

GREATER SAN DIEGO SCIENCE & ENGINEERING FAIR



2019-2020 Rules & Regulations

<http://www.gsdsef.org>

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WHO MAY ENTER the GSDSEF

Any 6th through 12th grade student attending a public, private, parochial or home school in San Diego or Imperial Counties may enter a project in a local school science fair. All students must submit an online SRC Pre-Approval Form with a Signature Page. Only after the GSDSEF Scientific Review Committee has approved the project may student(s) begin with experimentation. Top projects from each school/district then move on to on-line Screening, where projects are selected to apply to the Greater San Diego Science and Engineering Fair (GSDSEF).

All projects must have an adult advisor. This includes teachers, administrators, or science/engineering knowledgeable parents.

DIVISIONS

Junior -- grades 6 – 8 (either individual or 2-person team projects may be entered)

Senior -- grades 9 through 12 (either individual or 2-person team projects may be entered)

All students who develop a project for the Greater San Diego Science & Engineering Fair must read and comply with all Rules and Regulations in this document. Parents, teachers and adult supervisors must also read and understand these *2019-2020 Rules & Regulations*.

CONTACTS

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BASIC RULES



The GSDSEF Management Committee reserves the right to reject projects as unsafe/unsuitable for display.

- Starting in 2019-20, all students must complete the SRC Pre-Approval Form (done online), submit with a Signature page, and get SRC approval *prior to starting experimentation*. If Certification Forms are required, they must be submitted at the same time.
- After submission of the SRC Pre-Approval Forms and Signature Page, and any necessary Certification Forms, all students must receive approval from the GSDSEF SRC *prior to starting experimentation*.
- Teachers should ensure that their students obtain the necessary signatures and submit the SRC Pre-Approval form, and any necessary Certification Forms by mid-November. Students may begin with their projects only after receiving SRC approval.
- **Required**
 - **SRC Pre-Approval On-Line Form**—After establishing their account at gsdsef.org, all students fill out the SRC Pre-Approval on-line form.
 - **SRC Pre-Approval Signature Form**-- All students obtain the necessary 'wet' signatures, which are scanned and submitted with the SRC Pre-Approval On-line Form.
- **If Necessary**
 - **Certification of Humane Treatment of Live Vertebrate Animals Form** (GSDSEF Form 2) for projects involving live vertebrate animals.
 - **Certification of Compliance of Research Involving Humans Form** (GSDSEF Form 3) for projects involving human subjects and/or interviewees.
NOTE: A sample Human Subject Consent Form is included with this form on the GSDSEF website.
 - **Certification of Control of Hazards Form** (GSDSEF Form 4) for projects involving bacteria; molds or fungi; chemicals; toxic, corrosive, mutagenic, carcinogenic, teratogenic, or infectious agents; venomous animals; poisonous plants; or potentially hazardous substances or devices and/or anything labeled hazardous which, if not handled properly, can cause injury.
 - **Certification of Vertebrate Tissue Source and Safety Form** (GSDSEF Form 5) for projects involving human or other vertebrate animal tissue (including teeth and hair roots), blood, blood products and body fluids.
- After being screened and then selected to enter the GSDSEF, students will submit an on-line *Application for Entrance* before the stated deadlines.
- Team Projects: Once a project has started, team members cannot be changed. The final project should reflect the work of both members and each member should fully understand every aspect of the project. Each team member must complete and sign his/her own copy of the SRC Pre-Approval Form/Signature Page. Only one copy of other required GSDSEF forms (2, 3, 4, or 5) is needed for each team project.
- Projects that are a continuation of a previous project must involve significant new experimentation.

State this in the title, e.g., "2nd Year Study, 3rd Year Study", etc. Notebooks from previous projects should be available during judging. Download the Continuation Form found on the gsdsef.org website.

- Students who work in a research lab or industrial setting must have a supervising adult complete the Regulated Research Institution (RRI) Form *after* experimentation is complete. Download the RRI Form found on the gsdsef.org website.
- One table, 76 cm (30 in.) high or one floor space (without table) will be provided for each project. Outside measurements for each project are limited to 76 cm (30 in.) deep, front to back; 122 cm (48 in.) wide, side to side; 198 cm (77 in) high from table surface OR 274 cm (108 in.) high if a floor space is requested.



JUDGING STANDARDS

1. Creativity

Originality of the problem, uniqueness of approach and interpretation of data should be commensurate with the student's grade level. Ingenious use of equipment and materials is considered regardless of the expense of the items involved.

2. Scientific Thought/Engineering Project Goals/Computer Project Goals

A. Scientific Method:

The project shows depth of study and effort in employing scientific procedures in the solution of a clearly defined problem (including background study, organized procedures, appropriate sampling, orderly recording and analysis of data and the formulation of logical conclusions).

