

*65th Annual*

# **Pittsburgh Regional Science & Engineering Fair **GUIDE****



**April 2-3, 2004**

**Heinz Field**

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## **New for 2004**

- Forms Wizard, p.7
- Research Plan 1A Revised
  - Allows student to enter Projected Start Date
- Human Subject Projects
  - Form 4 replaces Forms 4A and 4B

**SciTech  
Festival.**

**Pittsburgh Regional Science and Engineering Fair**

c/o Carnegie Science Center

One Allegheny Avenue, Pittsburgh, PA 15212-5850

Phone: 412/237-1534

Website: [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org)

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# CALENDAR

**2004**

**SCIENCE**

**FAIR**

November 14, 2003	PRSEF School and HomeSchool Fee and Registration Deadline
February 20, 2004	PRSEF Student Registration Deadline
February 20, 2004	Preliminary ISEF Student Application Deadline
April 2, 2004	PRSEF Competition Day, 7:00 am - 5:00 pm
April 2, 2004	PRSEF Overnighter at Carnegie Science Center Reservations are required. \$30.00/person - adult chaperone required. Call 412/237-1637 for information
April 3, 2004	PRSEF Awards Celebration, tentatively 10:00 am - 12:00 noon
April 17 - 25, 2004	Pittsburgh International Science and Technology Festival (SciTech Festival)
April 17 - 18	Events and Programs for ALL ages
April 19	NEW Elementary Day
April 20	NEW Middle School Day
April 21 - 23	High School Career Days – Job shadowing, Cutting-edge industry experts
April 24 - 25	Events and Programs for ALL ages
	<i>Note:</i> The general public is invited to attend school programs as space permits.

Call 412/237-1552 or bakerg@csc.clpgh.org for more information or visit [www.scitechfestival.org](http://www.scitechfestival.org).

# ESSENTIAL STEPS FOR ALL STUDENTS



The International Rules for PreCollege Science Research are applied to ALL projects submitted to the Pittsburgh Regional Science and Engineering Fair (PRSEF). These rules are available from the Science Service, Inc. website at <http://www.sciserv.org/isef/document/Rule2004.pdf> or call the Science Fair office at: 412/237-1534.

## SCIENCE FAIR PROCESS:

Pick a topic of interest.  
Develop a research plan.



- Before starting your research or invention, ALL STUDENTS MUST
1. Meet with their Adult sponsor
  2. Complete Checklist for Adult Sponsor/Safety Assessment Form (1)
  3. Complete Research Plan Form (1A) and Research Plan Attachment
  4. Complete Approval Form (1B)
  5. In research/invention plans which involve the use of any substance other than tap or bottled H<sub>2</sub>O and/or any heating, electrical, cutting devices – complete Designated Supervisor Form (3) and list all materials

**NEW!**

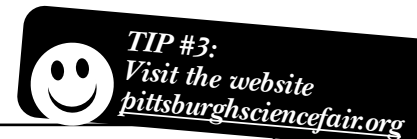
**TIP #2:**  
When in doubt,  
FILL IT OUT!

Mail these forms (1, 1A and Research Plan Attachment, 1B, and 3) to PRSEF Office – MAIL THE ORIGINALS

PRSEF will review your research plan and forms.

If approved, Student should  
**START RESEARCH!**

If requested by the SRC,  
Submit additional  
information/forms for  
review/approval



Submit 1) Registration form or Signature Page if submitted electronically, 2) Abstract form (electronically) after experimentation and prior to February 20, 2004, 3) all required forms to PRSEF office **on or before February 20, 2004.**

**NOTE:**

Check with your sponsoring teacher,  
he/she will need to submit all forms of students sponsored in one mailing!

In March, TEACHERS will receive registration confirmation from PRSEF with students' project numbers and complete Science Fair schedules. Check with your teacher for this information.

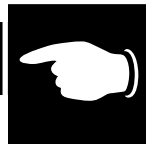


*The PRSEF Scientific Review Committee reviews research plans to ensure the safety and welfare of the student researchers and the human or animal subjects they are working with in their research. The International Rules for PreCollege Science Research are applied to ALL projects admitted to the Pittsburgh Regional Science and Engineering Fair. For a copy of these rules, call the PRSEF office or visit the Science Service, Inc. website at: <http://www.sciserv.org/isef/document/Rule2004.pdf>.*

- **A Scientific Review Committee (SRC) within the school should be established** 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. **Please call the science fair office EARLY for information on setting up your school/school district SRC.**
- All students **MUST HAVE** an adult sponsor (parent/teacher/mentor) who is ultimately responsible for the health and safety of the student conducting research, and of any humans or animal subjects. An **adult sponsor** may be a **teacher, parent, university professor, or scientist** who has a **solid background in science and will closely supervise the student's research.**
- 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.
- Students' research plans must include a detailed description of the methods or procedures involved in their projects (list all chemical concentrations, drug dosages). The procedure should be clear to the SRC reviewer.
- Designated Supervisor Form (3) is required for all research/invention plans. There was always confusion as to what was truly hazardous material and equipment. Over the last two years, PRSEF required the listing of all substances and devices without regard for the hazards they may or may not present. This practice ensured the safety and welfare of the student researcher and reduced the need for follow-up by the Scientific Review Committee and will be used again this year.
- Research plans must list at least 3 bibliographies
- Check all forms for completion. Signatures on ALL forms (except 1C, if applicable) **MUST** be obtained **PRIOR TO** the **START** of **STUDENT'S EXPERIMENTATION**.
- **Deadline for ALL REGISTRATIONS – FEBRUARY 20, 2004.** Student Registration Form (or Signature Page if submitted electronically), Abstract Forms (electronically submitted) and all other required research forms.

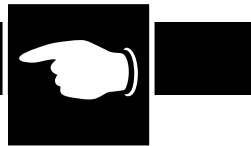
**Contact the Science Fair office, 412/237-1534, with any questions.**

**The Science Fair website, [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org), will contain the latest information for Fair Day.**



## Rules of Participation

- ☛ You must be less than 21 years of age as of May 1, 2004.
- ☛ You must live in one of the following counties:  
**PENNSYLVANIA:** Allegheny, Armstrong, Beaver; Bedford, Blair, Butler, Cambria, Centre, Clarion, Clearfield, Crawford, Erie, Fayette, Forest, Greene, Indiana, Jefferson, Lawrence, Mercer, Somerset, Venango, Washington, Westmoreland; or  
**WEST VIRGINIA:** Monongalia, Preston, Marion.
- ☛ You **MAY NOT** enter a group/team project (work by more than one student).
- ☛ Pittsburgh Regional Science & Engineering Fair is the *ONLY* science fair in Western PA which is affiliated with the International Science and Engineering Fair (ISEF). Please note for students new to your school (moving from other regions), you may compete in only one ISEF affiliated fair in any one school year.
- ☛ The **project must be solely the work of the exhibitor** in research, construction and design of the exhibit. Parents or sponsors may only advise. (Supervision and assistance with the use of power tools is exempt.)
- ☛ **NO** single school in a district may enter **more than 20 exhibits** per school registration from the Junior Division (grade 6), Intermediate Division (grades 7 & 8) and Senior Division (grades 9-12). If a school submits more entries, all entry forms will be returned to the sponsoring teacher.
- ☛ 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, parent, university professor or scientist who has a solid background in science and will closely supervise the student's research.
- ☛ All students (in all divisions) conducting **research involving vertebrate animals, human subjects, tissue, recombinant DNA, microbes, and pathogenic or controlled substances, MUST FILL OUT special approval certification forms BEFORE starting the project.**
- ☛ **Students must set up their own exhibit** at the fair for project inspection. If parents or teachers are present in the exhibit area during set up, the student will be disqualified.
- ☛ Students **MUST be present** at their project board during the official judging time on April 2, 2004. 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 judging times.**
- ☛ **Category Award winning students' project boards will be on display in the Winners Gallery for SciTech Festival week.** All other students must remove their project boards from the exhibit area on Saturday, April 3, 2004 by 1:00 pm following the awards program. Remaining projects will be discarded due to space limitations.



