Pittsburgh Regional Science and Engineering Fair

Judges' Handbook

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Types of Judges

There are five different types of judges at the Pittsburgh Regional Science and Engineering Fair (PRSEF):

Category Award 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.

Sponsor Award judges represent their professional organizations or institutions and judge students' projects for their specific award criteria. These judges have specific criteria based on their company's mission.

Affiliated Award judges represent sponsors from the Regeneron International Science and Engineering Fair (ISEF). PRSEF is a regional science fair affiliated with 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 Award judges choose senior division students who qualify for scholarship awards from participating colleges and universities in our region. 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.

Regeneron International Science and Engineering Fair (ISEF) judges will select the student(s) who will represent PRSEF at Regeneron ISEF.

Registering to be a Judge

All judges and volunteers at PRSEF register at https://www.STEMisphere.org/PRSEF/judge-volunteer-registration. Judges who already have a user ID and password at STEMisphere.org/PRSEF should log in and then use the widget on the right side of the screen to add their judge registration to their profile.

Category Award Judge registration opens in December. You will be asked to indicate your area of expertise and preferred categories when you register so we can assign you to an appropriate category.

Sponsor Award Judge registration will open in January. If your organization is not yet a sponsor of PRSEF and would like to be one, please contact PRSEF@CarneigeScienceCenter.org. If your organization is already a sponsor of PRSEF, please use the link above to register judges.

Affiliated Award Sponsor Judge registration opens in January. If you are associated with an affiliate sponsor of ISEF, please let us know at PRSEF@CarnegieScienceCenter.org after you register using the link above. If you are not associated with an affiliate sponsor of ISEF, we will assign you to judge for awards which match your experience and areas of expertise.

Scholarship Award Judge registration opens in January. Schools who have offered scholarships in the past will be contacted by the fair director in December to confirm their continued participation. If your college or university is new to PRSEF and would like more information about the scholarship program, please contact PRSEF@CarnegieScienceCenter.org.

Preparing to Judge

Each student is encouraged to submit an abstract for review by judges before the fair. Abstract books will be available at www.PittsburghScienceFair.org in late February.

The abstracts will act as a supplement to the traditional project gallery poster exhibits. Judges will also have one-hour poster review session without the students present before the student interview session on fair day.

Judge orientation sessions will be available to all judges the morning of the fair. Information about these sessions and about fair day logistics will be sent to the email address you use when you register to judge. Please be sure to arrive early enough to attend the orientation session.

Review Appendix 1 Tips for Judges at the end of this document and read the Compendium on Science Fair Judging at www.PittsburghScienceFair.org. These documents give ideas about what to look for in a superior science fair project and how to interact with students during the interview.

Category Award Judges

A **Category Award Judge** will evaluate student projects in a particular category and will award 1st place, 2nd place, 3rd place and 4th place winners in that category.

The Senior (9th-12th grades) and Intermediate (7th-8th grades) Division categories are:

Behavioral & Social Sciences
Biology
Chemistry
Computer Science/Math
Consumer Science (Intermediate only)
Earth/Environment
Engineering/Robotics,
Medicine/Health/Microbiology
Physics/Astronomy

The Junior Division (6th grade) categories are:

Behavioral & Consumer Sciences
Biological Sciences
Chemistry
Physical Sciences & Engineering.

Category Award Judge Types and Duties

Category Award Judge

Judges have the enjoyable and satisfying duty of interviewing students at the fair and evaluating their work. Many of the students in the Junior and Intermediate Divisions are "doing" science for the first time. Judges are in a unique position to encourage, teach and inspire these young people as they take early steps into science and technology. The FAQ section below elaborates on the events of fair day and is of value to new judges (and maybe even to experienced ones!)

Category Award Judge Co-Chair

Normally, each category is usually led by two category co-chairs who will:

- Lead orientation – Category co-chairs will conduct an orientation session for judges at the Carnegie Science Center on their category's day of the in-person fair. Suggested content will be provided by the fair director.
- Organize their judges - A list of judges and projects/exhibits in their category is sent to each Chair shortly before the fair. At least two judges are assigned to judge each project/exhibit. A judge can be expected to effectively evaluate 8-10 projects/exhibits in the time given for interviews. Chairs shall insure that each of the projects/exhibits listed for the category has judges assigned to evaluate it.
- Supervise and Facilitate Interviews – Category co-chairs may reassign judges to a projects within their category if judge absences or conflicts of interest necessitate that action. Most co-chairs also judge, but they are not required to do so. Category co-chairs are also available to help new judges as necessary.

- Review projects - It is good for the co-chair to review the abstracts for all of the projects in their category before the day of the fair and to leave some free time during the morning interview session to review posters of all the projects in the category. This is helpful during deliberation.
- Verify that all exhibits have been judged - After interviews are completed, the co-chairs shall make a final review to make certain that each student's project has in fact been evaluated. Not much worse can happen than have a student be overlooked.
- Lead in the selection of category winners - When it has been determined that all entries have been evaluated, the co-chairs lead judges in the selection of the category winners. The procedure may vary, but the Category Award Selection Procedure in Appendix 2 is recommended.
- Submit winning project information to the division chairperson – The Category co-chairs must submit the project ID and title of each of the winning projects for their category to the division chair before the end of fair day. Category co-chairs must also facilitate the awarding of merit certificates and collection of judging rubrics and submit those to the division chair.

