Rules for Indiana
Elementary and
Middle School Science Research
2018-2019

A Publication of

Science Education Foundation of Indiana, Inc.
864 E. Cambridge Dr.
Terre Haute, IN 47802

www.sefi.org

Acknowledgments

Much of this document is taken liberally from the Intel International Science and Engineering Fair document "International Rules for Precollege Science Research: Guidelines for Science and Engineering Fairs 2017-2018." Available online at https://student.societyforscience.org/rules-all-projects

The Purpose of this document is to develop a common set of rules and guidelines for projects in grades K-8 conducted at schools and homes across the state of Indiana for competition in a Regional Science Fair. All Regional Science Fairs are required to follow the Intel ISEF rules for students in grades 9-12. However, these rules and their associated forms have proven to be a hindrance to many students in the lower grades.

The rules and guidelines in this document are intended to secure the safety of students, parents and teachers while conducting a science fair project. It is our hope that each teacher will adopt these guidelines for projects at their school and district level science fairs. Regional Fairs are not required to use or accept this version of rules and guidelines. For region specific rules and guidelines, please contact your regional fair director. A comprehensive list may be found at www.sefi.org

The Science Education Foundation of Indiana Hosts an online system free of charge to help teachers to manage their students conducting projects and to facilitate the student's entry into a regional science fair. Any student who intends to compete in a regional fair and be selected to participate in the state fair (HSEF) must have an active account with all project information included on the system. The teacher must agree to manage the account and help the student to meet all formal requirements for participation.

www.sefireg.org

Teachers must create an account and have their accounts authorized by the regional fair director.   They will then be able to log in and create accounts for the students to begin the process of their scientific investigations.

For questions about the system, contact our Executive Director at gcook@sefi.org

All Projects

Scientific Fraud and misconduct are not accepted at any level of science research. The work you submit for science fair must be your own work. Taking some other students project and submitting it as your work will lead to disqualification from competition.

Approval and Documentation

1. Before you begin, you must submit to your teacher a project proposal (page …) and receive approval for the project you wish to do.
2. Certain projects are prohibited for students in grades K-8. If you desire an exception to this rule you will have to work with the Regional Fair Director in your Region to get permission to proceed. www.sefi.org/registration.html
3. Display guidelines for Intel ISEF must be followed by all participants.
4. Every student should have the following items as part of their science fair project display.

   - **Logbook:** The logbook contains a dated account of everything that concerns the project. Every student is required to keep detailed notes, original observations and data from the experiment in the logbook.

   - **Research Paper: (usually for grades 6-8)** This part of the project is typically 4-10 pages long. It should be typed or written in ink. It is based upon the information that was kept in the logbook and it also includes the review of literature (background science) that was conducted before the experiment began.

   - **Exhibit Board:** The purpose of the display is to show what the student has done. It includes elements from the research paper. The exhibit should be visually appealing. Photographs that are dated and labeled are useful to relay the progress of the experiment, and/or the outcome of the experiment.

   - **Abstract:** a one-page summary (not more than 250 words) that states the purpose, hypothesis, procedures and conclusion of the project.

5. Team Projects may be allowed. No team may have more than three (3) members. Each Team members' name must be entered into the registration system and linked by a teacher to be in a group.

6. Teachers and Parents are responsible for ensuring that these rules are followed and the student project is safely designed and supervised at all times.

PROHIBITED / RESTRICTED RESEARCH

The research topics below are either not permitted or have conditions for students in grades K-8. This is not a comprehensive list. Teachers who have concerns about projects should contact the Regional Fair Director for guidance.

PERMITTED RESEARCH WITH CONDITIONS

Bacterial Studies Conducted in a school setting using one of the approved bacterial cultures only as long as the teacher is trained and certified for BSL-1 work. *The school must be certified as a BSL-1 or better by the regional Scientific Review Committee (SRC).* Contact your Regional Fair Director. NO BACTERIAL STUDIES FOR STUDENTS IN ELEMENTARY SCHOOL (GRADES K-5) WILL BE ACCEPTED FOR ENTRY TO AN INDIANA REGIONAL FAIR.