## What You **MUST** Bring to the Science Fair...

**YOUR DISPLAY** which includes:

- Project Data Book
- Research Paper
- Presentation Board

***V.I.S.!! Very Important Stuff to remember....***

Student's name, school name, names of teachers, parents **MUST NOT** be displayed **ANYWHERE** on your project board or paperwork. PLEASE remember this when you are putting together your project board. **DO NOT list parents or teachers BY NAME on the acknowledgments.**

**YOUR PROJECT NUMBER**, which will be assigned by PRSEF and sent to your sponsoring teacher with the registration confirmation in mid-March. **PROJECT NUMBER CARDS WILL BE PROVIDED ON FAIR DAY FOR USE ON YOUR PROJECT BOARD.**



**YOU** - ready to present your work!

Be prepared! Practice your presentation! Remember that the judges will be interviewing you, 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 can your research enhance the world and its inhabitants.

### **THE FORMS**

Bring your copy of the forms submitted to PRSEF - for reference if necessary - **NOT FOR DISPLAY.**

### **INTERNATIONAL SCIENCE AND ENGINEERING FAIR (ISEF)**

Any student who wishes to be considered for the ISEF must be a PRSEF entrant and submit a Preliminary ISEF Application Form and Research Paper by February 20, 2004. See insert in this Guidebook for further information or contact the Science Fair office at 412/237-1534.

### **A LIGHT SNACK**

We suggest that you bring a piece of fruit or granola bar with you, especially if you are leaving early from home or school on fair day!

***NOTE: The Science Fair will NOT provide the students with lunch on competition day. However, the concession stands at Heinz Field will be open.***



## Presentation Board Size Requirements

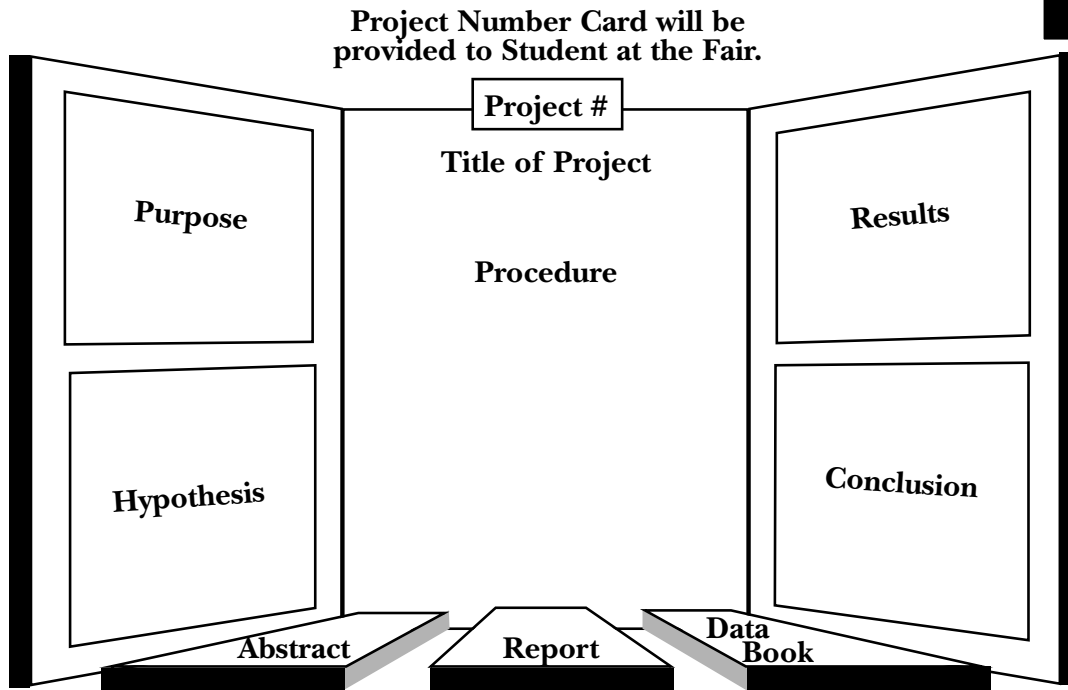
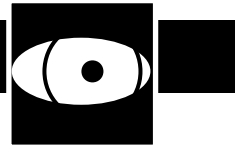
- Board size **MUST** not exceed:
  - Tabletop Display:** 48" wide (122 cm) x 30" deep (76 cm) x 78" high (198 cm)
  - Floor Display:** 48" wide (122 cm) x 30" deep (76 cm) x 108" high (274 cm)
- **Oversized exhibits will be disqualified.**

***IMPORTANT NOTE: STUDENTS MUST SET UP THEIR PROJECT DISPLAYS .  
Heavy wooden, plastic, or metal display boards are NOT suggested.***

## Safety Requirements: "When in doubt, do without."

**DO NOT bring..**

- **living organisms** (plants, animals, microbes, bacteria)
- **dried plants**
- **taxidermy specimens or parts** (stuffed or mounted skins of dead animals)
- **preserved vertebrate** (having a backbone or spinal column) **or invertebrate animals**
- **human or animal food**
- **human/animal parts or body fluids** (exception: teeth, hair, nails, dried animal bones, histological dry mount sections and wet mounts properly acquired)
- **soil or waste samples**
- **liquids of any kind** (laboratory chemicals and WATER)  
Label your bottles to indicate what is inside.
- **poisons, drugs, controlled substances, hazardous substances or devices** (firearms, weapons, ammunition, reloading devices)
- **dry ice or other sublimating solids**  
(i.e. solids which vaporize to a gas without passing through a liquid phase)
- **"loose" sharp objects** (pins, tacks, knives, scalpels, needles, syringes, etc.) **unless FIRMLY** intact on the project
- **empty tanks that have previously contained combustible liquids or gases,**  
unless purged with carbon dioxide
- **open-top cell batteries** (i.e. batteries with a removable cap/can see acid inside if removed)
- **breakable objects** (beakers, test tubes, slides, etc.) **unless** they are **FIRMLY** attached to the project
- **electrical or hot apparatus that is not properly insulated** (must be UL approved electrical materials, i.e. extension cords/surge suppressers)
- **photographs or other visual presentations depicting vertebrate animals in other-than-normal conditions** (i.e. surgical techniques, dissection, necropsies or other lab techniques)
- **awards, business cards, medals, accomplishments, phone or fax numbers**



## Sample Display Board Layout

The standard presentation board is a three-panel, free-standing structure that folds for ease in transporting to and from the fair. You can make your own or ask your teacher about ordering a stock board from an educational supply catalog or visit your local office supply store.