Division Chairperson
Junior, Intermediate, and Senior divisions each have a Division Chairperson who oversees the policies and operations of that division year-round and ensures quality assurance the day of the science fair. Each Division Chairperson is a member of the Judge Advisory Committee that meets quarterly.

Chair of Judging

The Chair of Judging is responsible for the overall conduct of the judging of the fair, and along with the Science Fair Director, is the final arbiter of any disputes. The Chair of Judging chairs the Judge Advisory Committee.

Frequently Asked Questions:

How do I know if I am qualified to judge?
Judges should have a Bachelor's degree or related experience in the field in which they are judging. However, in the Junior or Intermediate levels (Grade 6-8), a non-science degree may be acceptable. Judges need to be comfortable with students, be respectful of them and of their work and be able to interact with them in a constructive manner. Any questions may be directed to the chair of Judge Advisory Committee at ISEF@Pitt.edu. Active K-12 educators are not eligible to judge.

If you meet these criteria and have an understanding of a field of science or engineering and feel confident in your ability to chat with a bright young person, then you can judge! A large percentage of our judges return every year. They love doing it and look forward to the fair.

How do I learn to score the projects like experienced judges?
Judges are provided with an orientation on fair day. This will provide tips for judging which most judges find useful. Before the fair, new judges should review the Compendium on Science Fair Judging at www.PittsburghScienceFair.org, Appendix 1 Tips for Judging for suggestions of questions to ask students and important things to look for while reviewing projects, and Appendix 3 Judging Rubrics for a general framework for giving feedback.

Don't worry! Everyone brings their unique experience to the process and judges in their own way. Judging experience is not necessary. You will use your scores to rank the projects you judge. You will not compare your scores with those of other judges, but you will compare your rankings with those of the other judges. You will learn from the more experienced judges as you advocate for your favorite projects, deliberate and discuss the relative merits of the projects, and come to an agreement on which projects are the best in each category.

What makes a good project?
A good project is one that asks an interesting question in a novel or creative way and uses sound science or engineering to explore that question and come to a conclusion based on the work. The Judging Rubrics in Appendix 3 are used as a guide to help judges decide which projects are the best projects.

What really happens on the day of the fair?
You will register, have a cup of coffee, and meet the other judges in your category. Judges will gather at the place identified in the assignment letter which will be emailed to you shortly before fair day. After a brief orientation you will meet with your Category Chair to receive your assignment. Assignments are a list of projects, usually around 10, which are your responsibility to judge. At least one other judge will also be judging those projects. You will have one hour to review the exhibits and posters of the projects which have been assigned to you without the students present before the morning interview session begins. You will judge those projects and then deliberate with the other judges in your category to select the category winner.

How do I get a Category assignment?
When you register, you will be asked to choose four categories that are suitable to your interests and qualifications. We will do our very best to assign you to a category which matches your preferences and experience. We appreciated your flexibility in accepting judge assignments outside of your normal area

of expertise if it is necessary for us to re-assign you based on the balance of judges who wish to judge each category and students who register for each category or any conflict of interest which may arise (see below). We assign a minimum of two judges for each Intermediate and Junior Division project and three judges for Senior Division projects. You will receive your assignment by email at least one week before fair day.

Will I be on my own or will I have help?
Judges interview students by themselves. It is less intimidating to the students and better fills the time for them with individual interviews. If desired, a new judge may accompany an experienced judge for an interview. Your Category Chair can help you and there are other resources on the day of the fair. You are not alone.

How long will judging take?

On fair day, judges must be available to begin registration and orientation at 8:00AM. The day is finished when category winners are selected and confirmed by the division chairperson. Winners must be chosen by 4:00PM.

What if I recognize a student or project or have a potential conflict of interest?
Avoiding a conflict of interest is crucial to the integrity of the Pittsburgh Science and Engineering Fair. If you become aware that you have a relationship with a student or project in your category prior to the fair, you should report this to the Chair of Judging at ISEF@pitt.edu. If you discover a conflict of interest on fair day, immediately report this to your Category Co-Chairs. Appropriate action will be taken to resolve the conflict. In some circumstances, it may be determined that your situation does not represent a conflict of interest. PRSEF will always find a way for you to participate in judging, even if you have to move to another category.

Category Award Judge Schedule

Competition Days at Carnegie Science Center – Tuesday March 22 – Wednesday March 23

Intermediate and Junior Division - Tuesday March 22, 2022

Senior Division - Wednesday March 23, 2022

8:00 am – 8:20 am
Registration / Coffee, Donuts – Admissions desk at Carnegie Science Center

8:20 am - 8:30 am
Judge Training/Orientation – Rangos Theater and Science Stage

8:30 am – 9:00 am
Meet with category groups / Make project assignments – Assigned judging areas throughout Carnegie Science Center

9:00 am – 10:00 am
Review of projects without students - Student exhibits throughout Carnegie Science Center

10:00 am – 12:30 pm
Interview students - Student exhibits throughout Carnegie Science Center

12:30 pm – 2:00 pm
Lunch / Deliberate / Select Winners / Re-review projects without students - Assigned judging areas throughout Carnegie Science Center

*This schedule is subject to change based upon the number of students and judges in each category.