B. Engineering Project Goals:

The project has a clear objective relevant to the needs of the potential user. The product or process has been tested and is both workable and feasible economically and ecologically.

C. Computer Project Goals:

The project has a clear objective, has been thoroughly tested and documented and is both practical and workable.

3. Thoroughness

The study is complete within the scope of the problem. Scientific literature has been searched, experiments repeated and careful records kept.

4. Skills

Credit is given for special skills needed for the construction or use of equipment and for mathematical, computational, observational, and design skills.

5. Clarity

The purpose, procedures and conclusions are clearly explained orally and through the display. The PROJECT NOTEBOOK is well organized, neat and accurate. Sources of ideas, data, and assistance are clearly identified.

Judging Team Projects

In judging a team project in comparison to one done by an individual, it is fair to have a higher expectation of the team project regarding the overall level of effort involved in the project.

Team projects have greater resources (the number of minds working together) and therefore a greater capacity for more research and data collection, more time, effort, and thought spent on the project, and more analysis than someone acting alone. This should be evident in the project.

There should also be evidence of team collaboration and synergy among team members (which should become evident during the interview process).

SAFETY PRECAUTIONS

NO HAZARDOUS material may be displayed with your project.

EXAMPLES OF ITEMS NOT allowed in a display:

- live disease-causing organisms that are pathogenic to humans or other vertebrates
- microbial cultures and fungi, live or dead, including unknown specimens, food, either human or animal
- syringes, pipettes and similar sharp devices any flames, open or concealed potentially hazardous
- substances [including chemicals] and devices highly combustible solids, fluids or gases. Inert substitutes must be used if such materials are required for display. NOTE: Rockets must NOT contain fuel!
- tanks that have contained combustible gases, including butane and propane, unless they are verified to have been purged with carbon dioxide
- liquids (including water), all pose a threat to the floor finish at the BPAC
- sublimating solids including dry ice
- living or preserved organisms, like animal or plant tissues, by-products, etc.
- live or preserved vertebrate or invertebrate animals or parts (including embryos, microbial cultures or fungi, whether known to be disease-causing or not) may be exhibited at the Fair. Sealed insect collections will be permitted on display.
- human parts, other than teeth certified HIV free, hair (without roots), nails and histological sections (properly acquired) may be exhibited at the Fair. Any approved human parts on display must be sealed in an airtight container.
- photographs or other visual presentations depicting vertebrate animals in other than normal conditions may be displayed on the student's exhibit.

Devices producing temperatures in excess of 100° C (212 degrees F) must be adequately insulated.

ALSO, the following ELECTRICAL safety issues must be observed:

- Wiring must be properly insulated and fastened.
- Wiring, switches and metal parts of high voltage circuits must be located out of the reach of observers and must include an adequate overload safety device.
- High voltage equipment must be shielded with a grounded metal box or cage to prevent accidental contact, and MUST have prior permission to be demonstrated during judging.
- Approved connecting cords of a proper load-carrying capacity must be used for 110-volt operation of lights, motors, transformers, and other equipment.
- Standard switches must be used for 110-volt circuits. Open knife switches or bell-ringing push buttons are not acceptable for circuits exceeding 12 volts.
- Batteries with open top cells (wet cell batteries) are NOT permitted.
- Electrical connections in 110-volt circuits must be soldered or fixed under approved connectors and have connecting wires properly insulated.
- Electrical circuits for 110-volt AC must have an Underwriters Laboratories approved cord (of proper load carrying capacity) at least 2 meters long and equipped with a standard 3 prong grounded plug.

Electrical Safety continued

- Devices (vacuum tubes, lasers,) that generate dangerous rays must be properly shielded.
- Only class I and class II (NOT class III or IV) Lasers may operated at the Fair.

These lasers must:

- a. have a protective housing or barricade preventing human access to the beam during operation;
- b. be disconnected from the power source when not being operated;
- c. be operated only in the presence of the exhibitor and otherwise inoperable when displayed, and should be accompanied by a sign reading:
"LASER RADIATION: DO NOT STARE INTO BEAM"

SAFETY REMINDERS:

- Any Controlled Substances (drugs, chemicals, anesthetics, narcotics, etc., the use of which is regulated by the Comprehensive Drug Abuse Prevention and Control Act of 1970) must be acquired and used in accordance with existing local, state and federal laws. See your pharmacist or write the State Department of Health for information about these laws. Such substances may not be exhibited at the Fair. The use of many such substances is prohibited by the GSDSEF. Please contact Steve Rodecker, stevegsdsef@gmail.com, regarding ANY proposed use of a controlled substance in developing a science fair project.
- All Recombinant DNA research must be carried out in accordance with the latest NIH Guidelines for Research Involving Recombinant DNA Molecules. Only research normally conducted without containment in a microbiological laboratory and performed under the supervision of an appropriately qualified scientist will be permitted. The facilities to be used must be described in the research plan.
- Projects involving tobacco; tobacco products; smokeless powder; black powder; explosives; the manufacture of rocket fuel and/or alcohol/other intoxicants or gasohol (or the production of these), are prohibited.

