

Pittsburgh Regional Science & Engineering Fair GUIDE & Rulebook

March 22-25, 2022 Carnegie Science Center

2022 Rule Changes

Pre-approval project definitions have been expanded and clarified

Human participants rules have been expanded and clarified

Computer Science and math category description has been expanded and clarified

Pittsburgh Regional Science & Engineering Fair (PRSEF)

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2022 SCIENCE FAIR CALENDAR

November 12, 2021	Deadline for PRSEF School Registration
November 19, 2021	Deadline for pre-approval of PRSEF projects using Human Participants, Non-Human, Vertebrate Animals, Potentially Hazardous Biological Agents, and Hazardous Chemicals, Activities and Devices. The pre-approval deadline also applies to students from schools who have their own science fair.
January 7, 2022	Deadline for PRSEF paperwork for all other projects
February 4, 2022	Deadline for abstract submission for all projects and for PRSEF paperwork for schools with a school science fair
February 27, 2022	Deadline for submission of preliminary ISEF applications and research papers (11:59PM)
March 22-23, 2022	PRSEF Competition Days, 7:00 a.m. - 4:00 p.m. March 22, 2022 - Intermediate Division (7 th -8 th grade) and Junior Division (6 th grade) March 23, 2022 – Senior Division (9 th -12 th grade)
March 25, 2022	PRSEF Virtual Awards Celebration, 6:00 p.m. - 8:30 p.m.

Overview

The Pittsburgh Regional Science & Engineering Fair (PRSEF) is affiliated with the Regeneron International Science & Engineering Fair (ISEF). Therefore, the International Rules for Pre-College Science Research are applied to all projects submitted to PRSEF. The complete rules are available on the Society for Science & the Public's website at <https://www.societyforscience.org/isef/international-rules/>.

Rules and guidelines for conducting research were developed with the intent to do the following:

- protect the rights and welfare of the student researcher and human subjects
- protect the health and well-being of vertebrate animal subjects
- follow federal regulations governing research
- use safe laboratory practices
- protect the environment

This guidebook along with the document mentioned above will answer most questions and cover the details and requirements for students to compete at PRSEF. Additional information can be found in the Teachers' and Students' Handbook at www.PittsburghScienceFair.org. All other questions can be addressed to the Fair Director at 412.237.1534 or PRSEF@CarnegieScienceCenter.org.

At PRSEF, students complete independent research projects, display their presentation boards on fair day, and discuss their research with scientists and engineers. Sponsor and other special awards are presented on the exhibit floor on competition day. Category, Scholarship, Perseverance, and ISEF award winners will be announced during the Awards Celebration, March 25, 2022.

Thanks to all of the teachers, parents, and volunteers for your long hours of dedication in helping our young scientists and engineers to explore their world through hands-on science research. Without you, PRSEF would not exist. These young scientists and engineers are our future. Thank you for your commitment to our future.

2022 DEADLINES AND REGISTRATION

2022 School and Student Registration Deadlines:

- School Registration and Fee - November 12, 2021; Adult sponsors must register schools online at <https://www.STEMisphere.org/PRSEF>.
- Pre-approval is required for projects involving Human Subjects/Non-Human Vertebrate Animals/Potentially Hazardous Biological Agents and Hazardous Chemicals, Activities and Devices. Paperwork must be submitted through <https://www.STEMisphere.org/PRSEF> on or before November 19, 2021. **Students who are completing projects which fall into the pre-approval category and attend school fairs must submit their paperwork by the pre-approval deadline rather than the school fair deadline.**
- All other students must complete their registration and forms online at <https://www.STEMisphere.org/PRSEF> by January 7, 2022.
- School Fairs - Special arrangements can be made for schools that have school science fairs. However, final student registration forms for schools with their own fair must be submitted online by February 4, 2022.
- Students wishing to compete in the Regeneron International Science and Engineering Fair (ISEF) must submit a separate application (see page 13). The application form and required ISEF research papers must be submitted via email by February 27, 2022 at 11:59PM.

RULES OF PARTICIPATION

These rules are intended to protect the student researcher by ensuring that the proper supervision is provided and that all potential risks are considered.

Scientific fraud and misconduct are not condoned at any level of research or competition. This includes plagiarism, forgery, use or presentation of other researcher's work as one's own and fabrication of data. Fraudulent projects will fail to qualify for competition. PRSEF reserves the right to revoke recognition of a project subsequently found to have been fraudulent.

The student must be less than 21 years of age as of May 1, 2022.