Please contact the Science Fair office at 412.237.1534 or PRSEF@CarnegieScienceCenter.org with any questions.

Sponsor Award Judges

Sponsor Award Judges represent PRSEF sponsors and choose projects that address the particular field of interest of that sponsoring organization. Please see Appendix 6 for a list of all expected sponsor awards for PRSEF 2022.

Sponsor Award Judge registration will open in January. Sponsor Award Judges may evaluate projects in any division or category based on the criteria listed for each sponsor and grant awards accordingly.

Sponsor Award Judge Schedule

Competition Days at Carnegie Science Center – Tuesday March 22 – Wednesday March 23

Intermediate and Junior Division - Tuesday March 22, 2022

Senior Division - Wednesday March 23, 2022 (Gold sponsors and above only)

12:30 pm - 1:00 pm
Registration/Lunch

1:00 pm - 1:15 pm
Judge Training / Orientation - Assigned judging areas throughout Carnegie Science Center

1:15 pm - 2:00 pm
View projects without students – Student exhibits throughout Carnegie Science Center

2:00 pm - 4:00 pm
Student interviews at projects / Results form submission at information hub / Student award presentations at projects

The above schedule allows for Sponsor judging and presentation of the Sponsor Awards to be conducted within two hours. If you desire additional judging time, there will be an early-bird session from 9:30 – 10 am to review projects without students and from 10 am – 12:30 pm to interview students. Awards cannot be presented until after 2 pm.

Please contact the Science Fair office at 412.237.1534 or PRSEF@CarnegieScienceCenter.org with any questions.

Affiliated Sponsor Award Judges

Affiliated Sponsor awards (certificates, medallions etc. as determined by sponsors) are awarded at PRSEF because of its affiliation with Regeneron ISEF. The expected 2022 affiliated sponsors with the corresponding criteria for their awards are listed in Appendix 4.

Affiliate Sponsor Award Judge registration will open in January. Affiliate Award Judges may evaluate projects in any division or category based on the criteria listed for each affiliated sponsor and grant awards accordingly.

Please contact the Science Fair office at 412.237.1534 or PRSEF@CarnegieScienceCenter.org with any questions.

Affiliated sponsor Award Judge Schedule

Competition Days at Carnegie Science Center

Intermediate Division - Tuesday March 22, 2022

Senior Division - Thursday March 24, 2022

8:00 am – 8:20 am
Registration / Coffee, Donuts – Admissions desk at Carnegie Science Center

8:30am – 9:00am
Judge orientation and training - Assigned judging areas throughout Carnegie Science Center

9:00 am – 10:00 am
Review of projects without students - Student exhibits throughout Carnegie Science Center

10:00 am – 12:30 pm
Interview students - Student exhibits throughout Carnegie Science Center

12:30 – 1:15 pm
Lunch - Assigned judging areas throughout Carnegie Science Center

1:15 pm - 2:00 pm
View projects without students – Student exhibits throughout Carnegie Science Center

2:00 pm - 4:00 pm
Student interviews at projects / Results form submission / Student award presentations at projects

Please contact the Science Fair office at 412.237.1534 or PRSEF@CarnegieScienceCenter.org with any questions.

Scholarship Award Judges

Scholarship Award Judges are representatives from local colleges and universities which award scholarships to PRSEF students. Scholarship judges interview Senior Division PRSEF participants (9th-12th grade) and select those to whom they wish to award scholarships. Various awards and more than 50 scholarships are expected to be awarded as indicated in Appendix 5.

Returning schools will be contacted in December. If your college or university is new to PRSEF and would like more information about the scholarship program, please contact PRSEF@CarnegieScienceCenter.org.

Scholarship Award Judge Schedule

Competition Day at Carnegie Science Center – Thursday, March 24

8:00 am – 8:20 am
Registration / Coffee, Donuts – Admissions desk at Carnegie Science Center

8:30am – 9:00am
Judge orientation and training - Assigned judging areas throughout Carnegie Science Center

9:00 am – 10:00 am
Review of projects without students - Student exhibits throughout Carnegie Science Center

10:00 am – 12:30 pm
Interview students - Student exhibits throughout Carnegie Science Center

12:30 – 1:15 pm
Lunch - Assigned judging areas throughout Carnegie Science Center

1:15 pm - 2:00 pm
View projects without students – Student exhibits throughout Carnegie Science Center

2:00 pm - 4:00 pm
Student interviews at projects / Results form submission

Please contact the Science Fair office at 412.237.1534 or PRSEF@CarnegieScienceCenter.org with any questions.

Appendix 1 Tips for Judges

Scientific Thought/ Concept Formation – Is the project unique? Experienced judges have seen a lot and will recognize commonly used ideas. A project may seem familiar, but the student can use creative ability to find a unique twist. As a new judge, if you see several projects that are all basically the same, that is a clue. We are looking for students who have looked into their world, their environment, their interests, and asked a clever or interesting question.