## Hints

**Photographs.** Photograph the sequence or steps of your experiment and place the photographs on your board. The importance is the quality of your research not the objects you bring to the PRSEF. Photographs or visuals of human test subjects must have informed consent.

**A Good Title.** Your title should be simple, accurate and descriptive. Make the observer want to know more.

**Organization.** Make sure your display is logically presented and easy to read. A glance should permit anyone (particularly the judges) to locate quickly the title, experiments, results, and conclusions. When you arrange your 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. Home-built equipment, construction paper, and colored markers are excellent. 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.

**NOTE:** We suggest that students/teachers review their project display using the inspector's checklist on page 11 BEFORE Science Fair competition day to help eliminate potential problems. All projects MUST satisfy inspection requirements before they are cleared for judging.

# QUICK REFERENCE: Research Form Requirements



The Pittsburgh Regional Science & Engineering Fair is an affiliate fair of the International Science and Engineering Fair and must comply with federal regulations ensuring the safety and well-being of humans and animals involved in student research, as well as the safety and welfare of the student researchers, themselves.

Please visit <http://www.scitechfestival.org/sfmain form.asp> to determine which forms you require. This forms wizard will determine what forms must be completed for competition at PRSEF. If your school does not have a SRC/IRB, then FORMS MUST BE SUBMITTED PRIOR TO EXPERIMENTATION for approval.

<b>ALL STUDENTS</b>	<b>FORMS 1, 1A, 1B, 3, RESEARCH PLAN ATTACHMENT, STUDENT REGISTRATION FORM (or Signature Page if submitted electronically) AND ABSTRACT FORM</b>	
<b>ALL SCHOOLS</b>	<b>SCHOOL REGISTRATION FORM AND FEE</b>	
	<b>ADDITIONAL FORMS</b>	
<b>Project Type</b>	<b>Required</b>	<b>If Applicable</b>
Nonhuman Vertebrate Animals*	2, 5	1C, 3
Human Subjects*	4	1C, 2, 3
Recombinant DNA*	2, 3	1C
Human and Animal Tissue Research*	6	1C, 2, 3
Pathogenic or Controlled Substances *	2, 3	1C
<b>Hazardous Substances or Devices</b>	3	1C

\* Requires prior approval **BEFORE** beginning experiment **or** Form 1C.

Each school should designate a teacher leader as the liaison between the Pittsburgh Regional Science & Engineering Fair and the school. For information on this role, please call 412/237-1534.

The following section contains all the forms required for the Pittsburgh Regional Science & Engineering Fair. Teachers may photocopy these pages, if additional copies are needed.

All forms are available from the Science Fair website at: [www.pittsburghsciencefair.org](http://www.pittsburghsciencefair.org)

- From the main page, click on "Get Started".
- From Get Started, click on Straight to Forms".

All sections of the International Rules for PreCollege Science Research: Guidelines for Science and Engineering Fairs (2003-2004), including all necessary forms, are available for downloading as Adobe(r) Acrobat Reader documents (.PDF).

# CATEGORIES

Select your category on the registration form.

## JUNIOR DIVISION (Grade 6)

### **Physical Science:**

*physics:* state of matter, heat, temperature, electricity and magnetism, optics, acoustics, etc.

*chemistry:* organic, inorganic, chemical compounds, household chemicals, etc.

*engineering:* technology, inventions and projects that directly apply scientific principles to manufacturing and practical uses - civil, mechanical, aeronautical, chemical, electrical, photographic, sound, automotive, marine, heating and refrigerating, transportation, environmental engineering, etc.

### **Life Science:**

*biology, zoology, botany,* enzymes, photosynthesis, blood chemistry, protein chemistry, food chemistry, biochemistry, human and animal behavior, psychology, learning perception, educational testing, nutrition, allergies, studies of animal/human health, etc.

**Consumer Science:** consumer product testing and design

## 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.

**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:** development of computer hardware, software engineering, Internet, simulations, statistics, calculus, geometry, abstract algebra, number theory, probability, etc.

**Consumer Science:** consumer product testing and design

**Earth/Space/Environment:** pollution and sources of control, ecology, geology, mineralogy, oceanography, meteorology, climatology, astronomy, 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:** solid state, optics, acoustics, particle, nuclear, plasma, superconductivity, fluid and gas dynamics, magnetism, quantum mechanics, biophysics, etc.

# CATEGORIES

## SENIOR DIVISION (Grades 9, 10, 11, 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.

**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:** development of computer hardware, software engineering, Internet, simulations, statistics, calculus, geometry, abstract algebra, number theory, probability, etc.

**Earth/Space/Environment:** pollution and sources of control, ecology, geology, mineralogy, oceanography, meteorology, climatology, astronomy, 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:** solid state, optics, acoustics, particle, nuclear, plasma, superconductivity, fluid and gas dynamics, magnetism, quantum mechanics, biophysics, etc.

# ABSTRACT CRITERIA 2003 Pittsburgh Regional Science & Engineering Fair

Upon completion of research and experimentation, you are required to write a maximum 100-word, one-page abstract. The completed Abstract Form (sample below) along with an electronic copy MUST be submitted with your registration materials to PRSEF on or before FEBRUARY 16, 2004.

Please note that PRSEF sponsor and special judges have requested student abstracts prior to the fair competition day to determine which projects address their special areas. Therefore, PRSEF requires electronic submission of all Abstracts. Please submit to [abstracts@csc.clpgh.org](mailto:abstracts@csc.clpgh.org) and include the abstract in the body of the e-mail. Do not send as an attachment. The student's and teacher's name and school must be in the body of the e-mail. A hard copy must be submitted with all of the student's paperwork. Only electronically submitted abstracts will be included in the Abstract Book which is distributed to sponsor and special judges. Please call the Science Fair office at (412) 237-1534 if this creates a hardship. Your project number will be assigned to the abstract form by the science fair office.

An abstract is a very short description (100 word maximum) of what you did, why you did it, how you did it, what were the results, what was the conclusion and perhaps what work is planned as a follow-up. An abstract must NOT include any acknowledgements or work or procedures done by the mentor.

A sample abstract follows. Note that it has six sentences and only 91 words, yet it says all that needs to be said!

## ABSTRACT FORM

PROJECT NUMBER: \_\_\_\_\_  
will be completed by PRSEF

PROJECT TITLE: Hummingbird Color Preferences

CATEGORY: Behavioral & Social Science

Hummingbirds are a welcome visitor to a backyard or patio. This work intended to learn if these birds favor one color of nectar over other colors. Five different colored nectars were set out in clear feeding stations and the number of "hits" on each color was recorded. It was determined that the birds prefer red; no statistically significant difference was observed with the other colors. Literature suggests that food coloring is inappropriate for hummingbird nectar. Future work is planned to determine if red, prominent on the feeding station, is equally attractive.