The student must live in one of the following counties: **PENNSYLVANIA:** Allegheny, Armstrong, Beaver, Bedford, Blair, Butler, Cambria, Clarion, Clearfield, Fayette, Greene, Indiana, Jefferson, Lawrence, Mercer, Somerset, Venango, Washington, Westmoreland; **MARYLAND:** Garrett.

The Pittsburgh Regional Science & Engineering Fair is the **ONLY** science fair in western PA which is affiliated with ISEF. Students may compete in only one ISEF affiliated science fair per school year.

The project must be solely the work of the exhibitor(s) in research, construction and design of the exhibit. Parents or sponsors may only advise. Adult supervision and assistance with the use of power tools are recommended.

Team Projects (2 or 3 students) are permitted in all divisions. All team members must be currently enrolled in grades which are assigned to the same division. All team members must be present for interviews with the judges on fair day to compete. Exceptions may be made for illness or emergency.

Each student **MUST** have an adult sponsor (parent/teacher/mentor) who is ultimately responsible for the health and safety of the student conducting the research and of any human or animal subjects. An adult sponsor may be a teacher, club leader, parent, university professor or scientist who has a solid background in science and will closely supervise the student's research.

PRSEF's SRC must give the final approval for all projects submitted to the competition. Only students whose projects which have been given a status of Approved or Conditionally Approved by the SRC may compete. All forms submitted for review must be completed through the www.STEMisphere.org/PRSEF website.

Any student leaving early **MUST** have completed the early dismissal form and have approval from the PRSEF staff. Visit www.pittsburghsciencefair.org for

the early dismissal policy.

Pre-approval projects All students (in all divisions) conducting research involving **vertebrate animals, human subjects, tissue, recombinant DNA, microbes, and potentially hazardous biological agents or hazardous chemicals, activities or devices, MUST** have their research approved **BEFORE** starting the project. Please visit <https://www.societyforscience.org/isef/international-rules/> for additional information and requirements.

Human participant Research - Projects involving consuming, ingesting, tasting, applying, and/or absorbing of any substance will be accepted with the approval of both the school's Institutional Review Board (IRB) on Form 4 and of the PRSEF Scientific Review Committee (SRC). Research completed at a Regulated Institution and approved by the institution's IRB on Form 4 will be accepted by the PRSEF SRC if said research falls within the Society for Science's rules. In a human participant study, topics of study which could engender a feeling of shame, inadequacy, social exclusion, or prejudice including studies involving deception, social preference, friends, race/racism, religion, abuse, bullying, weapons, drugs, alcohol, mental illness, depression, girlfriend/boyfriend issues are prohibited.

Bacteria/Mold Research - Many students collect bacteria in a home environment. This is acceptable as long as the collected bacteria are immediately transported to a laboratory with the appropriate level of biosafety containment and petri dishes remain sealed. **Bacteria (even BSL-1 bacteria) may not be cultured in a home environment.** BSL-3 and BSL-4 projects are prohibited. All plates and petri dishes where bacteria are cultured must remain sealed throughout the study. Please visit <https://www.societyforscience.org/isef/international-rules/> for additional information and requirements.

Students **MUST** submit ALL required pre-fair project documentation including forms and SRC approval paperwork at <https://www.STEMisphere.org/PRSEF> (see Form Completion and Review on page 7).

Students **MUST** be present at their project boards during the official judging time(s) on fair day. The exhibit area is a restricted area during official judging. **ONLY students, judges, and official PRSEF volunteers/ staff are permitted on the exhibit floor during category judging times.**

All students must remove their project boards from the exhibit area when they leave on fair day. Remaining projects will be discarded due to space limitations.

The decisions of the judges determined on the day of the fair are final.

PROJECT CATEGORIES

The project category must be selected at the time of registration. The science fair office reserves the right to modify categories based on the number of projects per category.

JUNIOR DIVISION (Grade 6)

Behavioral & Consumer Sciences: These projects will explore consumer products and the science of how people respond to the world around them. The areas include:

Behavioral Science Related: psychology, human and animal behavior, learning and perception, educational and testing, surveys

Consumer Related: consumer product testing, consumer product design and enhancements, comparisons and evaluation of commercially available products

Biological Sciences: These projects will explore living things, including plants, animals and humans, and the things which affect them. The area includes: biology, botany & zoology, nutrition, photosynthesis, allergies, plant growth, exercise, biochemistry, studies of animal/human health, genetics & inherited traits

Chemistry: These projects will explore chemistry, which includes study of any kinds of chemicals. These areas include: organic & inorganic chemistry, chemical compounds, household chemicals (chemistry focus, not functional emphasis), chemical engineering. Note: If the project focuses on the biological impact/effect of the chemical, then the project should be placed in the biological sciences category.