Approach/Plan/Conduct of Experiment. Did the student ask the right question? Did they research and understand the problem? Did they use the scientific method? Do all the pieces fit together – question, hypothesis, experiment, conclusion. If this is an engineering project, is it practical? Does the engineering solution work?

Did the student do enough work? You are going to have to make a judgment, but there are some things that will give you clues. If an experiment takes weeks to perform, then there might only be one trial. If it takes one day, then they might do 10 – 20 or more trials. There should be a minimum of 2 trials of any process, to show that the methods and results are reproducible. More work should always be rewarded. **EXAMPLES: Growing plants:** A lower level student could probably do 20 - 30 plants. A high school student would probably need to do 100 or more. **Doing tests on other students**. Simple tests should include at least 10 people, and even that is small – they should have 30 in lower grades, 50 or 100 in high school. They should have a statistically valid sample for a survey. If testing some physical factor, such as rolling cars down a slope, then they should have hundreds of trials, perhaps, 25 runs for each car. If testing/growing specimens in a petri dish or well, a senior division student might have hundreds of specimens.

Analytical Approach/Validation of Hypothesis – Their numbers tell the story. 6^{th} - 8^{th} graders should use graphic representations of their data and report average (mean) values. They may use some percentiles or standard deviation. High school students should report standard deviations and be able to do a simple significance test to determine if the experimental values are statistically different than the control values. Regression analysis, Z-test, T-test, Chi Square and least squares curve fit wouldn't be unreasonable for a high school student. The student should understand what significance testing is.

Thoroughness - Was the project complete? Was it consistent from question to conclusion? Did they use the appropriate controls? Was the student able to thoroughly discuss the subject in their report and in their conversation with you?

Did the student do appropriate background research? Did they use peer-reviewed articles or did they use Wikipedia? If they used the Internet, are their URL citations correct? Are they from reliable sites?

Did the student do his or her own work? You will sometimes see brilliant projects, but then, in talking to the student, will find the student lacking in fundamental understanding of the subject. This may indicate that they had more than the appropriate level of assistance from mentors.

Skill – Did the student use good lab technique, observation, computation and design skills? Did they build something that required skill? How much help did the student have? Seeking and finding good consultation for your project is good work; having too much outside help is not. It's OK, especially for younger students, if a parent builds something, but better if the parent cut it and the student built it,

and best if student did all the work. We shouldn't expect that a student would be able to do welding or complete other advanced skills, but there have been students who have learned to weld in order to build materials for their project.

- There has been significant concern about students doing projects at major labs versus those working at home or in school. Please see Appendix 9 Judging Criteria for Lab Projects for PRSEF guidelines for judging projects completed in major labs. Your goal as a judge is to ensure that there is a level playing field. For students doing projects at major labs, there should be additional scrutiny of projects to determine if the student did all the work, took the initiative to find the laboratory position, knows the subject, and made use of what was available to use. In any case, it should always be clear who did what. Judges should press the student for information when there is any doubt.

Visual Presentation – Judges should not be dazzled by form over substance. Is the writing clear and simple? Are table and figures labeled and referenced? Do they contain units? Does the presentation have the required 5 parts: Purpose, Hypothesis, Procedure, Results, and Conclusions?

Oral Presentation - Did the student respond clearly to your questions? Did the student's presentation reflect his/her knowledge of the experiment and the subject? You have to distinguish shyness and nerves from lack of knowledge.

Team Projects – Did each member of the team do an equal amount of work? Do all students know the project thoroughly?

See the Compendium on Science Fair Judging at www.PittsburghScienceFair.org for more judging tips.

Appendix 2 Category Award Selection Procedure

Although there are many ways to reach a decision on category award winners, the following two procedures are simple and avoid the issue of disparity in judges' numerical scoring.

1. After interviews are completed, the judges determine which are the best 1-2 projects they reviewed. If a judge feels that none of the projects they saw are worthy of an award, they should discuss this with their category chair(s). Likewise, if a judge feels that more than the allowed number of projects is worthy of further consideration, this too should be discussed with the category chair(s).
2. These projects are reported to the category co-chairs through a vote or through deliberation to develop a list of projects for consideration for final awards. Depending upon the size of the category, between 6 and 15 projects should be advanced for final awards judging.
3. Each judge records the selected project numbers on the Award Selection Form (See Appendix 7).
4. All of the judges in the category convene for deliberation. Each project is presented to the group by one of the judges who interviewed the student(s).

Procedure A

5. When all projects have been presented to the group, each judge ranks the projects using an electronic voting form or other method determined by the category co-chair, giving their first choice 1 point, the second 2 points and so on. Discussion is encouraged.
6. The ranking scores from each judge are added and the award winners are determined based on the composite scores. The first-place winner is the project with the lowest score, second-place is the next lowest and so on.
7. Judges caucus to discuss the results and confirm that the project with the lowest score is the one which the group agrees is the best project. They repeat that procedure for the other award winners. Co-chair judges shall resolve ties if the selection appears to be at an impasse.
8. Based on the number of entries in each category, multiple second, third and 4th place awards may be awarded. **Only one first place will be awarded in each category**. Judges will follow the Final Category Ranking form to determine how many awards to select.

