2008-2009

A Handbook for Category Judges
Junior Division

Prince William County Public Schools
Office of Science and Family Life

Prince William County
PUBLIC SCHOOLS
Providing A World-Class Education

The Prince William County School Division does not discriminate in employment or in its educational programs and activities against qualified individuals with disabilities, nor on the basis of age, gender, race, color, religion, or national origin.

A Note to Our Judges...

Welcome to the Middle / Senior Divisions (Grades 7-8 / 9-12) 2008-2009 Prince William-Manassas Regional Science Fair! On behalf of Prince William County Public Schools, please accept our sincerest thanks and appreciation for your willingness to share your time and professional expertise with our students in providing quality feedback on their research efforts.

Science fair serve four major purposes: (1) they motivate students to pursue an active interest in a variety of science-related fields; (2) they provide a forum for students to showcase their research findings; (3) they provide students with an opportunity to dialog with science professionals and with the public and; (4) they give recognition to students for the talents they exhibit through their hard work.

Independent student inquiry is an important component of an active science program. Research projects are a wonderful way for students to demonstrate understanding of scientific concepts and proficiency with science process and research skills they have utilized throughout the year. Prince William County Public Schools encourages students to participate in local school science fairs and in the Regional Science Fair as a culmination to the research process. The competition aspect provides one more opportunity for students to publicly showcase their efforts and to defend their research findings. Healthy competition is beneficial in this respect, but our main intention in promoting science fairs continues to be for educational benefits they provide students.

Science Fair day is a busy and exciting time. A complete schedule of events is included in this handbook; please take a moment to determine when you should arrive. At the completion of the category judging, a separate group of judges will determine the grand prize from the first place winners in each category. Students are highly encouraged to be present during judging. You are invited to attend the presentation of awards at the public ceremony in the afternoon. I have provided for you a detailed agenda of events for the day, as well as a sample of the evaluation rubric you will be using during the judging process. In addition, detailed information regarding project evaluation criteria is included. If you are new to the judging experience, you may also find the judging hints and suggested questions for students to be helpful. Please contact me if you have questions or require further information.

Again, many thanks for your participation in this valuable science experience!

Jason Calhoun
Director, Prince William-Manassas Regional Science Fair
Supervisor of Science and Family Life Education, PWCPS

SCHEDULE OF EVENTS

Junior Division
(Grades 5 – 6)

Prince William – Manassas Regional Science Fair
2007 – 2008

Grade Levels	Location	Applications Due to Science Office	Registration & Project Set-Up	Science Fair Events
5 - 6	Marsteller Middle School 14000 Sudley Manor Drive Bristow, VA 20136	Friday April 17, 2009 By 4:00 pm	Friday April 24, 2009 4:30 pm – 7:30 pm	Saturday April 25, 2009 8:30 am – 3:30 pm 8:30 am - 1:00 pm: Presentation & Judging (Students only; students will be dismissed upon completion of category judging) 1:00 pm - 2:00 pm: Displays Closed to the Public 2:00 pm – 2:30 pm: Displays Open for Public Viewing 2:30 pm: Awards Ceremony (Auditorium) All projects must be removed at the conclusion of the awards ceremony

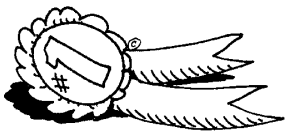
DIRECTIONS TO MARSTELLER MIDDLE SCHOOL

From the SOUTH or NORTH:

- Take Interstate 95 North toward Washington, D.C.
- Take the 234 exit towards Manassas
- (Pass Independent Hill)
- Take the 28S ramp toward US-17
- Merge onto Vint Hill Road/ VA 215
- Turn Right onto Sudley Manor DR.
- Make a U-Turn onto Sudley Manor Dr. <0.1 miles
- **End at Marsteller Middle School**
- **14000 Sudley Manor Dr., Bristow, VA 20136**

From the WEST:

- Take Interstate 66 East toward Washington, D.C.
- Merge onto VA-234 South via Exit 44 toward Manassas/Dumfries
- Take the 28 S ramp toward US-17
- Merge onto Nokesville RD/ VA-215
- Turn Right onto Sudley Manor Drive
- Make a U-turn onto Sudley Manor Drive
- **End at Marsteller Middle School**
- **14000 Sudley Manor Dr., Bristow, VA 20136**