Physical Sciences & Engineering: These projects will explore physics which includes our mechanical world, and engineering, which includes building things and solving problems.

Physics Related: states of matter, optics and photography, sound and acoustics, heat, cold and thermal conductivity, pressure and vacuum, electricity and magnetism, friction, inertia, gravity, density

Engineering Related: mechanical engineering, transportation, buildings and bridges, planes, trains, boats and cars, sports, robotics, computers, energy production, conversion and storage, alternative energy, such as wind and solar

INTERMEDIATE DIVISION (Grades 7 & 8)

Behavioral and Social Science*: human and animal behavior, social and community relationships – psychology, sociology, anthropology, archaeology, ethology, ethnology, linguistics, learning, perception, urban problems, reading problems, public opinion surveys, educational testing, etc.

Note: Social sciences projects which do not involve an experiment or data are not appropriate for competition at PRSEF.

Biology: botany, zoology, genetics, biochemistry, including hormones, molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, etc.

Chemistry: inorganic, organic, physical materials, plastics, fuels, pesticides, metallurgy, etc.

Computer Science/Math:

Computer Science - Scientific study of computers themselves and their uses, including: 1. Methods of programming/coding, computation, data processing, systems control, algorithmic properties, artificial intelligence, computer theory; and 2. Design and development of various application-based software.

Mathematics - including statistical methods, calculus, geometry, abstract algebra, number theory, probability, etc.

Note: Projects that use computers as a tool to investigate another problem, but that do not involve advanced programming, computer science or statistical methods should not be assigned to this category.

Consumer Science: consumer product testing and design.

Earth/Environment: pollution and sources of control, ecology, geology, mineralogy, oceanography, meteorology, climatology, geology, seismology, etc.

Engineering/Robotics: technology; projects that apply scientific principles to manufacturing and practical uses - civil, mechanical, aeronautical, chemical, heating and refrigerating, transportation, electrical, photographic, sound, automotive, marine, etc.

Intermediate Division continued on next page

PROJECT CATEGORIES CONT.

INTERMEDIATE DIVISION (Grades 7 & 8) cont.

Medicine & Health/Microbiology: bacteriology, virology, fungi, bacterial genetics, etc.; study of diseases and health of humans and animals - dentistry, pharmacology, pathology, ophthalmology, nutrition, sanitation, pediatrics, dermatology, allergies, speech and hearing, etc.

Physics & Astronomy: solid state, optics, acoustics, particle, nuclear, plasma, superconductivity, fluid and gas dynamics, magnetism, quantum mechanics, biophysics, astronomy, etc.

SENIOR DIVISION (Grades 9-12)

Behavioral and Social Science: human and animal behavior, social and community relationships – psychology, sociology, anthropology, archaeology, ethology, ethnology, linguistics, learning, perception, urban problems, reading problems, public opinion surveys, educational testing, etc.

Note: Social sciences projects which do not involve an experiment or data are not appropriate for competition at PRSEF.

Biology: botany, zoology, genetics, biochemistry, including hormones, molecular biology, molecular genetics, enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, etc.

Chemistry: inorganic, organic, physical materials, plastics, fuels, pesticides, metallurgy, etc.

Computer Science/Math:

Computer Science - Scientific study of computers themselves and their uses, including: 1. Methods of programming/coding, computation, data processing, systems control, algorithmic properties, artificial intelligence, computer theory; and 2. Design and development of various application-based software.

Mathematics - including statistical methods, calculus, geometry, abstract algebra, number theory, probability, etc.

Note: Projects that use computers as a tool to investigate another problem, but that do not involve advanced programming, computer science or statistical methods should not be assigned to this category.

Earth/Environment: pollution and sources of control, ecology, geology, mineralogy, oceanography, meteorology, climatology, geology, seismology, etc.

Engineering/Robotics: technology; projects that apply scientific principles to manufacturing and practical uses - civil, mechanical, aeronautical, chemical, heating and refrigerating, transportation, electrical, photographic, sound, automotive, marine, etc.

Medicine & Health/Microbiology: bacteriology, virology, fungi, bacterial genetics, etc.; study of diseases and health of humans and animals - dentistry, pharmacology, pathology, ophthalmology, nutrition, sanitation, pediatrics, dermatology, allergies, speech and hearing, etc.