Procedure B

6. When all projects have been presented to the group, the best of the category shall be chosen by a vote. The group discusses each of the projects and, via a show of hands, asks who among the judges feels that this particular project is worthy of 1st place. The project receiving the most votes is the 1st place selection for the category.
7. The group discusses each of the remaining projects and, via a show of hands, asks which projects are worthy of 2nd place, 3rd place and 4th place. Based on the number of entries in each category, multiple second, third and honorable mention awards may be awarded. **Only one first place will be awarded in each category**. Judges will follow the Final Category Ranking form to determine how many awards to select.

Appendix 3 Judging Rubrics

These rubrics were developed in order to provide constructive feedback to the students. These will be used by category judges to determine winners in each category. Please note that this will only be one judge's assessment of the strengths and weaknesses of the student's work given in order to improve future projects. It will not indicate how well the student performed with respect to other PRSEF participants. Each student will be interviewed by at least two category judges.

Some rubrics are tailored for specific applications. Point scores are used only as a judging tool. Rubrics, less the point values, will be provided to the students' teachers after PRSEF. The Category Judge Selection Procedure (See Appendix 2) has been designed to ensure all projects are evaluated on a consistent basis and ranked appropriately with regard to receiving awards. The decisions of the judges, determined on the day of the fair, are final.

Check back in September for new and improved 2022 rubrics.

Appendix 4 Expected Affiliated Sponsors Awards – 2022

American Meteorological Society
2 Certificates of Outstanding Achievement - Senior Division projects (9-12th grade) for best atmospheric and related oceanic and hydrologic sciences.

American Psychological Association
1 certificate recognizing outstanding research in psychology under the category of behavioral and social sciences.

ASM Materials Education Foundation
1 certificate for excellence in materials engineering, materials-related concepts and the materials paradigm (i.e. structure-processing-properties-performance relationship).

Association for Women GeoScientists
1 certificate for GeoScience Excellence projects which exemplify high standards of innovativeness and scientific excellence. Projects that increase the public awareness of the geosciences, illustrate interdisciplinary nature of geosciences, promote sensitivity to the earth as a global system will be considered.

Broadcom MASTERS Middle School Program
The top 10% of middle school students (generally 1st, 2nd and 3rd place category award winners in the Junior and Intermediate Division) will be nominated. Each winner will receive a nomination packet to complete.

Broadcom Coding with Commitment Award

Environmental Protection Agency
Letters of encouragement to students who have projects in the areas of environmental sciences and environmental engineering

Lemelson Early Inventor Prize
1 certificate and $100 cash prize to an individual or team in the junior or intermediate division who: (1) demonstrates problem-solving by identifying a critical problem; (2) applies empathy and STEM knowledge to find a practical solution; (3) displays entrepreneurial thinking by developing a tangible invention; (4) exemplifies environmentally-responsible thinking in their research and creation of the project.

Mu Alpha Theta
1 Certificate - Demonstrating the most challenging, thorough, and creative investigation of a problem involving modern mathematics in the Senior Division. Project does not need to be in the Math category.

NASA Earth System Science Award
1 Certificate - Presented to the students whose projects offer the Greatest Insight into Earth's

Interconnected systems, based on predetermined judging criteria ie. exhibits a clear and focused purpose that displays an Earth systems science perspective; project demonstrates significant creativity in ability and originality.

National Oceanic and Atmospheric Administration
1 Certificate - Winners' research will 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.

Regeneron Biomedical Science Award
1 certificate and $500 award to an exceptional student scientist who not only demonstrates an impressive command of biomedical science and research but also embodies Regeneron's core values and behaviors, known as The Regeneron Way.

Ricoh Americas Corporation
2 Certificates - This award will go to the project whose principles and technical innovations offer the greatest potential for increasing our ability to grow environmentally friendly and socially responsible businesses.

Society for In Vitro Biology
1 certificate for an 11th grade student with an exhibit in the area of plant or animal in vitro biology or tissue culture.

U.S. Agency for International Development (USAID)
1 certificate for a project which is relevant to international development programming and priorities including: agriculture, human rights, education, climate change, gender equity, global health etc.

U.S. Air Force
Will present awards at the regional fairs.

U.S. Metric Association
1 Certificate for a project which involves a significant amount of quantitative measurement and which best uses the SI metric system for measurements.

U.S. Navy/U.S. Marine Corps – Office of Naval Research
5 -10 certificates, letters, medallions and gift cards for projects in the senior and intermediate divisions.

U.S. Stockholm Junior Water Prize/Water Environment Federation
Regional certificates and nomination to enter the State Regional Stockholm Junior Water Prize Competition. Projects related to water quality, water resource management, water protection, water treatment or water treatment will be considered.

Yale Science and Engineering Association
1 certificate/medallion to most outstanding 11th grade student project in the areas of Computer Science, Engineering, Physics, or Chemistry. Student is given "preliminary certificate" and must sign-up online to accept the award.