CATEGORIES AND TOPIC DESCRIPTIONS

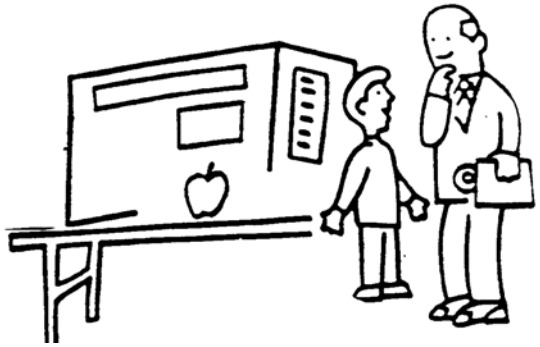
JUNIOR DIVISION (Grades 5-6)

Schools with students in grades 5 and 6 may enter one project per category. Team projects (consisting of no more than 2 students) are allowed and can be submitted to represent the category.

Category	Project Focus
Animal Sciences (AS)	animal genetics; animal husbandry; animal physiology; invertebrate and vertebrate studies (except behavioral studies)
Behavioral & Social Sciences (BE)	Human clinical & developmental psychology; cognitive physiology, sociology *(This category includes linguistics, learning, perception; reading problems; public opinion surveys; educational testing.)*
Chemistry (CH)	analytical chemistry, inorganic chemistry, organic chemistry, general chemistry *(This category includes product testing—shampoos, dyes, detergents, diapers, markers, nail polish, etc.—plastics, fuels, pesticides.)*
Computer Science (CS)	algorithms and data bases; networking and communications; graphics, simulations/virtual reality; computer and operating systems
Engineering & Mathematics (EM)	technology applications: civil, mechanical, aeronautical, chemical, and industrial engineering; material science; robotics; algebra, geometry, probability and statistics (mathematical analysis of data)
Earth & Space Sciences (ES)	geology, mineralogy, oceanography, climatology, weather, astronomy, seismology, paleontology
Environmental Sciences (EV)	air pollution/quality; water pollution/quality; soil contamination/equality; bioremediation; environmental engineering; forestry, recycling, waste management
Medicine & Health (MH)	disease diagnosis and treatment; epidemiology; human genetics; pathophysiology; antibiotics and antimicrobials—bacterial and yeast studies as they impact human health (*This category includes dentistry, pharmacology, ophthalmology, nutrition, pediatrics, dermatology, allergies, speech and hearing.)*
Physics (PH)	atoms, molecules, and solids; magnetics and electromagnetics; nuclear and particle physics optics, acoustics
Plant Sciences (PS)	agriculture, agronomy, horticulture, forestry, plant taxonomy and evolution, plant physiology, plant pathology, plant genetics, fungi studies

The goal of the regional fair is to allow students to exhibit projects that are similar in research focus in each category. Consistent identification of category place across individual schools is extremely important. Please call the Science Office if you have questions regarding the focus of specific project research. *The Regional Science Fair reserves the right to re-assign projects to ensure consistent and fair placement for competition.*

Judging Guidelines



- Each entry will be judged on a strict criterion basis for the scientific research process and on the intellectual creativity and uniqueness of the scientific product. The evaluation guide rubric is based on six criteria categories, totaling 100 possible points.

- Every student should be interviewed by as many members of the judging team as possible. If the category is large, the projects can be separated into two groups, with judges working in pairs. After the projects in the two groups are evaluated, the other judging team should visit the top projects for consideration from the other group. *All students should be interviewed by two judges.*

- The judging experience can be best achieved when judges conduct individual interviews. Every attempt is made to schedule judges for one-on-one interviews. However, with the large number of special awards judges, it is often necessary for several judges to be involved in student interviews where each judge actively questions the student during the interview.

- Each interview should last 5 to no more than 10 minutes. Judges should take the time to evaluate each student's project carefully. An important part of the educational experience is discussion of the project, including asking questions and receiving answers. Judges should budget the time accordingly to assure that the student's project is covered as completely as possible. Judges should not complete scoring evaluations in the presence of students.

- After the projects have been evaluated, each judge should order the projects based on total points earned. The points are then translated into rankings: the highest point-getter receives a ranking of 10; next receives a 9, etc.