Sample

SPONSORING TEACHER

SCHOOL

**FORMS**

# Checklist for Adult Sponsor / Safety Assessment Form (1)

This completed form is required for ALL projects and must be completed prior to experimentation

Student's Name \_\_\_\_\_

- 1)  The student and a parent / guardian have signed the **Approval Form (1B)**.
- 2)  I have reviewed the **Research Plan (1A)**, **Research Plan Attachment** and signed **Approval Form (1B)**.
- 3)  This project involves the following area(s) and requires **SRC/IRB approval** before experimentation begins:
  - Human Subjects**
  - Controlled Substances**
  - Non-Human Vertebrate Animals**
  - Recombinant DNA**
  - Pathogenic Agents\***
  - Human or Non-Human Vertebrate Animal Tissue**

\* All bacteria, fungi, etc. isolated from the environment should be considered potentially pathogenic.

- 4)  This project does not involve any of the research areas listed in #3.
- 5)  This project involves human subjects. The student will obtain approval from an **Institutional Review Board (IRB)** before experimentation is started. (See pp. 14-16.)
- 6)  This project involves non-human vertebrate animals, pathogenic agents, controlled substances, recombinant DNA, or human and animal tissue. The student will obtain approval from a **Scientific Review Committee (SRC)** before experimentation is started. (See pp. 17-25.)
- 7)  This project involves the hazardous substances or devices checked below. A Designated Supervisor will provide proper supervision to the student. Prior approval by the adult sponsor and certification by a designated supervisor is required. (See p. 28.)
  - Chemicals** (*i.e.*, hazardous, flammable, explosive or highly toxic; carcinogens; mutagens and all pesticides). I have reviewed with the student the Material Safety Data Sheet (MSDS) Listing for each chemical that will be used. I have also reviewed the proper safety standards for each chemical including toxicity data, proper handling techniques, and disposal methods. For *Safety in Academic Chemistry Laboratories*, visit the American Chemical Society's website at <http://pubs.acs.org>.
  - Equipment** (*i.e.*, welders; lasers; voltage greater than 220 volts). I have reviewed with the student the proper operational procedures and safety precautions for the equipment to be used by the student. For information about laser standards and research, visit the OSHA website at [www.osha.gov](http://www.osha.gov).
  - Firearms**. I have reviewed with the student the proper safety standards for firearms use.
  - Radioactive Substances**. I have reviewed the proper safety standards for each radioactive substance the student will use.
  - Radiation** (*i.e.*, x-ray or nuclear; unshielded ionizing radiation of 100-400 nm wavelength). I have reviewed with the student the proper safety methods concerning the type of radiation the student will use.

\_\_\_\_\_  
Adult Sponsor's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Review

(Must be prior to experimentation.)

# Research Plan (1A)

This completed form is required for ALL projects.

Type or print all information requested.

Answer all questions and complete Research Plan Attachment

1) Student's Name \_\_\_\_\_ Grade \_\_\_\_\_

2) Title of Project \_\_\_\_\_  
\_\_\_\_\_

3) Adult Sponsor \_\_\_\_\_

4) Is this a continuation from a previous year?  Yes  No

**If Yes:** a) Attach the previous year's **abstract & completed 1A & research plan** and

b) Explain how this project is new and different from previous years on **Continuation Form (7)**

5) **This year's** laboratory experiment/data collection will begin: (must be stated (mm/dd/yy))

Projected Start Date: \_\_\_\_\_ Projected End Date: \_\_\_\_\_

ACTUAL Start Date: \_\_\_\_\_ ACTUAL End Date: \_\_\_\_\_

6) Where will you conduct your lab work? (check all that apply)  Research Institution  School  Field  Home

7) Name, address & phone of school and work site(s):

School:

Work site:

Work site:

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

8) **All projects require completed forms: Checklist for Adult Sponsor/Safety Assessment Form (1), Research Plan (1A), Research Plan Attachment and Approval Form (1B) and may require Registered Research Institutional/Industrial Setting Form (1C).**

Check **ALL** items that apply to your research.

**The following areas require review and approval by SRC or IRB prior to experimentation :**

- Humans** (requires prior IRB approval; complete Forms: Checklist, 1A, 1B, 4 [1C, 2, 3, if required])
- Non-Human Vertebrate Animals** (requires prior SRC approval, complete Forms: Checklist, 1A, 1B, 2, 5 [1C, 3, if required])
- Recombinant DNA** (requires prior SRC approval, complete Forms: Checklist, 1A, 1B [2, 3, 1C, as required])
- Pathogens** (requires prior SRC approval; complete Forms: Checklist, 1A, 1B, 2 [1C, 3, if required])
- Controlled Substances** (requires prior SRC approval; complete Forms: Checklist, 1A, 1B, 2 [1C, 3, if required])
- Human/Animal Tissue** (requires prior SRC approval; complete Forms: Checklist, 1A, 1B, 6 [1C, 2, if required])

**This area requires approval by a Designated Supervisor prior to experimentation:**

- Hazardous Substances or Devices** (complete Forms: Checklist, 1A, 1B, 3 [1C, if required])

9) **Complete Research Plan Attachment (See page 31) and attach to this form.**

10) **An abstract is required for all projects after experimentation (see page 27).**

# Research Plan Attachment

REQUIRED for ALL Projects

A complete research plan must accompany Research Plan Form (1A)

Additional pages may be attached

Student Name(s): \_\_\_\_\_

Provide a typed research plan and attach to Research Plan Form (1A).

The research plan is to include the following:

**A. Question being addressed**

**B. Hypothesis/Problem/Engineering Goals**

**C. Description in detail of method or procedures (including chemical concentrations and drug dosages)**

For human research, include survey or questionnaires if used, and critically evaluate the risk. See instructions for human research on p. 14 of the Rules. **For nonhuman vertebrate animal research, you must briefly discuss POTENTIAL ALTERNATIVES and present a detailed justification of use of nonhuman vertebrate animals.** See instructions on p. 19 of the International Rules.

**D. Bibliography**

List at least three major references (*e.g.*, science journal articles, books, internet sites) from your library research. If you plan to use non-human vertebrate animals, give an additional animal care reference.

# Approval Form (1B)

This completed form is required for ALL projects.

## 1) REQUIRED FOR ALL PROJECTS.

- a) **Student Acknowledgment:** I understand the risks and possible dangers to me of the proposed **Research Plan (1A)**. I will adhere to all International Rules when conducting this research.

\_\_\_\_\_  
Student's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date Acknowledged

(Must be prior to experimentation.)

- b) **Parent/Guardian Approval:** I have read and understand the risks and possible dangers involved in the **Research Plan (1A)** and **Attachment**. I consent to my child participating in this research.

\_\_\_\_\_  
Parent/Guardian's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Approval

(Must be prior to experimentation.)

- c) **Adult Sponsor Approval:** I have read the **Research Plan (1A)** and **Attachment** prior to experimentation and reviewed the **Checklist for Adult Sponsor** with the student. I agree to sponsor the student named above and assume reasonable responsibility for compliance with all International ISEF Rules as they pertain to the **Research Plan (1A)**.

\_\_\_\_\_  
Adult Sponsor's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Approval

(Must be prior to experimentation.)

## 2) REQUIRED FOR PROJECTS REQUIRING SRC/IRB APPROVAL. SIGN 2a OR 2b AS APPROPRIATE.

- a) **Required for projects that need prior SRC/IRB approval BEFORE experimentation** (i.e., see Item #8 on Form 1A.)