PLEASE NOTE: STUDENTS MAY NOT LOAD OR RELOAD ANY AMMUNITION.

- Fire regulations prohibit use of highly flammable materials or decorations in project displays. Background panels must be of non-flammable material and meet the size specifications outlined on p.3 (purchased commercial backboards are recommended), to which poster paper, cardboard or fabric may be securely attached. Lights may not be attached to boards.

Please contact the GSDSEF Scientific Review Committee (SRC) using the [CONTACT US](#) on the gsdsef.org website or contact Steve Rodecker – stevegsdsef@gmail.com for information regarding these regulations.

CERTIFICATION OF HUMANE TREATMENT OF LIVE VERTEBRATE ANIMALS (GSDSEF Form 2)

REGULATIONS FOR EXPERIMENTS WITH ANIMALS

Students planning research involving live vertebrate animals **MUST**, before acquiring them and starting any experiments, **COMPLY** with the requirements of the *California Education Code*, the Intel International Science and Engineering Fair (Intel ISEF), and the GSDSEF **Rules & Regulations**. In case of conflict, the provisions of the California Education Code take precedence. Follow these steps:

1. Become familiar with the **California Education Code**, Intel International Science and Engineering Fair (Intel ISEF), and the Greater San Diego Science and Engineering Fair (GSDSEF) **Rules & Regulations** stated below.
2. Read and complete the Greater San Diego Science and Engineering Fair: Certification of Humane Treatment of Live Vertebrate Animals Form (GSDSEF form 2). Obtain all required signatures. This must be uploaded with your SRC Pre-Approval On-line Form. After you have received approval from the GSDSEF SRC, you may begin with experimentation.

Students must submit their signed Certification Forms to the GSDSEF Scientific Review Committee (SRC) at the same time as they submit their SRC Pre-Approval Form and Signature Page. Experimentation may begin only after GSDSEF SRC approval is granted.

PERTINENT EXCERPTS

From the:

- **CALIFORNIA EDUCATION CODE** PROVISIONS
- **INTEL INTERNATIONAL SCIENCE AND ENGINEERING FAIR (Intel ISEF)**
- **GSDSEF ANIMAL REGULATIONS**

*Any student research involving animals **MUST COMPLY** with the requirements of the **CALIFORNIA EDUCATION CODE** stated here:*

[California Education Code Title 2, Division 2, Part 28, Chapter 4, Article 5,51540:](#)

In the public elementary and high schools or in public elementary and high school sponsored activities and classes held elsewhere than on school premises, live vertebrate animals shall not, as part of a scientific experiment or any purpose whatever:

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

REGULATIONS FOR EXPERIMENTS WITH ANIMALS continued

- (b) Be injured through any other treatments, including, but not limited to, anesthetization or electric shock.
- Live animals on the premises of a public elementary or high school shall be housed and cared for in a humane and safe manner.
 - The provisions of this section are not intended to prohibit or constrain vocational instruction in the normal practices of animal husbandry.

Compliance with the following ISEF REGULATIONS is also required.

*HOWEVER, the provisions of the **California Education Code** MUST be followed whenever conflicting regulations occur.*

**INTEL INTERNATIONAL SCIENCE AND ENGINEERING FAIR (INTEL ISEF) REGULATIONS:**

1. The use of Protista, other invertebrates or tissue/cell cultures are encouraged for most research involving animals. Their wide variety and feasibility of using larger numbers than is usually possible with live vertebrates makes them especially suitable.
2. The basic aims of experiments involving animals are to achieve an understanding of life processes and to further knowledge. They do not include the development of new or refinement of existing surgical techniques or experiments in toxicological studies. Experiments involving animals live or preserved, vertebrate or invertebrate, (excluding homo sapiens), vertebrate embryos and fetuses and chicken embryos prior to three days (72 hours) of hatching, must have clearly defined objectives requiring the use of animals to demonstrate a biological principal or answer scientific propositions. Such experiments MUST be conducted with a respect for life and an appreciation of human considerations.

Animal Defined: The ISEF Rules define an animal as any live, nonhuman vertebrate, mammalian embryo or fetus, tadpoles, reptile or bird eggs within three days (72 hours) of hatching, and all other nonhuman vertebrates (including fish) at hatching or birth.