Appendix 5 Expected Scholarship Awards - 2022

Allegheny College will award up to four Trustee Scholarships with a minimum amount of $25,000 per recipient. The recipients must meet the academic scholarship qualifications designated by the Office of Admissions and enroll at Allegheny College following high school graduation. In addition, Allegheny will offer up to four students a discounted rate to attend our Summer Academy experience. Summer Academy is a Pre-College experience that offers an enriching and seriously fun week for highly motivated high school students. Students can earn college credit and focus their experience in one of three areas led by Allegheny's distinguished faculty. Preference for scholarship and summer academy consideration will be given to students who embody the philosophy of the College and wish to explore their diverse interests after high school. Allegheny College is a national liberal arts college where a diverse student body of 1800 students engage in exploration of multiple fields of interest declaring a major and minor in different disciplines.

Carlow University will award up to three students with the Whalen Scholarship, valued at $8,000 ($2,000 per year for a maximum of four years). Eligible students must meet the necessary criteria for admission and enroll at Carlow full-time upon graduation from high school in one of the following majors: Biology (including concentrations in human biology, cardiovascular perfusion, cytotechnology, and a pathway for environmental science), Chemistry, Data Analytics, or Behavioral Neuroscience with Intraoperative Neuromonitoring. Carlow has a strong program in the sciences and has developed several partnerships for advanced study, including an early acceptance program to LECOM. The Whalen Scholarship can be combined with other merit and/or need-based aid not to exceed the cost of tuition.

Carnegie Mellon University will potentially award up to two Pre-College Summer Session Program commuter scholarships valued at $7,150 for 2 courses or $4,270 for 1 course. The Summer Session Program is a challenging credit-bearing program in which students take one or two actual Carnegie Mellon classes for full credit during the summer. The credit can be used at Carnegie Mellon or may be transferred to other universities. Scholarship recipients will be required to apply for admission to the program. The Pre-College program will be fully remote and runs from July 6-August 14, 2021.

Chatham University will award up to four (4) scholarships each valued at $2,000 for undergraduate study. Each recipient must be admitted to and enroll at Chatham the fall semester following high school graduation. Scholarships are renewable annually for a period of four years or 120 credits provided the recipient maintains at least a cumulative GPA of 3.0 and remains enrolled on a full time basis at Chatham.

Duquesne University will award two scholarships valued at $10,000 each to outstanding high school juniors. All scholarships are renewable annually with satisfactory academic progress. Recipients of the awards must meet academic requirements designated by the Office of Admissions, and must enroll in Duquesne University's Bayer School of Natural and Environmental Sciences the semester following their high school graduation. In addition, Duquesne University will offer four CCHS (College Credit in High School) awards. Two of these awards will be designated for courses up to three credits each and two will be designated for participation in the Duquesne University Summer Undergraduate Research Program.

Gannon University will award up to eight (8) Science Fair Scholarships each valued at $8,000 ($2,000 per year for four years) to outstanding high school students. This academic scholarship is renewable each year with a cumulative GPA of 3.0 and continued full time enrollment. Recipients of this award must meet academic requirements designated by the Office of Admissions and enroll at Gannon University as a full-time student the semester following their high school graduation.

Indiana University of Pennsylvania's Kopchick College of Natural Sciences and Mathematics will award scholarships to outstanding high school juniors or seniors. Recipients must meet the academic requirements for admission, and enroll full-time in IUP as a Biochemistry, Biology, Chemistry, Computer Science, Geoscience, Mathematics, Physics or Psychology major. A scholarship will be valued at approximately $30,000 (24 credits per year for four consecutive years.) To qualify for this scholarship the recipient must have a high school cumulative GPA of 3.5, enroll full-time, and maintain a 3.25 grade point average in one of the above listed majors.

La Roche University will award up to four (4) Science Fair Scholarships to rising juniors or seniors, each valued at $8,000 ($2,000 per year for four years) per recipient. Recipients will enroll full-time at La Roche University the fall semester immediately following their high school graduation in one of the following majors: biochemistry, biology, biology forensics, chemistry, chemistry forensics, computer science, exercise and sports science, health sciences, mathematics, pre-dentistry (LECOM), pre-osteopathic medicine 4+ only (LECOM), and pre-pharmacy 4+ only (LECOM). The recipients must meet the academic scholarship requirements designated by the Office of Freshman Admission, including that they have a cumulative grade point average of no less than 3.0 upon graduation from high school, and must remain in good academic standing at La Roche University. This scholarship may be added to other scholarships that La Roche University provides. However, the total amount of the scholarships received may not exceed that total cost of tuition for the year the student enrolls.

Mount Aloysius College will award up to six science fair scholarships of $10,000 ($2,500 per year for four consecutive years). Recipients must meet all academic criteria for admissions and maintain a 3.0 GPA at the college. Recipients must enroll in a science related major as a full-time student the semester following their high school graduation.

Penn State Greater Allegheny will offer up to four – Blue & White scholarships, each valued at $3,000/year for students who enroll full time at PSUGA, the semester following their high school graduation. The scholarship is renewable for a second year provided students maintain specific renewal criteria. Students who remain at Greater Allegheny for their junior and senior years and major in biobehavioral Health, information science & technology or psychology/science option, may also renew their scholarship, provided they meet specific renewal criteria. Students who pursue energy engineering, 3+1 program, may renew their scholarships for the junior year with a minimum CGPA of a 2.0.