PLEASE NOTE:
MOST MIDDLE SCHOOLS DO NOT QUALIFY UNDER BSL-1 RULES FOR APPROVAL.
ELEMENTARY SCHOOLS ARE NOT ELIGIBLE TO RECEIVE THIS STATUS.

Human Subjects may be used only if all experimentation is conducted under adult supervision and student researchers have notified parents of the conditions of the experiment and provided the opportunity for their child to opt out of participation.

NOTE: Beginning in this school year, all projects involving human subjects must complete the Official ISEF Forms for human subjects (Attached to this document). Additionally, at the elementary/middle school level each school is expected to have a review and approval of a school level administrator and the school nurse. (signature on form). Projects without this approval (dated before beginning research/experimentation) may be disqualified from participating at any regional fair.

Animal Behavior Studies Research projects of this type should be reviewed by a Veterinarian to ensure the safety of the student and animal.

PROHIBITED – NO EXCEPTIONS

Radioactive substances or equipment that emits any form of ionizing radiation

Hazardous Chemicals or reagents, DEA Controlled substances, tobacco, alcohol, prescription drugs, firearms or explosives.

Biological Agents Experiments at Home projects that use or study microorganisms including bacteria, viruses, prions, fungi and parasites.
Some research may be possible if conducted in the school under the supervision of a properly trained teacher. (see above)

Vertebrate Animal Research involving pain, withholding of food or water.
All Vertebrate animal research should be reviewed by a Doctor of Veterinary Medicine.

Class IV Lasers (All use of Lasers must be under direct supervision of a qualified adult)

DISPLAY AND SAFETY GUIDELINES

Not Allowed at Project or in Booth

1. Living organisms, including plants
2. Taxidermy specimens or parts
3. Preserved vertebrate or invertebrate animals
4. Human or animal food
5. Human/animal parts or body fluids (for example, blood, urine)
6. Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state (Exception: manufactured construction materials used in building the project or display)
7. All chemicals including water (Exceptions: water integral to an enclosed, sealed apparatus.)
8. All hazardous substances or devices [for example, poisons, drugs, firearms, weapons, ammunition, reloading devices, and lasers (as indicated in item 5 in the section of these rules entitled "Allowed at Project or in Booth BUT with the Restrictions Indicated")]
9. Dry ice or other sublimating solids
10. Sharp items (for example, syringes, needles, pipettes, knives)
11. Flames or highly flammable materials
12. Batteries with open-top cells
13. **Awards, medals, business cards, flags, logos, endorsements, and/or acknowledgments** (graphic or written) unless the item(s) are an integral part of the project.
14. Photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissections, necropsies, or other lab procedures.
15. Active Internet or e-mail connections as part of displaying or operating the project at the Intel ISEF
16. Prior years' written material or visual depictions on the vertical display board.
17. Glass or glass objects unless deemed by the Display and Safety Committee to be an integral and necessary part of the project (Exception: glass that is an integral part of a commercial product such as a computer screen)
18. Any apparatus deemed unsafe by the Scientific Review Committee, the Display and Safety Committee (for example, large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks, etc.)

Allowed at Project or in Booth BUT with the Restrictions Indicated

1. Soil, sand, rock, and/or waste samples **if permanently encased in a slab of acrylic**
2. Photographs and/or visual depictions **if:**
   a. They are not deemed offensive or inappropriate by the Scientific Review Committee, the Display and Safety Committee, or Society for Science & the Public. This includes, but is not limited to, visually offensive photographs or visual depictions of invertebrate or vertebrate animals, including humans. The decision by any one of the groups mentioned above is final.
   b. They have credit lines of origin ("Photograph taken by..." or "Image taken from..."). (If all photographs being displayed were taken by the Student or are from the same source, one credit line prominently and vertically displayed is sufficient.)
   c. They are from the Internet, magazines, newspapers, journals, etc., and credit lines are attached. (If all photographs/images are from the same source, one credit prominently and vertically displayed is sufficient.)
   d. They are photographs or visual depictions of the Student.
   e. They are photographs of human subjects for which signed consent forms are at the project or in the booth.
3. Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points **if for display only and not operated.**
4. Any demonstration for judges or the public must be performed within the maximum size of the project permitted, (Check with Regional Fair for Size)