The SRC/IRB has carefully studied this project's **Research Plan (1A) and Attachment** and all the required forms are included. My signature indicates approval of the **Research Plan (1A)** before the student begins experimentation.

\_\_\_\_\_  
SRC/IRB Chair's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Approval

(Must be prior to experimentation.)

OR

- b) **Required for research conducted at all Registered Research Institutions with no prior fair SRC approval.**

This project was conducted at a registered research institution (**not home or high school**) and was not previewed and approved by the fair SRC before experimentation, but it does comply with the International Rules. **Attach (1C) and required institutional approvals (e.g. IACUC, IRB)**

\_\_\_\_\_  
SRC/IRB Chair's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Approval

**NOTE:** If a stamp is used, it must be initialed by the chairperson.

## 3) FINAL ISEF AFFILIATED FAIR SRC APPROVAL. (REQUIRED FOR ALL PROJECTS)

### SRC Approval After Experimentation and Shortly Before Competition at Regional/State/National Fair

I certify that this project adheres to the approved **Research Plan (1A)** and **Attachment** and complies with all International Rules.

\_\_\_\_\_  
Regional SRC Chair's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Approval

\_\_\_\_\_  
State/National SRC Chair's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Approval

(where applicable)

# Registered Research Institutional/Industrial Setting Form (1C)

This form must be completed by the scientist supervising the student research conducted in a registered research institution (*e.g.*, universities, medical centers, NIH, correctional facilities, etc.) or industrial setting.

This form **MUST** be displayed with your project.

Student's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

**To be completed by the Scientist (NOT the Student or Adult Sponsor) after experimentation:**

The student conducted research at my institution: (check one)

- a)  only to use the equipment                      b)  to perform experiment(s)

**If b, the following questions must be answered.**

1) How did the student get the idea for her/his project?

(*e.g.* Was the project assigned, picked from a list, an original student idea, etc.)

2) What did the student do that showed creativity and ingenuity?

(Did the student show creativity in experimental design, development of techniques or equipment, arrival at conclusions, etc.)

3) Did the student work on the project as a part of a research group?     yes     no

If yes, how large was the group and what kind of research group was it (students, group of adult researchers, etc.)

4) What specific procedures did the student actually perform and how independently did the student work?

Please list and describe. (Do not list procedures student **only** observed.)

5) Student research projects dealing with human subjects, nonhuman vertebrate animals or rDNA require review and approval by institutional regulatory board (IRB/IACUC). **Copy of approval(s) must be attached.**

\_\_\_\_\_  
Scientist's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Institution

\_\_\_\_\_  
Date Signed

\_\_\_\_\_  
Address

\_\_\_\_\_  
Phone

## Qualified Scientist Form (2)

Required for research involving animals, controlled substances and pathogens; may be required for rDNA, tissues, and humans. Must be signed prior to the start of student experimentation.

Student's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

### To be completed by the Qualified Scientist (qualifications must be in student's area of research):

Scientist's Name \_\_\_\_\_

Advanced Degree \_\_\_\_\_ Degree Specialty (must be stated) \_\_\_\_\_

If degree does not clarify, please explain qualifications in student's area of research:

Position: \_\_\_\_\_ Institution: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: \_\_\_\_\_

- 1) Will nonhuman vertebrate animals be used? . . . . .  yes  no  
a) If yes, were alternatives (see page 17) explored? . . . . .  yes  no  
b) Could this project cause pain or distress to the vertebrate animal(s)? . . . . .  yes  no  
c) Does this project duplicate previously published research? . . . . .  yes  no

If yes to any of the above (a, b, c) please explain and justify: \_\_\_\_\_

- 2) Will human subjects be used? . . . . .  yes  no  
3) Will controlled substances be used?. . . . .  yes  no  
(includes DEA classed substances, prescription drugs, alcohol and tobacco)  
If yes, a) Will they be used according to existing local, state and federal regulations?. . . . .  yes  no  
b) Please list the name(s) of the controlled substance(s): \_\_\_\_\_

- 4) Will recombinant DNA be used? . . . . .  yes  no  
5) Will pathogenic or potentially pathogenic agents be used? . . . . .  yes  no

If yes, name(s) \_\_\_\_\_

If yes, will accepted procedures be used? . . . . .  yes  no

- 6) Will human blood, blood products or body fluids be used?. . . . .  yes  no  
7) Will hazardous substances be used?. . . . .  yes  no  
8) Will you directly supervise the student(s)?. . . . .  yes  no

If yes, please explain what safety precautions will be taken in this study: \_\_\_\_\_

I certify that I have reviewed and approved the **Research Plan (1A)** and **Attachment** prior to the start of the experimentation. If the student or Designated Supervisor is not trained in the necessary procedures, I will ensure her/his training. I will provide advice and supervision during the research. I have a working knowledge of the techniques to be used by the student in the **Research Plan (1A)** and **Attachment**. If an addictive substance is used in this research, I certify that I possess a DEA license required for procuring and dispensing an addictive substance. I understand that a Designated Supervisor is required when the student is not conducting experimentation under my direct supervision.

Qualified Scientist's Printed Name \_\_\_\_\_

Signature \_\_\_\_\_

Date of Approval \_\_\_\_\_  
(Must be prior to experimentation.)



# Human Subjects Form (4)

Required for all research involving humans. IRB approval required before experimentation.

Student's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

**To be completed by Student Researcher:** (All questions are applicable and must be answered; additional page may be attached.)

- 1) Describe the purpose of this study and list all of the research procedures in which the subject will be involved. Include the duration of the subject involvement. Attach any surveys or questionnaires.
- 2) Describe and assess any potential risk or discomfort, and, if any, potential benefits (physical, psychological, social, legal or other) that may be reasonably expected by participating in this research.
- 3) Describe the procedures that will be used to minimize risk, to obtain informed consent, and to maintain confidentiality.

For questions or concerns regarding this research, contact: \_\_\_\_\_ at \_\_\_\_\_.  
Adult Sponsor Email/phone

## To be completed by Institutional Review Board (IRB) prior to experimentation:

Determination of risk, including physical and psychological risks (See risk evaluation, p. 14.)

- Minimal risk where informed consent is recommended, but not required.
- Minimal risk where informed consent is **REQUIRED**.
- More than minimal risk where informed consent & a Qualified Scientist are **REQUIRED**

*Neither the Adult Sponsor, parents, the Qualified Scientist, nor the Designated Supervisor who oversees a specific project is permitted to serve on the IRB reviewing that project. This eliminates conflict of interest.*

## IRB SIGNATURES (a minimum of three signatures is required)

**1) Medical Professional:** (a licensed psychologist, psychiatrist, medical doctor, licensed social worker, physician's assistant, or registered nurse) (circle)

Member of IRB's Printed Name \_\_\_\_\_ Signature \_\_\_\_\_ Date of Approval \_\_\_\_\_

### 2) Science Teacher:

Member of IRB's Printed Name \_\_\_\_\_ Signature \_\_\_\_\_ Date of Approval \_\_\_\_\_

### 3) School Administrator:

Member of IRB's Printed Name \_\_\_\_\_ Signature \_\_\_\_\_ Date of Approval \_\_\_\_\_

## To be completed by Human Subject:

(prior to experimentation)

- I have read and understand the conditions above, and I consent/assent to voluntarily participate in this research study.
- I realize I am free to withdraw my consent and to withdraw from this study at any time without negative consequences.
- I consent to the use of visual images (photos, videos, etc.) involving my participation in this research.