3. To provide for humane treatment of animals, an animal care supervisor knowledgeable in the proper care and handling of experimental animals (may be teacher or parent) MUST assume primary responsibility for the conditions under which the animals are maintained. If the school faculty includes no one with adequate training in this area, the services of a qualified consultant MUST be obtained.
4. All live or preserved animals or animal parts MUST be lawfully acquired from an approved source and their care and use MUST be in compliance with local, state and federal laws. NOTE: Pet store animals are inappropriate for experimentation as their genetic background, age and past nutritional status are difficult to obtain.
5. The COMFORT of the animals shall be a prime concern. No research using live vertebrate animals shall be attempted unless the animals are obtained from a reliable source and the following conditions can

REGULATIONS FOR EXPERIMENTS WITH ANIMALS continued

6. be assured: appropriate, comfortable quarters; adequate food and water; humane treatment and gentle handling. Care must be provided at all times, including weekends and vacation periods.



Compliance with the following GSDSEF REGULATIONS is also required.

*HOWEVER, the provisions of the **California Education Code** MUST be followed whenever conflicting regulations occur.*

GSDSEF REGULATIONS:

1. Student research involving animals/animal parts MUST comply with the requirements of the California Education Code, the GSDSEF and the Intel International Science and Engineering Fair (Intel ISEF) – see last page GSDSEF form 2. In case of conflict, the provisions of the California Education Code take precedence.
2. **GSDSEF Form 2, Certification of Humane Treatment of Live Vertebrate Animals, when required must be submitted simultaneously with the SRC Pre-Approval Form and Signature Page, and approved by the GSDSEF Scientific Review Committee prior to experimentation starting. Once approved, the forms will be visible on the Teacher Account Dashboard.**
3. **Note: The “Certification by Biomedical Scientist” must be completed for research involving studies other than observations of animals in their natural environment.**
4. The biomedical scientist must provide continuing supervision to assure compliance with the protocol. A biomedical scientist is defined as one who possesses an earned doctoral degree in science or medicine and who has current working knowledge of the techniques to be used in research under consideration.
5. Major deviations from the approved protocol may be implemented only with written approval of the biomedical scientist.
6. The biomedical scientist must be in the same locality as the student for the duration of the experimental work except for short trips. This means that a project started in one city may not be continued in another unless a designated adult supervisor (an individual who has been properly trained in the techniques and procedures to be used in the investigation), approved by the biomedical scientist prior to the continuation of the experimental work, agrees to supervise the project.
7. Experiments involving procedures not in violation of the painful reaction or injured restrictions of the California Education Code are permitted if certified by a qualified biomedical scientist PRIOR TO the beginning of the investigation. NOTE: GSDSEF rules do not permit students OR their adult supervisors, as part of a student-planned /conducted project, to:
 - a. perform surgery.
 - b. conduct experiment involving toxicity, nutritional deficiency or harmful physical or psychological stress.
 - c. perform the sacrifice (humane euthanasia) of live vertebrate animals. Projects designed with the intent to harm or kill ANY live vertebrate animal are prohibited.



CERTIFICATION OF COMPLIANCE OF RESEARCH INVOLVING HUMANS (GSDSEF Form 3)

REGULATIONS FOR EXPERIMENTS WITH HUMAN SUBJECTS/INTERVIEWEES

The HIPAA Regulations regarding patient records and confidentiality may well affect whether a project is suitable for student development:

No identifiable personal information may appear in your records or project notebook or on your display. All subjects must sign a consent form allowing the student to use data collected and these consent forms must be kept in a sealed envelope but made available if requested. A sample blank consent form should be included in the Project Notebook. If any question exists as to the propriety of the proposed project, the student or teacher must contact: Steve Rodecker, stevegsdsef@gmail.com for guidance.

Students must submit their signed Certification Forms to the GSDSEF Scientific Review Committee (SRC) at the same time as they submit their SRC Pre-Approval Form and Signature Page. Experimentation may begin only after GSDSEF SRC approval is granted.

The following steps must be taken BEFORE any student begins research involving human subjects:

1. The student completes the GSDSEF "Research Plan", a 200-250 word explanation of the planned project/experiment and the procedures to be used. This plan is part of the SRC Pre-Approval Form, which is the same as section 7 of GSDSEF Form 3, the Certification of Compliance of Research Involving Human Subjects. It is then submitted to his/her teacher.
2. The sponsoring teacher reviews the "Research Plan" and determines if any POTENTIAL physical, psychological or social risk is involved.
3. If none is apparent, the teacher signs the certification (final approval subject to confirmation by the GSDSEF Scientific Review Committee).
4. If any question exists, the student must redesign the project or plan a different study.

REGULATIONS FOR EXPERIMENTS WITH HUMAN SUBJECTS/INTERVIEWEES continued

- Projects involving exercise or other strenuous activity or in which subjects are given stimulants like caffeine found in items like Colas, coffee, tea, etc., or other over-the-counter products and/or food supplements must have their protocols analyzed by and/or be supervised by a medical doctor. Ingestion of other substances like nuts (possible allergen) or sugar (possible diabetic subjects) may also require medical supervision (to be determined on a case by case basis.)



