survey/questionnaire/test, did you make it? And if you did not, describe where and how you obtained it. Make sure you write that you require permission to use said survey/questionnaire/test.
- Explain the frequency and length of time involved for each participant.
- For example, if you were going to use human participants in memory testing, explain what you will have them do in order to test their memory. If you will create your own test, write that. If you will use a previously created one, explain that and that you got it from a professor or scientist that created it and explain that you required permission. Explain the length of the test; e.g., if it will take the participant a half-hour. Explain how often participants will need to take e.g., if you will test the effect of drinking coffee on memory, or something in which a stimulus would be introduced several times and require several tests, describe the frequency and if the length of each test will change or remain the same.

Risk Assessments

- Describe the risks or potential discomforts, e.g., physical, psychological, mental, legal. If you will have participants do rigorous exercise before a test, describe this. Emphasize how you minimize risks, i.e., make it seem like you planned for everything and have made your experiment as safe and comfortable as possible.

Protection of Privacy

- Describe how you will keep everything anonymous. If you will collect information such as names, telephone numbers, birthdays or contact information, describe how that will be kept private. Anonymity and confidentiality in these projects are very important, so make sure the reader knows that everything was proper and anonymous and/or safely confidential. If anonymous, describe how data will be collected while still staying anonymous. Describe whatever way you will use to differentiate data, while still keeping everything anonymous.
- Describe where data will be stored and who would have access to the data, as well as what you will do with data once the experiment will be over.

Informed Consent Process

- Describe how you will inform participants of your purpose, what they will be asked to do and that their participation will be voluntary AND could be stopped at any time.
- If you use a signed form or any form, make sure you clarify that participants will be notified of the above. If you will be using a survey, make sure that there will be questions or information on the survey that clarified this and describe this.

4.2 Vertebrate Animal Research — For each section, include what you will do and what your mentor will do.

- Discuss potential alternatives to vertebrate animal use and present justification for use of vertebrates.
- Describe other ways you could have done this research without the use of vertebrate animals. Could you have tested on non-vertebrates? Could you have used cell cultures instead of physically testing on the animals?

- Justify why you will have to use vertebrates. Make it seem like it will be crucial and will be the only way to collect data well. The reader should agree that using vertebrate animals will be the best way to conduct this research and that your justification is compelling.
- Explain potential impact or contribution of this research.
  - Describe why this research will be important and impactful to not only support your justification to use vertebrate animals, but it will be a vital piece to your research and advancing the science. Make a compelling argument how it also will impact your field, society or the world.
- Detail all procedures that will be used, including methods used to minimize potential discomfort, distress, pain and injury to the animals and detailed chemical concentrations and drug dosages.
  - Describe what you will do to the vertebrates. If you will take blood samples, describe how you will take the blood samples (from where, how much blood) and emphasize how and what you will do to minimize discomfort, distress, pain or injury.
  - If you will use drugs or chemicals with your research, include concentrations and dosages.
  - Again, you want someone to be able to read this and replicate your experiment and get the same results.
  - If you're worried that something will be too vague, add another sentence or bullet to clear it up or make it more specific. It's better to be a bit too specific than to be too vague.
- Detail animal numbers, species, strain, sex, age, source, etc. Include justification of the numbers planned.
  - Include all the details about your vertebrate animals. If you will use mice, thoroughly explain the species, the population, the sex and age of the mice and include where you or your mentor will get the mice.
  - Justify your populations, e.g., will use one hundred mice in your experiment, and explain why you will use a hundred instead of fifty or two hundred.
- Describe housing and oversight of daily care.
  - Describe how your mice will be kept. Will males and females be kept separate? Will they be separated by age? Describe how they will be cared for. How will you make sure the mice will be in good shape and properly cared for?
- Discuss disposition of the animals at the termination of the study.
  - What will happen to the mice once the study is done? If they will be killed, explain how your mentor will do this.