- Judges then meet and share their project rankings, which are recorded on the **Consensus Worksheet**. At this point, discussion and possible reevaluation of projects may occur. Judges then arrive at consensus and record the place winners on the **Report of Awards** for the category. The consensus form and report form are then submitted to the science fair secretary. (Sample copies of these forms are included.)

For The Judges

Judging Hints

1. Examine the quality of the student's work and how well the student understands the project and area of study. The physical display is important, but secondary to the student's knowledge of the research.

2. Look for evidence of laboratory, field or theoretical work, not just library research or "gadgeteering."

3. Keep in mind the age level of the student who performed the research. Sometimes judges tend to go to extremes, giving students either far more credit than they deserve or not enough because it is not in the Nobel Prize category.

4. Compare projects only with those in the same competition and not with projects seen elsewhere under other circumstances.

5. *If students are present:* Judges should keep in mind that the fair is not only a competition, but also an educational and motivating experience for students. The high point of the fair experience for most students is their interview with the judges.

6. *If students are present*: As a general rule, judges represent professional authority to students. For this reason, judges should use an encouraging tone when asking questions, offering suggestions or giving constructive criticism. Judges should never criticize, treat lightly, or display boredom toward projects they personally consider unimportant. Always give credit to the student for having expended effort to present a project.

7. *If students are present:* Remember that students have an opportunity to continue and expand on their projects in the future. Probe students for considerations for future research. This gives them an opportunity to let you know if he/she is aware of any shortcomings in the research or procedure.

Suggested Questions for the Judges

Background Knowledge
Why did you decide on this research? What is the purpose of your project? What resource did you find that was helpful?
Experimental Design
What was your hypothesis? What variable did you intentionally change? What response did you observe or measure? What did you intentionally keep the same? What group did you compare the others against? Why? How many times did you repeat the experiment?
Materials and Methods
What materials did you use? What steps did you follow in conducting the experiment? If you had a mentor, in what ways did the mentor assist you?
Results-Conclusion
What results did you find? How did your results relate to your original hypothesis? What conclusions did you make? If you conducted the experiment again, what would you do differently? What additional experiments would you suggest? Which groups in the community would be interested in your research? What recommendations would you make to these groups? What was the most important thing you learned from the experiment?

From Cothron, Giese, & Rezba. Students and Research, Kendall/Hunt, 1989.

Prince William – Manassas Regional Science Fair Project Evaluation Form

Evaluation Criteria Grades 5 – 6	List Category & Project Number (BE6)												
Background Knowledge (0-10pts.)													
Project shows depth of study (key science concepts; literature review); information is presented clearly, logically													
Experimental Design / Procedure (0-25 pts.)													
Question is identified; hypothesis is clearly stated and relates directly to the question; procedure tests hypothesis; experiment replicated (3 times, minimum); sample size adequate to conclude result is not due to chance; variables identified (manipulated, responding, controls, constants)													
Results / Conclusion (0-30 pts.)													
Evidence of data (results in charts, tables or graphs, including correct scale, title, labels, units); results directly related to hypothesis (supports/does not support); evidence of raw data recorded; thorough interpretation of data; conclusion is logical and based on data; conclusion includes questions for future research													
Display (0-10 pts.)													
All components present; evidence of correct grammar, sentence structure, spelling													
Clarity (Verbal or Written) (0-10 pts.)													
Communicates scientific basis of research; description of design principles; explanation of data analysis procedure; recognition of study limitation													
Creative Ability / Originality / Skill (0-15 pts.)													
Shows creativity and originality in questions posed Innovative approach to solving the problem and use of equipment Study was within student's ability range; excessive help not utilized													
GRAND TOTAL													

Project Evaluation / Judging Criteria: Grades 5 – 6

Background Knowledge **(0-10 points)**

- Depth of study (key concepts; literature review)
- Information is presented clearly, logically

Experimental Design **(0-25 points)**

- Question is clearly identified
- Hypothesis is clearly stated; related to the question
- Procedure clearly tests the hypothesis
- Experiment was replicated at least 3 times for reliability
- Sample size was large enough to conclude it was not chance
- All variables are clearly identified (manipulated, responding, controls)

Results / Conclusion **(0-30 points)**

- Results are presented with chart, table or graph (including scale, title, labels, correct units)
- Results are directly related to the question and hypothesis (supports/does not support)
- Lab notebook contains raw data and orderly recording of data
- Thorough interpretation of data
- Conclusion is logical and based on data collected
- Conclusion includes questions for future research