Point Park University will offer two (2) scholarships with a value of $5,000 per year. The Department of Natural Sciences, Engineering and Technology will participate in the selection of the recipients. Each scholarship is awarded for four (4) years of study, provided the student meets the stated renewal

criteria. Recipients of the scholarship must meet the academic requirements for admission and enroll at Point Park University.

Saint Francis University will award six Science Fair Scholarships of $4,000 ($1,000 per year for four consecutive years). Recipients must meet academic criteria for admission and scholarship at SFU and enroll in a major with the school of sciences the semester following high school graduation.

Saint Vincent College will award five Science Fair Scholarships. Each scholarship will be valued at $8,000 ($2,000 per year for four years). Students must enroll at Saint Vincent College in a math or science related major the semester following high school graduation.

Seton Hill University will award four Seton Hill University Science Fair Scholarships. Each scholarship will be valued at $8,000 ($2,000 per year for four consecutive years.) Recipients must enroll at Seton Hill University in a math or science major the semester following high school graduation.

Slippery Rock University will award up to 10 undergraduate scholarships valued at $8,000 ($2,000 per academic year for four years) for individuals majoring in Biology, Chemistry, Engineering, Mathematics & Statistics, Geography, Geology and the Environment, Computer Science, Physics, and Psychology at Slippery Rock University. Students must have at least a 3.5 cumulative high school GPA and 1220 SAT (evidence-based reading and writing and math) or 25 ACT composite score to be eligible for the scholarship and be entering the senior year of high school. Recipients will be required to maintain a 2.5 GPA, complete 24 new credits per academic year and be enrolled at Slippery Rock University full-time, following the approved curriculum, in one of the majors listed above. The total financial aid, including this scholarship, may not exceed the total cost of attendance determined by the Office of Financial Aid each year.

Thiel College will award up to four $2,000 scholarships which would be renewable for four years. Recipients must be a junior or senior with a 3.0 cumulative GPA who plans on studying a science related field. The students must stay in a science related field, meet all admission requirements and enroll at Thiel as a full-time student status for all four years following their high school graduation.

University of Pittsburgh at Bradford will award up to four (4) $1,000 scholarships in addition to any Pitt-Bradford merit award for which a student is eligible. Students must meet admissions and scholarship criteria. Awards are renewable annually for a total of 4 academic years. Students must be enrolled full time, have a cumulative GPA of 2.25 or higher and maintain the housing that the scholarship was based on. Enrollment at the Bradford Campus is required. Awards are not transferable to any other Pitt Campus

University of Pittsburgh at Bradford will award up to four (4) $1000 scholarships in addition to any other Pitt-Bradford merit awards for which a student is eligible. Students must meet admissions and scholarship criteria. Awards are renewable annually for a total of 4 academic years. Students must be enrolled full time, have a cumulative GPA of 2.25 or higher and maintain the housing status that the scholarship was based on. Enrollment at the Bradford Campus is required. Awards are not transferable to any other Pitt Campus.

University of Pittsburgh at Greensburg will award up to 4 University scholarships ranging $2,000 - $3,000. Students must meet admission and scholarship criteria. Awards are renewable annually pending an overall GPA of 3.25 or higher. Enrollment at the Greensburg campus required - awards are not transferable to another Pitt campus.

Washington and Jefferson College will award up to four (4) scholarships valued at $8,000 ($2,000 per year renewable for a maximum of 4 years). Scholarships will renew annually provided the recipients maintains a cumulative GPA of 3.0 and maintain full-time enrollment. Recipients of this award must meet the Office of Admissions' academic requirements, enroll as full-time students, and live on campus the semester following their high school graduation. W&J has strong programs in the sciences and pre-health professions. Scholarship winners are not required to choose a specific major upon entry to the college but are encouraged to explore their many passions through research experiences and internships before declaring a major.

Appendix 6 Expected Sponsor Awards - 2022

The following Sponsors are expected to present awards at the 2022 Science Fair

Air & Waste Management Association

ALCOSAN

Allegheny County Health Department

Allegheny County Medical Society Foundation

American Chemical Society, Pgh. Section

American Industrial Hygiene Association

American Society for Quality

American Society of Civil Engineers, Pgh Section

American Statistical Association, Pgh. Chapter

Arconic

Braskem

Broadcom Foundation

Carnegie Mellon University, Chapter of Sigma Xi

Carnegie Mellon University Leonard Gelfand Center for Service Learning and Outreach

Carnegie Robotics

Chemical Association of Pittsburgh

Covestro LLC

Eaton Corporation

Facebook

FedEx Ground

Fluor Marine Propulsion

HATCH

Institute of Electrical & Electronics Engineers, Inc.

Magee-Womens Research Institute

National Institute of Occupational Safety and Health (NIOSH)

Pittsburgh Coal Mining Institute of America

Pittsburgh Geological Society

Pittsburgh Intellectual Property Law Association

Pittsburgh Psychoanalytic Center

PPG

Princeton Alumni Association of Western PA

Range Resources

Sherwin Williams

Society for Analytical Chemists of Pittsburgh

Society for Mining, Metallurgy & Exploration

Society of American Military Engineers

Society of Women Engineers

Spectroscopy Society of Pittsburgh

The Webb Law Firm

Thiel College

University of Pittsburgh, Department of Neuroscience

Young Women in Bio

Appendix 7 Award Selection form

Pittsburgh Regional Science and Engineering Fair Award Selection Form

Project Numbers	____	____	____	____	____	____	____	____	____
Rank	____	____	____	____	____	____	____	____	____	____

Although there are many ways to reach a decision on category award winners, the following two procedures are simple and avoid the issue of disparity in judges' numerical scoring.