5. **Potentially Hazardous Biological Agents Research — For each section, include what you will do and what your mentor will do.**
   - Give source of the organisms and describe Biosafety Level (BSL) assessment process and BSL determination.
     - Describe where you will get the potentially hazardous agent. If they will be collected from tissue, describe how this step will be completed.
     - Describe how the BSL level will be assessed and what will be determined. Be sure you state what level you will be completing in your research.
   - Detail safety precautions and discuss methods of safety.
     - Detail what precautions you will take to make sure everyone will be safe. If lab members will wear protective clothing, make sure to detail what they wore (e.g., closed toe shoes, special gloves, lab coats, safety goggles).
     - Describe how the agent will be disposed of and make sure that this will be in a safe way that limits exposure and danger.

6. **Hazardous Chemicals, Activities and Devices — For each section, include what you did and what you will do and what your mentor will do.**
    - Describe Risk Assessment process, supervision, safety precautions and methods of disposal.
        - Describe how you will analyze the risk and how the laboratory will undergo Risk Assessment. Make sure you include if your laboratory or storage containers will meet a fire code or safety code.
        - Describe any supervision you will be under. Make sure to include that your mentor will supervise you at all times when working with (even potentially) dangerous chemicals.
        - Describe safety procedures. This includes what you will wear to limit exposure to the hazardous chemical/activity/device. You want to communicate that you will be safe when working with this.
        - Describe the methods of disposal. How will you dispose of the chemical in a SAFE and proper manner? Once again, you will want to communicate that you will be safe and that you will handle disposal in a mature and professional manner.

SOURCES OF INFORMATION

1. Abstract Database, Society for Science
   https://abstracts.societyforscience.org/
2. The Basics
   https://www.societyforscience.org/isef/the-basics/
3. Broadcom MASTERS, Society for Science
   https://www.societyforscience.org/broadcom-masters/
4. California Science and Engineering Fair
   https://csef.usc.edu/
5. How to Do a Science Fair Project
   https://www.jpl.nasa.gov/edu/learn/activities/science-fair-project/
6. Math Projects for Science Fairs
   https://cms.math.ca/education/math-projects-for-science-fairs/
7. Regeneron International Science and Engineering Fair
   https://www.societyforscience.org/isef/
8. Regeneron Science Talent Search, Society for Science
   https://www.societyforscience.org/regeneron-sts/
9. Science News for Students, Society for Science
   https://www.sciencenewsforstudents.org/
10. Science News in High School, Society for Science
    https://www.societyforscience.org/outreach-and-equity/science-news-in-high-schools/
11. Science News, Society for Science
    https://www.sciencenews.org/
12. Working with DNA and Bacteria in Precollege Science Classrooms
    https://nabt.org/files/galleries/workingwithdna.pdf

Sources of Information: Human Participants

1. American Psychological Association
   750 First Street, NE Washington, DC 20002-4242
   Phone: (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
2. Ethical Principles and Guidelines for the Protection of Human Subjects of Research
   www.hhs.gov/ohrp/humansubjects/guidance/belmont.html
3. The Children's Online Privacy Protection Act of 1998 (COPPA) (15 U.S.C. §§ 6501–6506)
   https://www.ftc.gov/legal-library/browse/rules/childrens-online-privacy-protection-rule-coppa
4. Code of Federal Regulation (CFR), Title 45 (Public Welfare), Part 46-Protection of Human Subjects (45CFR46)
   https://www.hhs.gov/ohrp/sites/default/files/ohrp/policy/ohrpregulations.pdf
5. Educational and Psychological Testing
   Testing Office for the APA Science Directorate
   Phone: (202) 336-6000
   Email: testing@apa.org
   www.apa.org/science/programs/testing/index.aspx
6. Dunn, C. M. and Chadwick, G. L., Protecting Study Volunteers in Research, 3rd Edition (2004). Boston, MA: Thomson Centerwatch. ISBN 1-930624-44-1.
7. NIH Tutorial, "Protecting Human Research Participants"
   https://pmc.ncbi.nlm.nih.gov/articles/PMC10579004/
8. Standards for Educational and Psychological Testing. (1999). Washington, DC: AERA, APA, NCME.
   www.apa.org/science/programs/testing/standards.aspx