Physics & Astronomy: solid state, optics, acoustics, particle, nuclear, plasma, superconductivity, fluid and gas dynamics, magnetism, quantum mechanics, biophysics, astronomy, etc.

REQUIRED REGISTRATION FORMS

The following summarizes which forms are required for different types of projects.

All teachers and/or adult sponsors must review the PRSEF Guide to the Review document at www.PittsburghScienceFair.org. It provides important information on common paperwork problems and how to avoid them.

All student registration forms must be submitted online by January 7, 2022. If your school has its own science fair, this deadline is extended to February 4, 2022 (except for pre-approval projects which must be submitted by November 19, 2021.)

Forms required for ALL STUDENTS

- **Form 1 — Checklist for Adult Sponsor**
- **Form 1A — Student Checklist**
- **Research Plan** (Must include detailed description of research and at least five (5) references)
- **Form 1B — Approval Form**
- **Form 3 – Risk Assessment**
- **Abstract** (abstracts must be submitted online on or before February 4, 2022)

Required forms can be accessed online at <https://www.societyforscience.org/isef/forms/>. **All forms must be completed online at <https://www.STEMisphere.org/PRSEF>. Do not mail hard copies of forms to the fair office.**

Pre-Approval Projects

Projects involving Human Participants, Non-Human Vertebrate Animals, Potentially Hazardous Biological Agents and Hazardous Chemicals, Activities and Devices require additional forms. All required forms will be generated by <https://www.STEMisphere.org/PRSEF> when Form 1 is completed. These projects require PRSEF SRC/IRB approval prior to experimentation and must be submitted on or before November 19, 2021. For projects with Human Participants, approval from the school's IRB on Form 4 and informed consent from participants are also required.

Still unsure on which forms are required - Visit <https://ruleswizard.societyforscience.org/>, or contact the PRSEF office at 412.237.1534 or PRSEF@CarnegieScienceCenter.org with any questions.

Non-Human Vertebrate Animals Projects — Forms 1, 1A, Research Plan, 1B, 3, and

- Form 2 — Qualified Scientist and
- Form 5A — Vertebrate Animal Form (if conducted in a school, home or field research site), **OR**
- Form 5B — Vertebrate Animal Form (if conducted in a Regulated Research Institution)

If applicable:

- Form 1C — Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)

Human Participants— Forms 1, 1A, Research Plan, 1B, 3, and

- Form 4 — Human Subjects Form with applicable consents and surveys

If applicable:

- Form 1C — Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)
- Form 2 — Qualified Scientist (required if more than minimal risk is involved)

Potentially Hazardous Biological Agents — Forms 1, 1A, Research Plan, 1B, 3, and

- Form 2 — Qualified Scientist, and
 - Form 6A — Potentially Hazardous Biological Agents
- If applicable:

- Form 1C — Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)
- Form 6B — Human and Vertebrate Animal Tissue Form (for all studies involving tissues and body fluids.)

Hazardous Chemicals, Activities or Devices (includes DEA-controlled substances, prescription drugs, alcohol and tobacco, firearms and explosives, radiation, lasers, etc.)* — Forms 1, 1A, Research Plan, 1B, 3, and if applicable:

- Form 1C — Regulated Research Institution/Industrial Setting Form (if conducted in a Regulated Research Institution)
- Form 2 — Qualified Scientist

FORM COMPLETION AND REVIEW

Teachers and/or Adult Sponsor - All teachers and/or adult sponsors must review the PRSEF Guide to the Scientific Review document on our website at www.PittsburghScienceFair.org prior to submitting students' paperwork.

Required registration forms – All students must be registered at <https://www.STEMisphere.org/PRSEF> before January 7, 2022 (February 4 for schools with their own science fair). Forms 1, 1A, Research Plan (see research plan instructions on page 2 of Form 1A and/or within Form 1A at <https://www.STEMisphere.org/PRSEF>), 1B and 3 are required for ALL projects. Other forms may also be required. For more information, see Required Registration Forms on page 6 or visit the ISEF forms wizard at <https://ruleswizard.societyforscience.org/>. All required forms will be generated by <https://www.STEMisphere.org/PRSEF> when the adult sponsor completes Form 1.

An abstract (250 words or less) for each project must be submitted online on or before February 4, 2022.