5. All projects involving human subjects (including projects involving surveys and questionnaire) or data that came from human subjects with identifiable private information (e.g. names, addresses, birth date, phone number) must conform to the regulations listed here and on the Certification for Research of Human Subjects form.

- Students must submit their completed GSDSEF Form 3 to the GSDSEF Scientific Review Committee (SRC) BEFORE testing begins.
- **New for 2020!** A School IRB (Institutional Review Board) may also review and approve Human Subjects research BEFORE testing begins and submit the GSDSEF Human Subjects Research Certification to the GSDSEF Scientific Review Committee
- Human studies without GSDSEF Form 3 will not be allowed in the GSDSEF for exhibition or judging.
- **New for 2020!** Medical device inventions and prototype must be conducted in a Regulated Research Institution with the exception of those projects in which the student researcher is the only person testing the invention and testing does not pose a safety hazard.

DEFINITIONS:

- A human subject is legally defined as "a person about whom an investigator (professional or student) conducting scientific research obtains data through intervention or interaction with the person."
- A subject at risk is legally defined as "any individual who may be exposed to the possibility of injury, including physical, psychological or social injury, as a consequence of participation as a subject in any research."
- Students using human subjects must comply with all regulations that reflect the will of society and plan proper methodology for the protection of those subjects. It is essential that they be alert to humane concerns at all times.

NOTES

1. Because Federal regulations have become increasingly more rigid, students must plan carefully before undertaking research which involves the use of human subjects in either behavioral or biomedical studies. This will protect subjects from unnecessary exposure to physical or psychological risks and experimenters and schools from legal complications. {For example, the law is very clear about disclosure of medical information: "This information may be disclosed to accredited public or private non-profit educational or health care institutions for bona fide research purposes. However, no information so disclosed shall be further disclosed by the recipient in any way which would allow the identification of the patient." {California Civil Code, Section 56.10, (c), (7).}}
2. Student researchers may not use professional psychological (or other) tests without the written approval of the author(s).
3. Student researchers must obtain written permission from each subject/interviewee to be used in the study (or, if under the age of 18, from their parents/guardians). The teachers involved may certify studies conducted in classrooms. **NOTE: A SEALED ENVELOPE CONTAINING ALL CONSENT FORMS MUST BE HELD BY THE TEACHER FOR SAFE KEEPING AND BE AVAILABLE IF NEEDED BY A SCREENER OR JUDGE.** Originals should be kept for possible State or International S & E Fair applications.
4. Any project involving human subjects/interviewees that is developed with the advice and assistance of personnel at a medical/scientific organization must also comply with any regulations of that organization requiring approval of its Institutional Review Board (IRB) and Informed Consent Certification.
5. Identifiable personal or medical information may not be included in this study.
6. The rights and privacy of human subjects/interviewees must be respected at all times.



CERTIFICATION OF HAZARDS CONTROL FORM (GSDSEF Form 4)

PROCEDURES FOR PROJECTS INVOLVING:

- Bacteria
- Molds or fungi
- Protozoa
- Chemicals
- Toxic, corrosive, mutagenic, carcinogenic, teratogenic or infectious agents
- Venomous animals
- Poisonous plants
- Potentially hazardous substances or devices (anything so labeled, if not handled properly, can cause injury)

Students must submit their signed Certification Forms to the GSDSEF Scientific Review Committee (SRC) at the same time as they submit their SRC Pre-Approval Form and Signature Page. Experimentation may begin only after GSDSEF SRC approval is granted.

1. ALL studies involving the use of microorganisms (including bacteria, viruses, viroids, prions, rickettsia, fungi, and parasites), recombinant DNA (rDNA) technologies or human or animal fresh tissues, blood, or body fluids require pre-approval by the GSDSEF SRC. Please contact Steve Rodecker, stevegsdsef@gmail.com with questions.
2. ALL studies in these areas of research are prohibited in a home environment.
3. A risk assessment is required for all projects in these research areas. Research projects in these areas of research are now classified into biosafety levels that require appropriate biosafety containment. Essentially, biosafety level 1 research may be conducted in a high school laboratory with a trained Designated Supervisor.
4. Projects Involving Unknown Microorganisms (i.e. those collected from the environment) have additional rules and restrictions. See items 1-5 on the next page.
5. Some tissues do not need to be treated as potentially hazardous biological agents (i.e. plant tissue, established cell lines, hair, etc.). Please see the Additional Rules for Projects Involving Tissues Including Blood and Blood Products for full rules (found on GSDSEF Form 5).