Sources of Information: Vertebrate Animals Animal Care and Use

1. Euthanasia Guidelines
   AVMA Guidelines on Euthanasia (June 2007)
   American Veterinary Medical Association.
   www.avma.org/KB/Policies/Documents/euthanasia.pdf
2. Federal Animal Welfare Act (AWA)
   7 U.S.C. 2131-2157
   Subchapter A – Animal Welfare (Parts I, II, III)
   www.nal.usda.gov/awic/animal-welfare-act
   Above document is available from:
   USDA/APHIS/AC
   4700 River Road, Unit 84
   Riverdale, MD 20737-1234
   Email: ace@aphis.usda.gov
   Tel: (301) 734-7833
   Fax: [301] 734-4978
   https://www.aphis.usda.gov/aphis/ourfocus/animalwelfare
3. Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (Agri-Guide)
   Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC International)
   https://www.asas.org/docs/default-source/default-document-library/agguide_4th.pdf?sfvrsn=56b44ed1_2
4. Guidelines for the Use of Fish in Research (2004), American Fisheries Society.
   www.fisheries.org
5. Guide for the Care and Use of Laboratory Animals, 8th Edition (2011)
   http://grants.nih.gov/grants/olaw/Guide-for-the-Care-and-Use-of-Laboratory-Animals.pdf
   www.nap.edu/catalog.php?record_id=12910
6. Guidelines for the Care and Use of Mammals in Neuroscience and Behavioral Research (2003), Institute for Laboratory Animal Research (ILAR).
   https://olaw.nih.gov/sites/default/files/National_Academies_Guidelines_for_Use_and_Care.pdf
   To order these ILAR publications contact:
   National Academies Press
   500 Fifth Street, NW
   Washington, DC 20055
   Phone: (888) 624-8373 or 202-334-3313
   Fax: [202] 334-2451
   https://nap.nationalacademies.org/
7. Laboratory Animals, Institute of Laboratory Animal Research (ILAR), Commission on Life Sciences, National Research
   http://dels.nas.edu/ilar

Alternative Research and Animal Welfare

1. Institute of Laboratory Animal Resources (ILAR) provides a variety of information on animal sources, housing and handling standards, and alternatives to animal use through annotated bibliographies published quarterly in ILAR Journal.
   ILAR
   The Keck Center of the National Academies
   500 Fifth Street, NW, Keck 687
   Washington, DC 20001
   Phone: (202) 334-2590
   Fax: [202] 334-1687
   Email: ILAR@nas.edu
   http://dels.nas.edu/ilar
2. John's Hopkins Center for Alternatives to Animal Testing (CAAT) has worked with scientists since 1981 to find new methods to replace the use of laboratory animals in experiments, reduce the number of animals tested, and refine necessary tests to eliminate pain and distress.
   Email: caat@jhsph.edu
   http://caat.jhsph.edu/

3. National Agriculture Library (NAL) Provides Reference Service for Materials that Document a) Alternative Procedures to Animal Use and b) Animal Welfare
   Animal Welfare Information Center
   National Agriculture Library
   10301 Baltimore Avenue, Room 410
   Beltsville, MD 20705-2351
   Phone: (301) 504-6212
   Fax: [301] 504-7125
   Email: awic@ars.usda.gov
   www.nal.usda.gov/awic
4. The National Library of Medicine Provides Computer Searches Through MEDLINE:
   Reference & Customer Services
   National Library of Medicine
   8600 Rockville Pike
   Bethesda, MD 20894
   (888) FIND-NLM or (888) 346-3656, (301) 594-5983
   Email: info@ncbi.nlm.nig.gov
   www.nlm.nih.gov
   www.ncbi.nlm.nih.gov/sites/entrez
5. Quality Assurance Manuals (for appropriate species) Such as:
   Poultry: https://ams.prod.usda.gov/sites/default/files/media/PoultryGradingManual.pdf
   Beef: https://www.bqa.org/Media/BQA/Docs/nationalmanual.pdf
   Pork: http://www.pork.org/
6. Quarterly Bibliographies of Alternatives to the Use of Live Vertebrates in Biomedical Research and Testing May be Obtained From:
   Specialized Information Services
   NLM/NIH
   2 Democracy Plaza, Suite 510
   6707 Democracy Blvd., MSC 5467 Bethesda, MD 20892-5467
   Phone: (301) 496-1131
   Fax: [301] 480-3537
   Toll Free: (888) FIND-NLM or (888) 346-3656
   Email: tehip@teh.nlm.nih.gov
   https://www.nlm.nih.gov/