Signature \_\_\_\_\_ Date \_\_\_\_\_

## To be completed by Parent/Guardian:

(Prior to experimentation and when participant is under 18 and informed consent is required)

- I have read and understand the conditions and risks stated above and consent to the participation of my child.
- I have reviewed a copy of any survey or questionnaire used in the research.
- I consent to the use of visual images (photos, videos, etc.) involving my child in this research.

Signature \_\_\_\_\_ Date \_\_\_\_\_

**Non-Human Vertebrate Animal Form (5)**  
**Required for all research involving nonhuman vertebrate animals.**  
**(SRC approval required before experimentation.)**

ATTENTION: *This form is not necessary if student uses only tissue from non-human vertebrates in the project.*

Student's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

**To be completed by Student Researcher:**

1. Genus, species, common name of animal(s) used. **(Use separate animal form for each species used.)**  
\_\_\_\_\_
2. Where will animals be obtained? (See p. 17); Pet store animals, except fish and those used for behavioral studies, are inappropriate for research.  
\_\_\_\_\_
3. How many animals will be used? \_\_\_\_\_ Average weight \_\_\_\_\_
4. Cage size \_\_\_\_\_ Number of animals per cage \_\_\_\_\_
5. Type of food \_\_\_\_\_
6. How often fed and given water? \_\_\_\_\_
7. Type of bedding used (Do not use cedar chips, newspaper, or paper towels.) \_\_\_\_\_
8. Where will animals be housed? \_\_\_\_\_
9. Name the veterinarian who will provide veterinary medical and nursing care in case of illness or emergency **(required)**.  
D.V.M. \_\_\_\_\_ Name of Facility \_\_\_\_\_ Phone \_\_\_\_\_
10. Will animals be euthanized?     Yes     No  
If yes, why and by what method? \_\_\_\_\_ By whom? \_\_\_\_\_  
If no, what will happen to the animals after experimentation? \_\_\_\_\_

**To be completed by Animal Care Supervisor:**

Name \_\_\_\_\_

Position \_\_\_\_\_

Institution \_\_\_\_\_

Address \_\_\_\_\_

Office Phone \_\_\_\_\_

I certify that I have discussed this research with the student prior to its start and will supervise and will accept primary responsibility for the quality of care and handling of the live vertebrate animals used by the above named student. I further certify that I am knowledgeable in the proper care and handling of laboratory animals, and meet prevailing animal care supervisory requirements. When an animal must be euthanized, I certify that I will perform the procedure, using recommended agents.

Animal Care Supervisor's Printed Name \_\_\_\_\_ Signature \_\_\_\_\_ Date of Approval \_\_\_\_\_  
(Must be prior to experimentation.)

Title \_\_\_\_\_ Phone \_\_\_\_\_

Institution and Address \_\_\_\_\_

# Human and Non-Human Vertebrate Animal Tissue Form (6)

Required for all projects using viable fresh tissue, organs, human or animal parts, including blood, blood products, teeth, primary cell cultures, and body fluids (plant tissue is excluded).  
(SRC approval required before experimentation.)

Student's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

## To be completed by Student Researcher:

1) What tissue(s), organ(s), or part(s) will be used?

2) Human or animal material:

a) Where will the above tissue, organ, or part be obtained (identify each separately)

b) If to be obtained from an animal source, will the animal be euthanized?  Yes  No  
If yes, please explain why.

## To be completed by provider of tissue if tissue is obtained from a noncommercial source:

a) Human blood and blood products will be tested and documented free of AIDS and hepatitis B and C antibodies and antigens. Human teeth will be certified free of blood and blood products.

\_\_\_\_\_  
Certifying Authority's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date Signed

**OR**

b) I certify that tissues and fluids in this project will be handled in accordance with the standards and guidance set forth in Occupational Safety and Health Act, 29CFR, Subpart Z, 1910.1030 - Blood Borne Pathogens.

\_\_\_\_\_  
Qualified Scientist's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date Signed

I certify that the above listed materials will be provided by me and that the student listed will not be involved in the direct acquisition of the samples provided or purchased.

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date Signed

(Must be prior to experimentation.)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Institution

## Continuation Projects Form (7)

Required for projects that are a continuation in the same field of study from a previous year(s)' project.

*This form is required for projects exhibiting at the Intel ISEF and should be accompanied by the previous year's abstract and Research Plan (1A) with Attachment.*

**Please use a separate sheet of paper to list additional years as necessary.**

Student's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

### To be completed by Student Researcher:

1) How does the current year's project document new and different research?

2) Please briefly explain former years' work on this project, emphasizing how it is different from the current year.

2003 - Describe and Submit:  Abstract  Research Plan (1A) with Research Plan Attachment

2002 -

2001 -

Please use a separate sheet of paper to list additional years as necessary.

*This form must be displayed at your project to help provide the judges a better understanding of your project and what research has been done in the current year.*

I hereby certify that the above information is correct and that the current year Abstract & Certification and project display board properly reflect work done in the current year.

\_\_\_\_\_  
Student's Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date of Signature

# PROJECT INSPECTION CHECKLIST



*After setting up their projects, all students' displays are inspected. All projects must satisfy certain inspection requirements before they are cleared for judging. The following is a checklist used by Science Fair inspectors and is provided here, FOR REFERENCE PURPOSES ONLY, to assist students/teachers in double-checking their project displays before Science Fair day. DO NOT COMPLETE THIS FORM, DO NOT MAIL OR BRING THIS FORM TO THE FAIR – FOR REFERENCE ONLY.*

1. Is the project number displayed on the upper left corner of the student's board presentation?  
 **yes, go to #2**                       **no, student must write it in**
  
2. Is the name of the student, school, teacher, or advisor/mentor anywhere on the project or in the report?  
 **yes, it must be removed/white out**                       **no, go to #4**
  
3. **Size must not exceed?**  
**Tabletop Display:** 48" wide (122 cm) x 30" deep (76 cm) x 78" high (198 cm)  
**Floor Display:** 48" wide (122 cm) x 30" deep (76 cm) x 108" high (274 cm)
  
4. Project **must not** contain the following:
  - living organisms**  
(plants, animals, microbes, bacteria)
  - dried plants**
  - taxidermy specimens or parts** (stuffed or mounted skins of dead animals)
  - preserved vertebrate** (having a backbone or spinal column) **or invertebrate animals**
  - human or animal food**
  - human/animal parts or body fluids**  
(exceptions: teeth, hair, nails, dried animal bones, histological dry mount sections and wet mounts properly acquired)
  - soil or waste samples**
  - liquids of any kind** (laboratory chemicals and WATER). Label your bottles to indicate what is inside.
  - poisons, drugs, controlled substances, hazardous substances or devices**  
(firearms, weapons, ammunition, reloading devices)
  - dry ice or other sublimating solids**  
(i.e. solids which vaporize to a gas without passing through a liquid phase)
  - "loose" sharp objects** (pins, tacks, knives, scalpels, needles, syringes, etc.) **unless FIRMLY** intact on the project board
  - empty tanks that have previously contained combustible liquids or gases, unless** purged with carbon dioxide
  - open-top cell batteries** (i.e. batteries with a removable cap/can see acid inside if removed)
  - breakable objects** (beakers, test tubes, slides, etc.) **unless FIRMLY** attached to the project
  - electrical or hot apparatus that is not properly insulated** (must be UL approved electrical materials, i.e. extension cords/surge suppressers)
  - photographs or other visual presentations depicting vertebrate animals in other-than-normal conditions** (i.e. surgical techniques, dissection, necropsies or other lab techniques)
  - awards, business cards, medals, accomplishments, phone or fax numbers**



## Scientific Research

By following the six stages listed below, you should be able to produce a superior scientific experiment:

1. Be curious, choose a limited subject, ask questions, identify or define a problem.
2. Review published materials related to your question.
3. Evaluate possible solutions and make your educated guess (hypothesis).
4. Challenge and test your hypothesis through experimentation (data collections) and analysis.
5. Evaluate the results of your experiment and reach conclusions based on your data.
6. Prepare report and exhibit.