HAZARDS CONTROL - SPECIAL CONSIDERATIONS

THE METHODS AND MATERIALS SECTION OF THE PROJECT DESCRIPTION MUST CONTAIN EXPLICIT AND DETAILED STATEMENTS AS TO HOW AND WHERE EXPERIMENTS WILL BE CONDUCTED.

Following are examples of precautions that must be taken to prevent injury to people or the environment. No list could possibly include all possible hazards, so teachers, parents and students must carefully plan and follow safe procedures specific to each study. Include all hazards you anticipate or encounter and necessary precautions on GSDSEF Form 4 in the section "Safety Precautions to be Exercised During Procedures":

1. All cultures in petri dishes must be sealed with two tapes on opposite sides immediately after exposure. Examine through lids only. Dispose of as possible pathogen (biohazard bags or sterilization).
2. All bacteria, protozoa and fungi (including molds) are to be handled as though pathogenic. Known pathogenic bacteria are NOT to be cultured. Pure cultures of nonpathogenic microorganisms should be used in experiments. When soil or water is used as a source of bacteria (or fungi), it is important to collect samples unlikely to be contaminated by human pathogens. For example, water should be collected from lakes, estuaries or beaches free of sewage or animal-waste pollution and never from areas suspected to be or posted as polluted. Collection of soil samples in or around old building sites, animal burrows and/or areas in which Valley Fever is endemic should be avoided.
3. Bacterial studies must be conducted in a properly equipped laboratory under qualified supervision. Petri dishes may be *inoculated* at home but must be IMMEDIATELY SEALED and taken to the lab. *Culturing* microorganisms in the home environment is prohibited. Such projects will not be allowed to compete in the GSDSEF.
4. Petri dishes that are inoculated with materials containing unknown microorganisms (i.e., the material is not a pure non-pathogenic culture) must not contain blood agar or BHI, but rather nutrient or trypticase soy agar.
5. Manipulation of molds must take place in a fume hood or open-air area to prevent contamination of living areas with fungal spores. If anyone in the area has a depressed or damaged immune system or any allergies, experiments with molds must be conducted in a laboratory. Containers must be sealed at all times during observations and disposed of as possible pathogens.
6. Approved eye-protective devices should be used by all persons performing science activities involving hazards to the eyes. All persons in close proximity must be similarly equipped. Laboratory aprons and rubber or plastic gloves should be available and should be worn whenever hazards exist that could damage clothing, injure someone or irritate skin.
7. Eyes and skin must not be exposed to ultraviolet light experimentally or accidentally as part of a project.

HAZARDS CONTROL continued



8. The use of especially hazardous chemicals should be avoided and substitutes used. If the use of certain hazardous chemicals (e.g., gel preparations of Acrylamide, a neurotoxin, or Ethidium Bromide, mutagen) cannot be avoided, extra precautions must be exercised and any procedures which involve exposure to these hazards *must be performed by the supervisor*. Consult (*MSDS*) *Material Safety Data Sheets* (available from each chemical supplier) prior to use of any hazardous chemicals.

Student use or handling of Ethidium Bromide or gel stained with Ethidium Bromide is prohibited. If it is a necessary part of the experiment, they must be handled only by qualified lab personnel trained in the standards for their use. Care must be taken that the student experimenter does not come into contact with them.

9. Projects involving tobacco; tobacco products; smokeless powder; black powder; explosives; the manufacture of rocket fuel and/or alcohol/other intoxicants or gasohol (or the production of these), are PROHIBITED. PLEASE NOTE, IN ADDITION, THAT STUDENTS MAY NOT LOAD OR RELOAD ANY AMMUNITION.

Please contact the GSDSEF Scientific Review Committee (SRC) Steve Rodecker, stevegsdsef@gmail.com for information regarding these regulations.

10. The use of Controlled Substances (drugs, chemicals, anesthetics, narcotics, etc. which are regulated by the Comprehensive Drug Abuse Prevention and Control Act of 1970) must be in accordance with existing local, state and federal laws. See your pharmacist or write the State Department of Health for information about these laws. The use of many such substances is prohibited by the GSDSEF.

Please contact Steve Rodecker, stevegsdsef@gmail.com regarding any proposed use of a controlled substance in developing a science fair project.

11. Arrangements must be made to assure proposed procedure is safe before any project proposal is approved. When specialized safety equipment and/or facilities (e.g., fume hoods, clinical laboratory) are necessary, arrangements must be made in advance.
12. Other hazardous or potentially hazardous procedures, materials or devices must be clearly specified.
13. Requests for approval of procedures (to be performed at hospital, university or other professional labs) that include activities such as transfer or microscopic identification of unknown bacterial cultures must include detailed information/statements on safety procedures and equipment, e.g. "the following procedures will be conducted by the laboratory supervisor" or "these procedures will be conducted in a bacteriological hood using the following additional precautions:" Student add items as appropriate.