Sources: Potentially Hazardous Biological Agents

1. American Biological Safety Association: ABSA Risk Group Classification – List of Organisms
   www.absa.org
2. American Society for Microbiology
   https://asm.org/
3. American Type Culture Collection (ATCC)
   www.atcc.org
4. Bergey's Manual of Systematic Bacteriology Website – follow the links for resources and microbial databases for a collection of international websites of microorganisms and cell cultures:
   https://www.bergeys.org/
5. Biosafety in Microbiological and Biomedical Laboratories (BMBL) – 6th Edition. Published by CDC-NIH
   https://www.cdc.gov/labs/pdf/SF__19_308133-A_BMBL6_00-BOOK-WEB-final-3.pdf
6. Canada – Agency of Public Health – List of Non-Pathogenic Organisms
   https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment.html
7. Microbiology Society Charles Darwin House
   12 Roger Street London WC1N 2JU UK
   http://microbiologyonline.org
8. NIH Guidelines for Research Involving Recombinant DNA Molecules. Published by National Institutes of Health.
   https://osp.od.nih.gov/wp-content/uploads/NIH_Guidelines.pdf
9. OSHA – Occupational Health and Safety Administration
   www.osha.gov
10. World Health Organization Laboratory Safety Manual
    https://drive.google.com/file/d/1_-7NCd9Z7vPNAJEI8mNnFXjuWxj2DIh-/view

Sources: Hazardous Chemicals, Activities or Devices

General Lab/Chemical Safety

1. Alcohol and Tobacco Tax and Trade Bureau
   www.ttb.gov
   Bureau of Alcohol, Tobacco, Firearms, and Explosives.
   www.atf.gov
2. CDC Laboratory Safety Manuals
   https://www.cdc.gov/safelabs/resources-tools/biosafety-resources-and-tools.html
3. Drug Enforcement Agency Website
   https://www.dea.gov/
   Controlled Substance Schedules – a list of controlled substances.
   chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.deadiversion.usdoj.gov/schedules/orangebook/c_cs_alpha.pdf
4. Environmental Protection Agency (EPA) Website for Green Chemistry
   www.epa.gov/greenchemistry
5. Howard Hughes Medical Institute as a resource for working with cell cultures, radioactive materials, and other laboratory materials.
   https://www.hhmi.org/
6. Material Safety and Inspection Branch
   One White Flint North
   11555 Rockville Pike
   Rockville, MD 20852
   Phone: (301) 415-8200; (800) 368-5642
   www.nrc.gov
7. National Pesticide Information Center
   http://npic.orst.edu/ingred/products.html
   Describes the various types of pesticides and the legal requirements for labeling. Provides links and phone numbers to get additional information.
   Environmental Protection Agency.
   http://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1
   A database of product labels. Enter the product name or company name to view the approved label information of pesticides which are registered with the agency.
8. Occupational Safety and Health Administration.
   www.osha.gov
   www.osha.gov/SLTC/
   www.osha.gov/SLTC/reactivechemicals/index.html
   www.osha.gov/SLTC/laserhazards/index.html
   www.osha.gov/SLTC/radiationionizing/index.html
9. Radiation Studies Information (CDC).
   https://www.cdc.gov/radiation-health/
10. Safety and Data Sheets (SDS).
    http://www.flinnsci.com/msds-search.aspx/
    A directory of SDS sheets from Flinn Scientific Inc. that includes a ranking of hazard level and disposal methods.
    www.ilpi.com/msds/index.html – A listing of numerous sites that have free downloads of SDS sheets.
11. Safety in Academic Chemistry Laboratories, Volumes 1 and 2, 2003. Washington, DC: American Chemical Society.
    Order from (first copy free of charge):
    American Chemical Society
    Publications Support Services
    1155 16th Street, NW
    Washington, DC 20036
    Phone: (202) 872-4000 or (800) 227-5558
    Email: help@acs.org
    www.acs.org/education

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