Good scientists, both young and old, follow a similar approach to study what they see in the world. Research is the process by which people create new knowledge about themselves or the world in which they live in order to answer a question or solve a problem. When choosing your topic, give careful thought to how your research might enhance the world and its inhabitants.

Questioning is probably the most important part of scientific creativity and is often followed by an “if...then” statement. Questioning usually leads to experiments or observations.

Students should learn to be skeptical of all research results, especially their own. A good experiment may or may not answer the questions asked, but almost always leads to fresh questions requiring new experiments or observations. The final hypothesis is often developed after one has run a number of preliminary experiments, analyzed a body of results, and reached a tentative conclusion.

## Goals of Engineering

What is the difference between a scientist and engineer? Scientists try to understand how nature works, engineers create things that never were or improve on a previous design. An engineering project should state the engineering goals, the development process and the evaluation of improvements. Engineering projects may include the following stages:

1. Define a need.
2. Develop design criteria.
3. Search literature to see what has already been done.
4. Prepare preliminary designs.
5. Build and test a prototype.
6. Retest and redesign as necessary.

## Patent and Copyright Information

You may want to consider applying for a patent or copyright if you want to protect your work. Contact the U.S. Patent and Trademark Office, at 800/786-9199 or their website, [www.uspto.gov](http://www.uspto.gov), for patent information, or the Library of Congress at 202/707-3000 for copyright information.



## Written Presentation

### Project Data Book

A project data book is your most treasured piece of work. Accurate and detailed notes make a logical and winning project. Good notes show consistency and thoroughness to the judges and will help you when writing your research paper.

### Abstract

After finishing research and experimentation, you are required to write a (maximum) 100-word, one-page abstract. An **abstract should include**: (a) **purpose** of the experiment, (b) **procedures** used, (c) **data**, (d) **conclusions**. It also may include any possible research applications. Only minimal reference to previous work may be included. The abstract should focus on work done since the last PRSEF and **should not include**: a) **acknowledgments**, or b) **work or procedures done by the mentor**. The Science Fair office requests that abstracts be submitted electronically at [abstracts@csc.clpgh.org](mailto:abstracts@csc.clpgh.org). See page 10 for an example of an appropriately written abstract.

### Research Paper

A research paper should be prepared and available along with a project data book, and any necessary forms or relevant written materials. A research paper helps organize data as well as thoughts. A good paper includes the following sections:

**Title Page.** Center the project title.

**Table of Contents.** Include a page number for the beginning of each section.

**Introduction.** The introduction sets the scene for your report. The introduction includes your hypothesis; an explanation of what prompted your research, and what you've hoped to achieve.

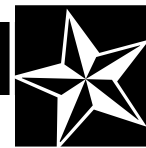
**Experiment.** Describe in detail the methodology used to collect your data or make your observations. Your report should be detailed enough so that someone could repeat the experiment from the information in your paper. Include detailed photographs or drawings of self-designed equipment. Only include this year's work.

**Discussion.** Be thorough, the discussion is the essence of your paper. The results and conclusions should flow logically from your data. Tell your readers exactly what you did and thought. Compare your results with theories, published data, commonly held beliefs, and expected results. Discuss possible errors. How did the data vary between repeated observations of similar events? How were results affected by uncontrolled events? What would you do differently if you repeated this project? What other experiments should be conducted?

**Conclusion.** Briefly summarize your results. Be specific, do not generalize. Never introduce anything in the conclusion that has not already been discussed.

**Acknowledgments.** Credit those who assisted you, including individuals, businesses, and educational or research institutions. Note any financial or material donations. (Remember however DO NOT LIST teachers/ parents/school by name.)

**References.** Include any documentation not your own (i.e., books, journal articles). See an appropriate reference for format.



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, representing university faculty, industrial scientists and engineers, representatives of private and federal research centers and agencies, medical researchers, volunteer their time to interview and award our region's most promising young scientists and engineers.

There are five different categories of judges at PRSEF: **Category Award** judges who judge student projects in each of the categories in the student divisions, **Sponsor Award** judges who represent their professional organizations or institutions and judge student's work to qualify for their specific award criteria, **Affiliated Award** judges who represent the sponsors from PRSEF's affiliation with Science Service, Inc. and the International Science and Engineering Fair, **Scholarship Award** judges who judge student's work to qualify for scholarship awards from colleges and universities in our region and **International Science and Engineering Fair (ISEF)** judges who judge the students who submitted an application and research paper to be considered for ISEF this year.

Individuals cannot serve as both Category Award judges and Sponsor, Affiliated, or Scholarship Award judges. All judges have expertise in scientific disciplines and engineering. Science fair directors, elementary or secondary schoolteachers are NOT eligible to serve as PRSEF judges.

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.*

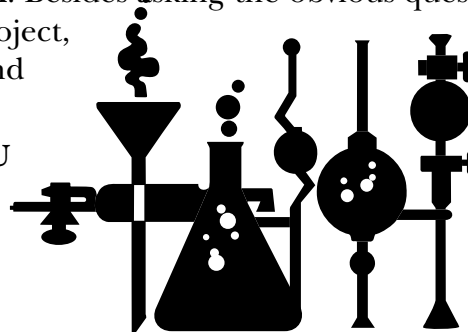
## Message From the Judges:

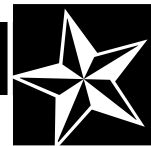
Be ready to talk in depth about your research. You should be able to have a conversation about your work and results. Practice explaining your research to others, especially people who don't understand your research. Tell everyone to ask you at least three questions.

Judges look for thoughtful 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?

**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?" and "What would be your next step?"

**JUDGES EXPECT YOU TO DEMONSTRATE THAT YOU DID THE WORK.**





## Junior Division (6th grade students)

### Concept Formation - 25 points

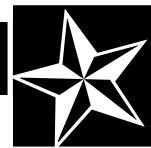
- How did the student come up with the idea for the project?
- Is there any evidence of additional data to reinforce or develop the hypothesis?
- Does the project have a clear objective?
- Was the problem scope sufficiently limited to allow a plausible attack?
- Was the purpose carried out to completion within the scope of the original intent?
- How completely was the problem covered?