Display **(0-10 points)**

- All components are present
- Evidence of correct grammar, sentence structure, spelling

Clarity **(0-10 points)**

- Communicates scientific basis of research
- Describes design principles, explains data analysis procedures, recognizes study limitations

Creative Ability / Originality **(0-15 points)**

- Shows creativity and originality in question posed
- Innovative approach to solving the problem and using equipment
- Study was within the student's ability range; excessive help not utilize

Description of Criteria Categories

Background Knowledge and Plan

- Knowledge of basic scientific concepts related to the experimental topic. An advanced project may include a formal literature review.

  Are key scientific concepts developed?
  Has a review of literature been done?
  Does the student cite scientific literature as opposed to popular resources only?
  Is there evidence of a procedural plan to obtain an answer to the research question?

Experimental Design / Procedures

- Articulation of hypothesis, independent and dependent variables, constants, controls, and repeated trials.

  Does the project have a clear objective?
  Is there a testable relationship between variables?
  Does the independent variable change?
  Does the dependent variable respond to a change in the independent variable?
  If controls are necessary, were they used as a standard for comparison?
  Is there adequate data to support a conclusion?

- Clear and Precise description of materials used and steps followed.

  Is there a clear and accurate description of materials used?
  Is there a description of the steps and procedures followed?

Results / Conclusions

- Presentation of data in tables, graphs, and summary sentences or paragraphs in support of the hypothesis.

  Are the data tables clearly and accurately labeled?
  Are appropriate graphs used?
  Are summary sentences and paragraphs used with each table and graph?
  Is there a statement of how the data support or do not support the hypothesis?

- Major findings, interpretations, suggestions for further study, and applications.

  Are the major findings adequately described?
  Was the purpose carried out to completion within the scope of the original intent?
  Are the interpretations of the major findings correct or within reason?
  Does the student have an idea of what further research is warranted?
  Does the student understand the project's ties to related research?
  Could the solution be utilized successfully in design or construction of some end product?

Display

- Attractive, legible, accurate, and consistent with fair regulations.

  Is the display attractive and complete?
  Is there evidence of correct grammar and spelling?
  Is the display consistent with fair regulations?

Clarity

- The project communicates a scientific research basis, describes design principles, explains data analysis procedures, and recognizes limitations. It also shows project evolution over time, the influence of other individuals, and future implications.

  How clearly can the student discuss the project and explain the project's purpose, procedure, and conclusions?
  Does the written material reflect the student's understanding of the research?
  Are the important phases of the project presented in an orderly manner?
  Is the data presented clearly?
  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 else help?
  Does the student recognize the limitations of the project?

Creative Ability / Originality

- 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 should not be considered creative unless they are used to support an investigation and to help answer a question in a creative way.

- An original idea for a project shows greater creativity than a suggested project from a textbook. Keep in mind that some projects may contain some elements that <u>seem</u> original. However, the material may have come from new curricula in textbooks or laboratory manuals that are unfamiliar to judges.

- Consider how much help the student received. An approach to solving a problem may seem to have originated from the student, but may have come from a scientist's or engineer's suggestions. If a student received assistance from an outside source, credit for creative ability should reflect the student's own contributions.

- Does the project show creative ability and originality in the questions asked? The approach used to solve the problem? The use of equipment? The analysis of data? The interpretation of data? The construction or design of new equipment?

Consensus Worksheet for Category Judges

Category: _____

Project Number	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	Total Relative Ranking	PLACE

1. List in numerical sequence all projects considered for an award.
2. Each judge should record the relative rankings of his or her own evaluation: project with highest points earned receives a ranking of 10; next highest receives 9; etc.
3. Total the relative rankings for each project.
4. Determine places by the total relative rankings.
5. No more than 3 Honorable Mentions should be awarded.
6. Record the order in the place column.
7. Transfer the information to the **Report of Category Awards** form.

Prince William-Manassas Regional Science Fair
Junior Division Category Awards Report

Category: _____

Award	Project Number	Project Title
First Place		
Second Place		
Third Place		
Honorable Mention		
Honorable Mention		
Honorable Mention		

Judges' Initials: _____ _____ _____ _____

Submit this **Category Awards Report**, along with the **Consensus Worksheet for Category Judges,** to Science Fair Personnel