Research plan - At a minimum, the student's research plan should include: Rationale, Research Question, Hypothesis, Procedure, Risk and Safety, Data Analysis, and Bibliography. Students' research plans **MUST** include a detailed description of the methods or procedures involved in their projects (list all materials, chemical concentrations, drug dosages, etc.). **The procedure must be clear to the reviewer.**

Research plans must list at least **five (5)** major references (e.g. science journals, books, articles, internet sites etc.) All references must be well documented and formatted in a standard recognized format (APA, MLA etc.). **URLs alone are not acceptable as references.** See <https://www.WLNonline.org/PRSEF> for high quality sources and bibliography formatting guidelines.

All signatures must be added to forms using the www.STEMisphere.org/PRSEF system. When the student or adult sponsor enters contact information for an adult associated with their project (parent, qualified scientist, designated scientist etc.) that individual must log in to the system to add their signature to the form.

Check all forms for completion before submitting the project for review. Signatures on ALL forms (except 1C, if applicable) **must** be dated **prior** to the **start** of the **student's experimentation on Form 1A**. Adults should enter the date they first approved the project - not the

date they signed the form. Projects cannot be submitted to the SRC until the dates associated with the signatures are correct.

Form (3) Risk Assessment Form is required for ALL projects.

The deadline for submission of all registration forms at schools **without** their own science fair is **January 7, 2022** (February 4 for schools with their own science fair). However, projects involving Human Participants, Non-Human Vertebrate Animals, Potentially Hazardous Biological Agents and Hazardous Chemicals, Activities and Devices require approval prior to beginning research and must be submitted on or before **November 19, 2021**.

A Scientific Review Committee (SRC) within the school is recommended to support the teacher in reviewing students' research plans. Proper review of students' research plans will eliminate the risk of a student being disqualified from participation in PRSEF due to rule violations. **PRSEF's SRC reserves the right of final approval of all projects submitted to the competition.**

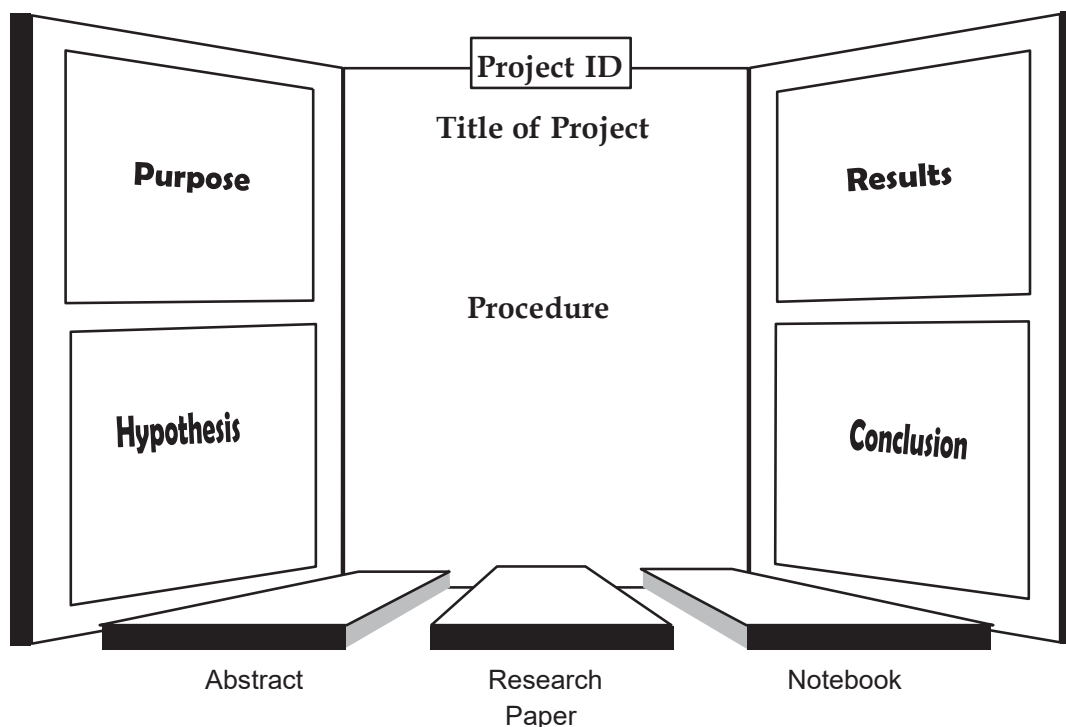
Vertebrate Animal Studies - Conducting experiments which pose a threat to the safety and welfare of animals (such as feeding them human food or placing the animal in an unsafe or unethical environment) are prohibited. Please visit <https://www.societyforscience.org/isef/forms/>, 2022 Rules and Guidelines, page 12, for additional rules regarding animal research.