### Conduct of Experiment - 30 points

- Was there a procedural plan for obtaining a solution?
- If controls were necessary, did the student recognize their need and were they correctly used?
- How clearly are the data results presented?
- Are the conclusions based on a single experiment or replication?
- Did the student acquire the necessary lab, computation, observation or design skills?
- Where did the equipment come from?  
(Did the student build it, was it bought, or part of it a kit?)
- Did the student receive assistance from parents or some other source or did the student work largely alone?

### Validation of Hypothesis - 45 points

- Did the student interpret the data correctly?
- How clearly can the student discuss the project and explain the project's purpose, procedure and conclusions?
- Was the written material well prepared?
- Is the student familiar with scientific literature in the studied field?
- Is there adequate data to support the conclusions?
- Does the student recognize the data's limitations?
- Does the student understand the project's ties to related research?
- Does the student have an idea of what further research is warranted?



## Intermediate and Senior Division (7th - 12th grade students)

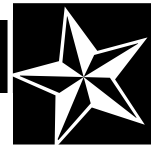
### Creative Ability - 30 points

- Does the project show creative ability and originality in:
  - the questions asked?
  - the approach of solving the problem?
  - the analysis of the data?
  - the interpretation of the data?
  - the use of equipment?
  - the construction or design of new equipment?
- An original idea for a project would show greater creativity than a suggested project from a textbook. Obviously, no project is creative and original in every aspect. Remember that standards for creativity and originality for high school students differ from those of professionals.
- Keep in mind some projects may contain elements that seem original. However, the material may have come from new curricula in textbooks or laboratory manuals unfamiliar to judges.
- How much help did the student receive? The approach to solving a problem may seem original, but may have come from a scientist's or engineer's suggestions. If a student received help on a project, any credit for creative ability and originality should reflect the student's own contributions.
- Creative research should support an investigation and help answer a question in an original way. The assembly of a kit would not be creative unless an unusual approach was taken. Collections would not be considered creative unless they supported an investigation or helped answer a question in an original way.
- A creative contribution promotes an efficient and reliable way to solve a problem. Judges should distinguish gadgeteering and genuine creativity.

### Scientific Thought/Engineering Goals - 30 points

#### *Scientific Thought*

- Is the problem stated clearly and unambiguously?
- Was the problem sufficiently limited to allow plausible attack? Good scientists can identify important problems capable of solutions. Neither working a difficult problem without getting anywhere nor solving an extremely simple problem is a substantial contribution.
- Was there a procedural plan for obtaining a solution?
- Are the variables clearly recognized and defined?
- If controls were necessary, did the student recognize their need and were they correctly used?
- Are there adequate data to support the conclusions?
- Does the student recognize the data's limitations?
- Does the student understand the project's ties to related research?
- Does the student have an idea of what further research is warranted?
- Did the student cite scientific literature, or only popular literature (i.e., local newspapers, magazines)?



## Intermediate and Senior Division (7th - 12th grade students)

### *Engineering Goals*

- Does the project have a clear objective?
- Is the objective relevant to the potential user's needs?
- Is the solution workable? Unusable solutions might seem interesting but are not practical.
- Acceptable to the potential user? Solutions that will be rejected or ignored are not valuable.
- Economically feasible? A solution so expensive it cannot be used is not valuable.
- Could the solution be utilized successfully in design or construction of some end product?
- Is the solution a significant improvement over previous alternatives?
- Has the solution been tested for performance under the conditions of use? (Testing might prove difficult, but should be considered).

### **Thoroughness - 15 points**

- Was the purpose carried out to completion within the scope of the original intent?
- How completely was the problem covered?
- Are the conclusions based on a single experiment or replication?
- How complete are the project notes?
- Is the student aware of other approaches or theories?
- How much time did the student spend on the project?
- Is the student familiar with scientific literature in the studied field?

### **Skill - 15 points**

- Does the student have the required laboratory, computation, observational and design skills to obtain supporting data?
- Where was the project done (i.e., home, school laboratory, university laboratory)?
- Did the student receive assistance from parents, teachers, scientists or engineers?
- Was the project done under adult supervision, or did the student work largely alone?
- Where did the equipment come from?
- Was it built independently by the student? Was it obtained on loan? Was it part of a laboratory where the student worked?

### **Clarity - 10 points**

- How clearly can the student discuss the project and explain the project's purpose, procedure, and conclusions? Make allowances for nervousness. Watch out for memorized speeches that reflect little understanding of principles.
- Does the written material reflect the student's understanding of the research? (Take outside help into account.)
- Are the important phases of the project presented in an orderly manner?
- How clearly are the data presented?
- How clearly are the results presented?
- How well does the project display explain itself?
- Was the presentation done in a forthright manner, without cute tricks or gadgets?
- Did the student do all the exhibit work, or did someone help?
- What can you do with your research after the Science Fair?

# AWARDS AND SCHOLARSHIPS



**More than \$300,000 in cash prizes and scholarships!**

*Over 30% of all PRSEF participants in 2003 won an award!*

## DIVISION AWARDS

**Senior Division (9th - 12th grades):** Each student researcher entering an exhibit may apply for participation in the Intel International Science and Engineering Fair (ISEF), [www.sciserv.org/isef](http://www.sciserv.org/isef). The procedure for that application is provided on page 4 of this guidebook. Up to four student researchers will be chosen and will receive an all-expense paid trip to compete at ISEF, held May 9 - 15, 2004 in Portland, Oregon, [www.intelisef2004.org](http://www.intelisef2004.org).

**Intermediate Division (7th - 8th grades):** Category Award Winners are nominated to advance to the Discovery Young Scientists Challenge (DYSC) competition, [www.school.discovery.com/sciencefaircentral/dydc/](http://www.school.discovery.com/sciencefaircentral/dydc/).

**Junior Division (6th grade):** Category Award Winners are nominated to advance to the Discovery Young Scientists Challenge competition.

**The PRSEF is the ONLY Science Fair in Western Pennsylvania which is affiliated with the ISEF and can advance students to the Intel ISEF and DYSC.**

## 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 will be sent to the students' schools. All category award winners receive medals.

## SPONSOR AWARDS

Sponsor awardees receive \$50 and a medal. Sponsor awards are defined and selected by the sponsoring organization. Many sponsors also recognize the sponsoring teacher with a cash award of \$50.

Affiliated Sponsor awards (certificates, medallions, items as determined by sponsors) are awarded at PRSEF because of its affiliation with ISEF. These sponsors include Intel, Kodak, U.S. Army, Navy and Marines.

## SCHOLARSHIPS

Awards, which include full/half/partial tuition scholarships, pre-college program scholarships, are determined and selected by the awarding colleges and universities.

## PERSEVERANCE AWARDS

Inscribed trophies are awarded to students for their continued dedication to the exploration of science and engineering.

### Honorary Scientist.

Seniors or Juniors with five or more years of active participation.

### Associate Scientist.

Seniors or Juniors with three or four years of active participation.

### Junior Scientist.

Eighth, Ninth, Tenth-grade students with three years of active participation.

## MERIT AWARDS

The Junior Division Category Judges select the students that exhibit excellence in Creativity, Presentation, or Scientific Method. Students will receive a certificate of excellence that signifies his or her outstanding performance in one of these areas.

## Sponsors

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