5. Class II lasers **if**:
   a. The output energy is <1 mW and is operated only by the Finalist
   b. Operated only during the Display and Safety inspection and during judging
   c. Labeled with a sign reading **"Laser Radiation: Do Not Look into Beam"**

     d.   Enclosed in protective housing that prevents physical and visual access to beam

     e.   Disconnected when not operating *Note: Class II lasers are found in laser pointers and in aiming and range-finding devices. They pose a risk if the beam is directly viewed over a long period of time.*

6. Class III and IV lasers if for display only and not operated.
7. Any apparatus producing temperatures that will cause physical burns if adequately insulated

DISPLAY SIZE. (not to exceed 48" wide x 54" tall(above table) x 30" deep.) No portions of the display may exceed these dimensions.

All posters must be representative of the work of the student. It must include only work done this school year. Parents and teachers are encouraged to assist in checking grammar and spelling for posters.

TYPES OF PROJECTS

Experimental: This type of project begins with a question of a scientific nature. It involves changing a variable, observing and recording the effects of changing the variable, and interpreting the importance of these effects. Experimental projects must have a control group to compare results to. Repeated trials or the use of large sample sizes are important processes to reduce the possibility of error and increase the validity of the results.

Descriptive Study: These projects involve comparing two or more different groups. The set up is much like experimental projects but missing the element of a control group. In this type of study you could compare the amount of sea grasses in a protected area against areas frequented by boaters.

Engineering: This project involves redesigning or attempting to improve an existing process or device. It may include combining devices for a new purpose. The process of engineering is cyclical and has a set of engineering goals rather than a scientific question and hypothesis.

Product testing This type of project is typically not an acceptable scientific study, however some regional fairs will accept them from the lower grades. Check with your Regional Fair Director to confirm.

Science Fair protocol prohibits any student from working with bacteria or fungi in their home. There are no exceptions to this rule. Similarly, any work involving human or animal tissue will not be allowed in K-8 regional or school fairs. The student must read and cite the MSDS sheet for any chemical that is used in the experiment. Safety of the experimenter and the community must always be a priority and are the responsibility of the teacher and parent to monitor.

The following format is recommended for organizing and writing the research paper:

Title Page: Project Title, Your Full Name & Date Submitted

Purpose/Question: What question will your project be trying to answer? Should be in the format of an If....then statement. (Example: Will changing the temperature of a honey cause it's viscosity to change?)

Variables, Constants and Control: You need to list your Manipulated variable (what you change), your Responding variable (what you measure that changes based on your change) , your constants (what must stay the same) and the control group (what you are comparing the experimental group to).

Research Section: Before you begin your experiment, even before you make your hypothesis you should find out as much as you can about the related topics and underlying scientific principles that will be involved in your project. The purpose of this section is to show that you understand the branch of science this topic falls under, the related science concepts and specific vocabulary. This is a retelling in your own words of what experts know about the topic. Keep

track of the sources you use and include them in the works cited page. This section of the paper may be at least 3 to possibly 4 pages long.

Hypothesis: On this page the purpose of the project is stated. The purpose should include what you plan to do, the reason you chose the topic, and what you were hoping to learn. The hypothesis is a written statement that concerns your prediction as to how the manipulated variable will affect the responding variable.

Materials List/Procedures (Experimental Design): The material list should include everything you used to complete your project. The procedures should follow a step by step format. The procedures should be detailed and explain all safety protocols that were followed to protect the experimenter and the community. If chemicals are used discuss the safe handling and disposal of the chemicals. This section of the paper may be one to two pages long.

Data & Graphs: Once the experiment starts all possible data should be collected and recorded in the logbook. For the report, organize this data into charts, tables and graphs. Use line graphs whenever possible and the metric system at all times. This section of the paper may be one or more pages long, depending on the amount of data collected.