1. After interviews are completed, the judges determine which are the best 1-2 projects they reviewed. If a judge feels that none of the projects they saw are worthy of an award, they should discuss this with their category chair(s). Likewise, if a judge feels that more than the allowed number of projects is worthy of further consideration, this too should be discussed with the category chair(s).

2. These projects are reported to the category co-chairs through a vote or through deliberation to develop a list of projects for consideration for final awards. Depending upon the size of the category, between 6 and 15 projects should be advanced for final awards judging.

3. Each judge records the selected project numbers on the Award Selection Form.

4. All of the judges in the category convene for deliberation. Each project is presented to the group by one of the judges who interviewed the student(s).

Procedure A

5. When all projects have been presented to the group, each judge ranks the projects using an electronic voting form or other method determined by the category co-chair, giving their first choice 1 point, the second 2 points and so on. Discussion is encouraged.

6. The ranking scores from each judge are added and the award winners are determined based on the composite scores. The first-place winner is the project with the lowest score, second-place is the next lowest and so on.

7. Judges caucus to discuss the results and confirm that the project with the lowest score is the one which the group agrees is the best project. They repeat that procedure for the other award winners. Co-chair judges shall resolve ties if the selection appears to be at an impasse.

8. Based on the number of entries in each category, multiple second, third and 4th place awards may be awarded. **Only one first place will be awarded in each category**. Judges will follow the Final Category Ranking form to determine how many awards to select.

Procedure B

5. When all projects have been presented to the group, the best of the category shall be chosen by a vote. The group discusses each of the projects and, via a show of hands, asks who among the judges feels that this particular project is worthy of 1st place. The project receiving the most votes is the 1st place selection for the category.

6. The group discusses each of the remaining projects and, via a show of hands, asks which projects are worthy of 2nd place, 3rd place and 4th place. Based on the number of entries in each category, multiple second, third and honorable mention awards may be awarded. **Only one first place will be awarded in each category**. Judges will follow the Final Category Ranking form to determine how many awards to select.

Appendix 8 Sample Final Category Ranking form

2021 FINAL CATEGORY RANKING – Junior Biological Sciences

To be submitted by a Category Judge Chair to the Division Chair and Fair Director

Submit this form to
Mike Scherer at Michael.Scherer.WindmillHill@gmail.com and
Nicki Wood at PRSEF@CarnegieScienceCenter.org

	Project #	Project Title
FIRST		
SECOND		
THIRD		
FOURTH		
FOURTH		

Judge's Name_____ Cell Phone Number _____

Category _____

Division _____

Date _____

We encourage you to provide the awards as noted above.
Any change in the above award distribution should be communicated to Mike Scherer, Junior Division Chairperson

Appendix 9 Judging Criteria for Lab Projects

Some students who compete at PRSEF have had opportunities to work in industrial research or teaching hospital labs. Students, parents and judges have expressed concern about equity in judging these projects in competition with those done in more traditional places, i.e., home or school labs. We have considered how best to maintain a level playing field and that discussion has caused us to generate these guidelines.

Research is usually an activity that proceeds faster when ideas are exchanged and techniques are shared. This is especially true whenever the ideas shared are in some part generated by a specialist or scientist working actively in the field in question. A student stands to gain considerable knowledge by association with these professionals and also usually has access to the latest research equipment. ***To this point, however, it is essential that the judge determine how the student earned their position with the lab and what role they had in completing the project. A student who chose the project and pursued the lab situation will be more highly rated than one who was led to those choices by someone of influence like a parent. The judge is evaluating the creativity of the student, not the mentor.***

The student researcher shall convince the judges of the following:

- ***The student did all of the work***. All of the work reported must be done by the student. It is unacceptable to present other's work; any project doing that will be disqualified. It is understood that in some situations a high school student will not be allowed to use expensive or complex testing equipment and another member of the lab may assist them.
- ***A higher level of science is expected***. When work is done in these labs it is expected to be more complex and advanced. In and of itself, this shall not influence a judge's evaluation. More complex science is usually presented in these cases; this is as expected and should not influence the rating.
- ***The student has a complete understanding of the work reported***. Each judge shall thoroughly test the student's knowledge of the subject. If a judge is not familiar with the science of the project a Category Chair shall be notified and other judges assigned. Here especially, judges shall not be satisfied with "canned" presentations.
- ***The student made use of the tools available***. The judge shall determine how effectively the student used resources available in the lab.

When deciding which of these projects to advance for Category awards, judges shall consider the judges' rubric attributes (See Appendix 3 Judging Rubrics) and reward projects that have scored well against those criteria. Just as judges are not unduly influenced by a flashy poster, they should not automatically assume that these are better science projects.