14. All projects that involve the use of hazards including Potentially Hazardous Biological Agents (microorganisms, recombinant DNA (rDNA) technologies, or human or animal tissues, blood, or body fluids) or Hazardous Substances or Devices (including physical and chemical hazards, anything so labeled or which, if not handled properly, can cause injury) must conform to the regulations listed here and on the Certification of Hazards Control form.
15. **New for 2020!** Projects involving multidrug resistant organisms must be conducted at a Regulated Research Institution.
16. **New for 2020!** Projects involving Recombinant DNA (rDNA) technologies. Genome editing studies that include alteration of germline cells are BSL2 and must be conducted at regulated research institution (RRI) and approved by the institution's Biosafety Committee.



CERTIFICATION OF VERTEBRATE TISSUE SOURCE AND SAFETY FORM (GSDSEF Form 5)

PROCEDURES FOR PROJECTS INVOLVING HUMAN/OTHER VERTEBRATE TISSUES

Students **MUST** complete GSDSEF form 5, the Certification of Vertebrate Tissue Source and Safety, and have it approved by their supervising scientists, teachers/advisors and parents/guardians **BEFORE** starting projects involving these substances (final approval subject to confirmation by the GSDSEF Scientific Review Committee when application is made for admission to the Fair).

Students must submit their signed Certification Forms to the GSDSEF Scientific Review Committee (SRC) at the same time as they submit their SRC Pre-Approval Form and Signature Page. Experimentation may begin only after GSDSEF SRC approval is granted.

REGULATIONS FOR PROJECTS INVOLVING VERTEBRATE TISSUES OR PARTS



1. The procedures to be followed for projects with vertebrate tissue, body parts, or body byproducts will ensure that neither the methods nor the materials used will constitute any known danger to persons or the environment.
2. Vertebrate animal tissue used must be from (1) a continually maintained tissue culture or (2) from animals already being used in ongoing institutional research. NOTE: in the case of (2), the student must indicate in the procedures section of their Project Notebook that materials were by-products from another on-going procedure and animals were NOT sacrificed (i.e. euthanized) for the student's project.
3. Any human tissue, body fluids, blood and blood products must be in compliance with the blood born pathogens exposure control plan of the institution at which the research is being done, and must be tested and certified free of human immunodeficiency virus (HIV) as well as hepatitis B and C antibodies and antigens. A designated supervisor must supervise the student at all times during preparation, experimentation and cleanup. The supervisor or their institution will provide the materials used, and the student will NOT be involved in the direct acquisition of tissue samples. The supervisor will assume responsibility for the proper disposal of any chemicals or tissues used in the student's project.

TISSUE SOURCE AND SAFETY continued



HUMAN OR OTHER VERTEBRATE TISSUES SPECIAL CONSIDERATIONS

The following are examples of precautions, which must be taken to prevent inappropriate use of, or injury from, human or other vertebrate tissue to persons or the environment. No list could possibly foresee all possible situations, so teachers, parents and students must carefully plan and follow safe procedures specific for each study and be sure to include all related concerns you anticipate or encounter and necessary precautions on GSDSEF Form 5, in the section labeled Safety Precautions to be Exercised During Procedures.

Examples:

1. If human blood, blood products or tissue (including hair roots) is used, the student must obtain (in addition to the completed online SRC Pre-Approval Form and attached Signature Page and GSDSEF Form 3) a signed statement, on laboratory letterhead, that any human tissue, body fluids, blood and blood products have been tested and certified free of human immunodeficiency virus (HIV) and Hepatitis B and C antibodies and antigens prior to the student receiving the material.
2. If human teeth are used the student must, before receiving them, obtain (in addition to the completed forms online SRC Pre-Approval Form and attached Signature Page and GSDSEF Form 3) a signed statement, on organizational letterhead, that any human teeth provided are certified free of blood and blood products or specifying approved procedures that have been followed to assure no hazard from HIV or Hepatitis B or C remains.
3. Tissues from vertebrate animals must be acquired from institutional researchers and be from either a continuously maintained tissue cell culture line or from animals already being used in an on-going institutional research project. In either case, a clear statement including the phrase:
 - a. "from a continuously maintained tissue (or cell) culture from_____ lab,"
 - or,
 - b. "tissue was obtained as a by-product of ongoing research in a laboratory at_____."
4. Arrangements must be made to ensure that any proposed procedure is safe before any project proposal is approved. Whenever specialized safety equipment and/or facilities (e.g., fume hoods, clinical laboratory) are necessary for a procedure, arrangements must be made in advance.
5. Other vertebrate tissue concerns not listed above must be specified.