Conclusion: Follow a three paragraph format to ensure the conclusion is thorough.
The first paragraph is a discussion of the hypothesis and data. Restate the hypothesis and decide if the data supported this statement or did not support it. Retell the data using the numbers, and/or your analysis of the numbers such as the mean, median or mode. State your inference concerning why the data turned out the way it did. The second paragraph discusses the problems or concerns you had during the experiment. Include new ideas that came to you that you might use as the basis of a science project in the future, or ways to change this idea to use in the future. The last paragraph states what you learned as the result of this project. Include any observations you made as to how this information can be applied to real life. This is one page.

Works Cited: Using MLA or APA style, document all books, magazines or electronic information sources that you used for your review of literature.

From Science Buddies
http://www.sciencebuddies.org/science-fair-projects/project_ideas/Safety_Guidelines.shtml

Safety should be a primary concern for every science experiment. The good news is that most projects you'll find on the Science Buddies website involve virtually no risk. However, almost any tool or technique, no matter how safe, can be used in an unsafe manner. At the same time, many potentially dangerous tools are perfectly safe if they are used in the proper way. So how do you know if your project is within reasonable safety guidelines? Science Buddies recommends you ask three simple questions to test your project's level of safety.

1.   Is it safe for other people or animals that are involved? All projects involving humans as subjects must involve minimal risk. Unacceptable risks include ingestion of any substance or physical contact with any potentially hazardous materials, as well as unnecessary physical, psychological, or emotional stress, including invasion of privacy. Even if you are simply surveying other students, you should review your questions in advance and decide if the questions meet this test, and determine if a parent/guardian's consent is needed for any students that are participating. If you're not sure, don't hesitate to ask a teacher, parent, or mentor to help you decide. Live animals (in particular vertebrate animals-those with a backbone) should be housed, cared for, and observed in a safe and humane manner.

2.   If you are participating in another science fair after your classroom or school fair, does your project meet the safety rules for that higher-level fair? If you will be participating in a city or county-wide fair, make sure that the projects meet the rules of that fair. Science fairs affiliated with the Intel International Science and Engineering Fair (ISEF) must follow very strict and detailed safety rules, often including pre-approval before experimentation begins. The Science Buddies website has an overview of these rules on the Scientific Review Committee (SRC) page.

3.   Finally, have you addressed safety concerns to your parents' and teacher's satisfaction? Make sure you address all safety issues in your project proposal so your adult supervisors are aware of any issues ahead of time. Your teacher will then evaluate your project based on the following questions:

   o Where will the experiment be performed?

   o What safety gear will be used?

   o Who will be supervising the experiment?

   o Are you knowledgeable about or do you have training in the procedures being used?

If in doubt about the safety of the experiment, ask your teacher, parent, or mentor for advice. Be prepared to choose another project if your teacher decides that yours does not meet the appropriate school safety guidelines. Hopefully good common sense and the questions above will help you put together a fun, informative, and safe science fair project.

ONLINE REGISTRATION SYSTEM

SEFI offers to schools and regions an online registration system that teachers may use to help organize the school level fair. When a teacher creates an account on the system they will be able to give access to students. This system must be used if you are planning on attending the regional fair. Additional information can be found on the SEFI website www.sefireg.org

Regional Fairs in Indiana:

East Central Indiana Regional Science Fair	Ball State University
Lafayette Regional Science Engineering Fair	Purdue University
Northeastern Indiana Regional Science Fair	IUPUI Fort Wayne
Northeastern Indiana Tri-State Regional Science Fair	Trine University
Northern Indiana Regional Science & Engineering Fair	Notre Dame
Northwestern Indiana Regional Science & Engineering Fair	Valparaiso University
Tri-State Regional Science & Engineering Fair	University of Southern Indiana
West Central Indiana Science & Engineering Fair	DePauw University
Central Indiana Regional Science & Engineering Fair	Marian University
South Central Indiana Science & Engineering Fair	Ivy Tech Community College – Bloomington Campus

FOR SPECIFIC DATES AND TIMES VISIT OUR WEBSITE

www.sefi.org
Look under the link "Regional Fair Network" for your region.

Intel ISEF Categories

The categories listed below are those used at the Intel ISEF. Local, regional, state and country fairs may or may not choose to use these new categories, dependent on the needs of their area. Please check with your affiliated fair(s) for the appropriate category listings at that level of competition.