Human Participant Studies - Institutional Review Board (IRB) Schools are asked to form a school IRB to evaluate the potential physical and/or psychological risk of research involving humans. The adult sponsor for the project may not serve as the educator on the school's IRB. The student must obtain signatures from the school IRB on Form 4 prior to submitting paperwork to PRSEF. Incomplete forms will be not be evaluated by the SRC. See page 8-11 of the 2022 Rules and Guidelines, <https://www.societyforscience.org/isef/forms/>. **PRSEF's SRC must give the final approval for all projects submitted to the competition.**

All feedback from the review committee will be delivered via <https://www.STEMisphere.org/PRSEF>.

All projects given a status of Approved or Conditionally Approved may compete at the fair. Do not submit corrections to Conditionally Approved projects to the SRC. Bring the corrected forms to the fair.

PRESENTATION BOARD



Project ID cards to be displayed at the top center of the presentation board will be provided at the competition on the student's exhibit table.

The standard presentation board is a three-panel, free-standing structure that folds for ease in transportation. You can make your own, ask your teacher about ordering a stock board from an educational supply catalog or visit your local office supply store. Standard board size is 36" wide (122 cm) x 30" deep (76 cm) x 78" high (198 cm).

Oversized exhibits may be disqualified.

IMPORTANT NOTE: Students must set up their project displays. Parents and teachers are not permitted on the exhibit floor. Heavy wooden, double-stacked, plastic, or metal display boards are **not** recommended. Please plan accordingly.

Photographs. Visual depictions are permitted on the display board IF: a. they are not deemed offensive or inappropriate by PRSEF; b. they include credit lines of their origins ("Photographs taken by..." or "Image taken from ..."); c. they are from the internet, magazines etc., and credit lines are attached; d. they are photographs of the student researcher; or e. they are photographs of human participants for whom consent forms were

obtained. NOTE: Photographs or visual presentations depicting vertebrate animals in surgical techniques, dissections or other lab procedures are **not permitted**. Many projects involve elements that may not be safely exhibited at home or at school, but are an important part of the projects. Take photographs of important parts/phases of the experiment to use in the display. Photographs of human test subjects must have signed consent forms. Credit must be given for all photographs.

A Good Title. The title should be simple, accurate, descriptive and make the observer want to know more.

Organization. Make sure the display is logically presented and easy to read. A glance should permit anyone (particularly the judges) to quickly locate the title, experiments, results, and conclusions. When arranging the display, imagine that you are seeing it for the first time.

Eye-catching. Make your display stand out. Include photographs. Use neat, colorful headings, charts, and graphs. Pay special attention to the labeling of graphs, charts, diagrams, and tables. Each item must have a descriptive title. Anyone should be able to understand the visuals without further explanation. Avoid large blocks of text which are difficult and time consuming to read.

COMPETITION DAY

What You Must Bring to the Science Fair at Carnegie Science Center:

- Presentation Board
- Project Data Book (highly recommended by the judges, but not required)
- Research Paper (recommended, but not required)
- Copies of your final Abstract; Form 1C and Form 7 (if required) for display
- Copies of the forms submitted to PRSEF. You can print these from www.PRSEF.STEMisphere.org. (For reference only – NOT FOR DISPLAY)
- **A light snack** - We suggest that you bring a piece of fruit, granola bar and/or water with you, especially if you are leaving early from home or school on fair day! The RiverView café at the Carnegie Science Center will be open for lunch.

Other important fair day details to remember.....

Your **Project ID** will be assigned by PRSEF and will be available online in mid-March at www.PittsburghScienceFair.org. Knowing your Project

ID before the fair will help you to find the location assigned for your project. Project ID Cards will be provided on Fair Day for use on your project board.

Judging - Students will be required to stand by their projects during the entire judging session. Please dress appropriately and wear comfortable shoes. You will be standing and walking throughout the day.

Your name **may** be displayed on your project board or paperwork, but **do not list parents or teachers by name on the acknowledgments**. Names can also be placed on the back of the board for identification purposes.

Be Prepared! - Practice your presentation! You will be given 2-5 minutes to introduce your project. The judges will then be interviewing you and asking about your work. You must know your research **and** be able to communicate your research to others effectively. The judges are interested in hearing why you chose your research topic, what interested you most in your findings, how your research can enhance the world and its inhabitants. Note cards are permitted, but please do not read directly from them

Still have questions? Visit the PRSEF website, www.PittsburghScienceFair.org.