PROJECTS REQUIRING A REGULATED RESEARCH INSTITUTION (RRI) CERTIFICATION

Students who perform projects in whole or part at an industrial, university, hospital, or other institution and not their school or home environment must follow these guidelines:

1. A Certification of Regulated Research must be filled out and signed by the adult supervisor or principal investigator at that institution AFTER experimentation has been completed.
2. Approval letters from the appropriate institutional oversight committees (e.g. IRB, Environmental Health and Safety and/or IACUC) must be attached to the Certification of Regulated Research. Letters from the Principal Investigator of the Laboratory attesting to appropriate approvals will not be accepted.
3. **New for 2020!** Studies that culture multidrug resistant organisms (e.g. MRSA, VISA/VRSA, VRE, CRE, ESBLs, fungi with known resistance to antifungal agents) require Institutional Biosafety Committee (IBC) approval, BSL-2 containment, and should be completed in a regulated research institution
4. **New for 2020!** Projects involving Recombinant DNA (rDNA) technologies. Genome editing studies that include alteration of germline cells must be completed in a BSL-2 laboratory and approved by the Institutional Biosafety Committee (IBC).

GSDSEF CATEGORIES AND DESCRIPTIONS

Category descriptions have been adapted from the Intel ISEF Handbook. Final placement will be resolved by the SRC.

- 1. Animal Sciences:** Study of animal behavior, classification, development, pathology, taxonomy; animal ecology, animal genetics, animal husbandry, circadian rhythms, cytology, entomology, herpetology, histology, ichthyology, ornithology, paleontology, physiology, studies of invertebrates, etc.
- 2. Behavioral & Social Sciences:** Human behavior, social and community relationships; anthropology, archaeology, circadian rhythms, educational testing, ethnology, learning, linguistics, perception, psychology, sociology, urban issues, etc.
- 3. Biochemistry:** Chemistry of life processes; enzymes, food chemistry, hormones, metabolism, molecular biology, molecular genetics, photosynthesis, protein chemistry, etc.
- 4. Chemistry:** Study of nature and composition of matter and laws governing it; fuels; inorganic chemistry, organic chemistry (other than biochemistry), physical chemistry; materials, metallurgy, pesticides, plastics, soil chemistry, etc.
- 5. Computer Science:** Study and development of computer hardware; programming languages; networking and communications; robotics control systems; simulations/virtual reality or computations science (including data structures, encryption, coding and information theory); algorithms, artificial intelligence, data bases, graphics, software engineering, etc.
- 6. Earth & Planetary Science:** Climatology, geography, geology, geophysics, meteorology, mineralogy, oceanography, paleontology, physiography, seismology, speleology, tectonics, etc.
- 7. Engineering, Electrical & Mechanical:** Computer engineering, controls, electrical engineering, mechanical engineering, robot mechanics, solar electric generation, thermodynamics, etc.
- 8. Engineering, Energy & Transport:** Aerodynamics, aerospace and aeronautical engineering, alternative fuels, automotive & marine vehicle development, fossil fuel energy, heating & refrigeration, renewable energies, solar heating, wind energy, etc.
- 9. Engineering, Materials & Bioengineering:** Acoustics, bioengineering, civil & construction engineering, chemical engineering, environmental engineering, ergonomics, industrial engineering & processing, material science, etc.
- 10. Environmental Sciences & Management:** Air pollution and air quality, bioremediation (i.e., oil spill cleanup, etc.), ecology,
- 11. Mathematical Sciences:** Science of numbers and their operations; algorithms, development of formal logical systems or various numerical and algebraic computations and the application of these principles; algebra, calculus, complex analysis, geometry, number theory, probability, statistics, etc.
- 12. Medicine & Health Sciences:** Study of diseases and health of humans; allergies, cellular & molecular biology, dermatology, dentistry, epidemiology, genetics, immunology, nutrition, ophthalmology, pathology, pediatrics, pharmacology, physiology, sanitation, speech and hearing, etc.
- 13. Microbiology:** Biology of microorganisms; antibiotics/microbials, bacterial genetics, bacteriology, fungi, molds, protozoology, virology, yeast, etc.
- 14. Physics & Astronomy:** Theories, principles and laws governing energy and the effect of energy on matter; acoustics; atoms, molecules, nuclear, plasma, solids; biophysics; fluid and gas dynamics; instrumentation and electronics; magnetism; optics, lasers, masers; particle, quantum mechanics; semiconductors, solid state, superconductivity, thermodynamics; theoretical or computational astronomy, planetary science, etc.
- 15. Plant Sciences:** Study of plant life; agriculture/agronomy, algae, circadian rhythms, ecology, forestry, horticulture, hydroponics, plant evolution, plant genetics, plant pathology, plant physiology, plant taxonomy, etc.
- 16. Product Testing/Consumer Science (JUNIOR DIVISION ONLY):** Quality control, comparison studies of product designs; using accepted scientific tests to obtain quantifiable results, etc.