Category Selection Advisement:
Many projects could easily fit into more than one Intel ISEF category. It is your decision to choose the category that most accurately describes your project.

Ask yourself the following questions to help in the selection of a category:

1. Who will be the most qualified to judge my project? What area of expertise is the most important for the judge to have? (For example, a medical background or an engineering background?)
2. What is the emphasis of my project? What characteristic of my project is the most innovative, unique or important? (For example, is it the application in medicine or the engineering of the machine? Is it inserting the proper gene or the method of computer mapping to demonstrate the results?)

Animal Sciences (ANIM)
Behavioral and Social Sciences (BEHA)
Biochemistry (BCHM)
Biomedical and Health Sciences (BMED)
Biomedical Engineering (ENBM)
Cellular and Molecular Biology (CELL)
Chemistry (CHEM)
Computational Biology and Bioinformatics (CBIO)
Earth and Environmental Sciences (EAEV)
Embedded Systems (EBED)
Energy: Chemical (EGCH)
Energy: Physical (EGPH)
Engineering Mechanics (ENMC)
Environmental Engineering (ENEV)
Materials Science (MATS)
Mathematics (MATH)
Microbiology (MCRO)
Physics and Astronomy (PHYS)
Plant Sciences (PLNT)
Robotics and Intelligent Machines (ROBO)
Systems Software (SOFT)
Translational Medical Science (TMED)

Human Participants Form (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 of prior review and approval.
(IRB approval required before recruitment or data collection.)

_____ | _____
Student's Name(s) | Title of Project

_____ | _____
Adult Sponsor | Phone/Email

Must be completed by Student Researcher(s) in collaboration with the Adult Sponsor/Designated Supervisor/Qualified Scientist:

1. ☐ I have submitted my Research Plan/Project Summary which addresses ALL areas indicated in the Human Participants Section of the Research Plan/Project Summary Instructions.
2. ☐ I have attached any surveys or questionnaires I will be using in my project or other documents provided to human participants.
   ☐ Any published instrument(s) used was /were legally obtained.
3. ☐ I have attached an informed consent that I would use if required by the IRB.
4. ☐ Yes ☐ No Are you working with a Qualified Scientist? If yes, attach the Qualified Scientist Form 2.

BELOW – IRB USE ONLY

Must be completed by Institutional Review Board (IRB) after review of the research plan. All questions must be answered for the approval to be valid. (If not approved, return paperwork to the student with instructions for modifications.)

☐ Approved with Full Committee Review (3 signatures required) and the following conditions: **(All 6 must be answered)**

1. Risk Level (check one) : ☐ Minimal Risk ☐ More than Minimal Risk
2. Qualified Scientist (QS) Required (Form 2): ☐ Yes ☐ No
3. Designated Supervisor (DS) Required (Form 3): ☐ Yes ☐ No
4. Written Minor Assent required for minor participants:
   ☐ Yes ☐ No ☐ Not applicable (No minors in this study)
5. Written Parental Permission required for minor participants:
   ☐ Yes ☐ No ☐ Not applicable (No minors in this study)
6. Written Informed Consent required for participants 18 years or older:
   ☐ Yes ☐ No ☐ Not applicable (No participants 18 yrs or older in this study)

IRB SIGNATURES (All 3 signatures required) None of these individuals may be the adult sponsor, designated supervisor, qualified scientist or related to (e.g., mother, father of) the student (conflict of interest).

I attest that I have reviewed the student's project, that the checkboxes above have been completed to indicate the IRB determination and that I agree with the decisions above.

Medical or Mental Health Professional (a psychologist, medical doctor, licensed social worker, licensed clinical professional counselor, physician's assistant, doctor of pharmacy, or registered nurse) with expertise related to this project.

_____ | _____
Printed Name | Degree/Professional License

_____ | _____
Signature | Date of Approval (Must be prior to experimentation.) (mm/dd/yy)

Educator

_____ | _____
Printed Name | Degree

_____ | _____
Signature | Date of Approval (Must be prior to experimentation.) (mm/dd/yy)

School Administrator

_____ | _____
Printed Name | Degree/Professional License

_____ | _____
Signature | Date of Approval (Must be prior to experimentation.) (mm/dd/yy)