JUDGING CRITERIA

One of the most valuable experiences for young scientists and engineers is the opportunity to discuss their findings with established members of the scientific, engineering and technology communities. PRSEF competitors take great pride in their work and judging interviews greatly contribute to the overall educational experience of the competition. Each year, professionals, university faculty, industrial scientists and engineers, representatives of private and federal research centers and agencies, and medical researchers volunteer their time to interview and encourage our region's most promising young scientists and engineers.

There are five different types of judges at PRSEF: **Category Award** judges select winners in each of the 21 categories; **Sponsor Award** judges represent their professional organizations or institutions and judge students' projects for their specific award criteria; **Affiliated Award** judges represent sponsors from the International Science and Engineering Fair (ISEF); **Scholarship Award** judges choose senior division students who qualify for scholarship awards from participating colleges and universities in our region; and **Regeneron International Science and Engineering Fair (ISEF)** judges select the winner(s) to attend ISEF.

The decisions of the judges determined on the day of the fair are final.

Pittsburgh Regional Science & Engineering Fair judges all adhere to the following ethics standard:

To preserve the integrity of the Pittsburgh Regional Science & Engineering Fair, even the appearance of prejudice must be avoided. If a judge has any relationship to or knowledge of an entrant or project, that judge must decline participation where it may influence an entrant's award.

Judging – Judges will review uploaded files from virtual participants and presentation boards displayed by in-person participants prior to interviewing students. Students will be interviewed by judges through online video conferencing or through in-person interviews at the Carnegie Science Center between 8AM and 4PM on the day(s) of the fair.

Be Prepared! - Practice your presentation! Remember that the judges will be interviewing you and asking about your work. You must know your research **and** be able to communicate your research to others effectively. The judges are interested in hearing why you chose your research topic, what interested you most in your findings, how your research can enhance the world and its inhabitants. Note cards are permitted, but please do not read directly from them.

Message from the judges:

Be ready to talk in depth about your research. You should be able to have a conversation about your work and results. Practice explaining your research to your parents, teachers, and friends, especially people who don't understand your research. Tell everyone to ask you at least three questions.

Judges look for well thought out research. They consider how significant your project is in its field, as well as how thorough you were in conducting your research. Did you leave something out? Did you start with four experiments and finish only three? It's OK if you didn't get the result you expected - make sure you can explain why your result was not what you expected.

Judges recognize students who can speak freely and confidently about their work. They are not interested in memorized speeches but prefer simply to TALK with you about your project to see if you have a good grasp of your research from start to finish. Besides asking the obvious questions, judges often ask questions to test your insight into your project, such as, "What was your role?" or "What didn't you do?" or "What would be your next step?"

JUDGES EXPECT STUDENTS TO DEMONSTRATE THAT *THEY* DID THE WORK AND UNDERSTAND THE RESULTS.

TYPES OF JUDGES

Category Judges

Category judges choose the winners in each category (i.e. Junior Division Chemistry, Senior Division Biology etc.). Students are judged on scientific thought or engineering goals, experimental method or procedural plan, analytical approach, visual presentation and oral presentation. These judges use rubrics which are tailored to specific areas of research. Point scores are used as a judging tool. Rubrics, less the point values, will be provided to the students' teachers after the competition. Check the judges handbook

<http://www.carnegiesciencecenter.org/stemcenter/stem-center-science-fair-judges-and-volunteers/> for the judging rubrics, procedure and selection process. The decisions of the judges, determined on the day of the fair, are final.

Sponsor Judges

Representatives of the Sponsors of PRSEF select winning science fair project(s) in their field of interest. These judges have specific criteria based on their company's mission. For example, PPG will present awards for projects involving chemistry, physics, engineering, or material science which demonstrate creativity and knowledge in topics related to fiberglass, glass, coatings, paints, plastics, inks, adhesive, color, optically transparent material, polymers or chemicals. For a list of project ideas from our sponsors, reference the Teachers' and Students' Handbook at

<http://www.carnegiesciencecenter.org/stemcenter/stem-center-science-fair-teachers-and-students/>. For a complete list of PRSEF sponsors, visit <http://www.carnegiesciencecenter.org/stemcenter/stem-center-science-fair-sponsors-and-awards/>.

Affiliated Sponsor Judges

PRSEF is a regional science fair affiliated with the Regeneration International Science and Engineering Fair (ISEF). Affiliated sponsor awards are presented at PRSEF based on criteria received from ISEF and their sponsors. For example, the National Oceanic and Atmospheric Administration provides certificates and medallions to the projects that emphasize NOAA's mission to understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social and environmental needs.

Scholarship Judges

In 2021, more than 60 scholarships were awarded to PRSEF student researchers from local colleges and universities. Scholarships include full/half/partial tuition scholarships and pre-college program scholarships. For example, Carnegie Mellon University awards two pre-college program commuter scholarships to be utilized for the Advanced Placement/Early Action Program valued up to \$7,882. Allegheny College awards up to four scholarships in the amount of \$18,000 per recipient. Preference for scholarship consideration will be given to students who indicate interest in the school through the pre-fair survey and who are a good fit for the college. Visit www.pittsburghsciencefair.com for a complete list of available scholarships.

ISEF judges

Students who submitted a research paper and a preliminary ISEF application may be interviewed by judges selecting finalists for ISEF. Students selected as ISEF finalists by these judges will represent PRSEF at the Regeneration International Science and Engineering Fair.

TIP: Judges applaud those students who can speak freely and confidently about their work. They simply want to talk with you about your research. Good manners, appropriate attire, confidence and enthusiasm for what you are doing will impress the judges.

AWARDS AND SCHOLARSHIPS

Nearly 50% of all PRSEF participants in 2021 won an award!

CATEGORY AWARDS

Senior Division:

\$300 - First Place \$75 - Third Place
\$150 - Second Place \$25 - Honorable Mention

Intermediate Division:

\$150 - First Place \$35 - Third Place
\$75 - Second Place \$20 - Honorable Mention

Junior Division:

\$75 - First Place \$30 - Third Place
\$50 - Second Place \$15 - Honorable Mention

Certificates of Science Excellence and medals will be sent to the winning students' schools. Checks will be mailed to students' homes after they complete the W9 form. Teams will split the cash prizes.

SPONSOR AWARDS

Certificates of Science Excellence and medals will be sent to the winning students' schools. A check for \$50 will be mailed to students' homes after they complete the W9 form. Sponsor awards are defined and selected by the sponsoring organization. Some sponsors invite students to club meetings, recognition dinners or site tours.

Affiliated Sponsor awards (certificates, medallions, items as determined by sponsors) will be awarded at PRSEF because of its affiliation with ISEF. These sponsors include Ricoh Americas Corporation and Yale Science and Engineering Association among others.

SCHOLARSHIPS

Full/half/partial tuition and pre-college program scholarships will be determined and selected by the awarding colleges and universities.

MERIT AWARDS

Category Judges select students who exhibit excellence in Creativity, Presentation, Literature Review or Scientific Method. Recognized students will receive a certificate of excellence that signifies their outstanding performance in one of these areas.

CARNEGIE SCIENCE AWARDS

One student in each Division will be honored at the Carnegie Science Awards in 2022.

PERSEVERANCE AWARDS

Certificates of excellence will be awarded to students for their continued dedication to the exploration of science and engineering. Qualifying students must submit the perseverance form by February 27, 2022.

Honorary Scientist

Eleventh and twelfth graders with five or more years of active participation.

Associate Scientist

Eleventh and twelfth graders with three or four years and tenth graders with four or five years of active participation.

Junior Scientist

Eighth and ninth grade students with three or four years of active participation.

REGENERON INTERNATIONAL SCIENCE & ENGINEERING FAIR (ISEF) AWARDS

Each student researcher entering an exhibit in the **senior division (9th-12th grades)** may apply for participation in the International Science and Engineering Fair (ISEF), <https://student.societyforscience.org/isef>. The procedure for application can be accessed at www.PittsburghScienceFair.org. Applications and research papers formatted in the style of a scientific research article must be submitted via email no later than February 27, 2022 at 11:59PM. Research papers must be no longer than 20 pages excluding data tables and appendices. ISEF finalists will be chosen on fair day and will receive an all-expenses paid trip to compete at Regeneron ISEF.

BROADCOM MASTERS AWARDS

The top 10% of students (generally first, second and third place category award winners) from the Junior Division (6th grade) and Intermediate Division (7th - 8th grades) are nominated to advance to the Broadcom MASTERS (Math, Applied Science, Technology, and Engineering for Rising Stars), a program of Society for Science & the Public. Learn more at <https://student.societyforscience.org/broadcom-masters>.

All award winners will be announced during the awards ceremony.

Sponsors

Covestro, FedEx Ground, with additional support from regional academic institutions, corporations, foundations and professional societies.

The Pittsburgh Regional Science & Engineering Fair is presented by Carnegie Science Center. Please contact us at 412.237.1534 or PRSEF@carnegiesciencecenter.org or visit www.pittsburghsciencefair.org.