PJAS Judging Criteria

**General comments on the criteria:** *Note that of the 5 criteria to be used* to evaluate the student, two (Presentation and Judges Opinion) are the same in all three of the research fields chosen (science presentations, math presentations, and computer science presentations). The other three criteria are referring to content of the project and will vary according to the nature of the specific discipline. The official criteria will appear here in bold face print with discussion or suggestions as to interpretation found in regular print. 4 Science Presentations

**SCIENTIFIC THOUGHT** - *Selection and statement of the problem, experimental validity and value, scope of design.*

The ultimate aim of science research is to promote new knowledge and understanding of the world in which we live. From reading and observation one comes up with a basic concept. This idea permits formulation of a meaningful question or hypothesis to which an answer may be found through a suitably designed experiment.

Thus judging the “scientific thought” criterion involves consideration of such questions as:

a) Does the student exhibit sufficient background understanding of the principles and concepts involved in the topic?

b) Is there a significant basic thought in the project? Is it clearly stated?

c) Does it admit formulation of an age-appropriate meaningful question?

d) Is the scope of the problem sufficiently limited to permit a meaningful experiment?

e) Is there a single, formal hypothesis?

**EXPERIMENTAL METHODS**- *choosing/developing techniques for valid analysis. Use of original materials or using old materials in an original way.*

Proper controls and sample size. This criterion refers to the details of a well-designed experimental procedure intended to answer the question posed. The project may require designing, building and using material hardware. The presenter must design and carry out his/her own experiment.

a) Is the project well designed for the problem at hand?

b) Is the experiment basically sound, with sufficient sample size and control of variables? Did the experiment have both a control group and experimental group(s)?

c) Does the procedure follow a logical sequence?

d) Have any original or ingenious materials or methods been used? e) Were results measurable/quantifiable and done in metric?

**ANALYTICAL APPROACH** *- Ability to draw valid conclusions. Full use of data and findings. Interpretations of weakness of design. Suggestions for further research.*

Book reports and research theories unsupported by practical data cannot achieve success in PJAS competitions because of this criterion. The student must have personally accumulated some actual data to analyze, even if the trend is negative or neutral to his hypothesis. The critical thing for a student to exhibit to judges is that he knows what the data MEANS.

a) Is the body of data sufficient to draw valid conclusions?

b) Do the conclusions refer back to the original question or hypothesis?

c) Is the student grouping the data properly to enable comparisons between groups? Is the data fully used to draw conclusions?

d) Is he evaluating the significance of his own data properly?

e) Has the student thought about how his experiment could be improved if it were to be repeated? Is he aware of sources of error?

f) Is the student able to make suggestions for further researches related to his topic or perhaps see a practical application of his findings to the real world?

**PRESENTATION** - *Ability to convey the information gained to others. To demonstrate new and improved ways of expressing and communicating scientific ideas.*

The presentation should, preferably, be in the form of a free talk employing good oral communication skills. The time restrictions in the rules necessitate planning and rehearsal. The critical question is “When the student is finished do you understand exactly what he did and why?”

a) Does the talk cover all the essentials of the project - the basic premises, the hypothesis or problem, the experimental methods, the data, and the conclusions?

b) Is the talk well-organized and flowing in a logical pattern?

c) Do the audiovisual aids enhance the audience's understanding? 5

d) Does the student demonstrate through the presentation and his responses during the questioning period a firm understanding of the basic scientific principles involved?

**JUDGE’S OPINION** - *Consider the age level and project correlation when necessary. Also, your overall feeling of the problem and the quality of the student's work.*

This criterion covers simply the judge’s overall reaction to the nature of the project and its handling by the student.

Mathematics Presentations Mathematics presentations are expository in nature, not experimental. Appropriate projects should either be of a level beyond what the student is currently studying or on an enrichment topic.

**FULFILLMENT OF PURPOSE –**

a) Did the presentation have focus?

b) Considering the topic and time allowed, was the scope of the presentation suitable?

c) Did the student use appropriate mathematical vocabulary?

d) Did the student show depth of understanding of mathematical concepts and principles?

**CONTENT**

a) Did the presentation have specific and illustrative content?

b) Was the presentation free from mathematical errors?

c) Is there a practical application or any correlation or interaction with other disciplines?

d) Did the student use correct mathematical notation?

**DEVELOPMENT**

a) Was there unity, coherence and inherent logic in the sequence of ideas?

b) Does the student show insight?

c) Does the student show sufficient examples or counter-examples? d) Can the student make suggestions as to related topics needing further investigation?

**PRESENTATION**: The presentation should, preferably, be in the form of a free talk employing good oral communication skills. The time restrictions in the rules necessitate planning and rehearsal.

a) Is the talk well organized and flowing in a logical pattern?

b) Do the audiovisual aids enhance the audience’s understanding?

c) Is the quality of exposition of a high degree?

d) Is the student’s competency with the principles such that he can answer questions with clarity, and elaborate where necessary to make a point?

**JUDGE’S OPINION:** This criterion is an overall subjective evaluation of the student’s work considering age level, depth, complexity of the subject matter, as well as the student’s success in achieving his purpose or objective.

Computer Science Presentations

**PROPER PLACEMENT DECISIONS:**  As in the mathematics projects this category is expository in nature of its presentations and seldom involves the controlled experiments required of science projects. Judges, sponsors and students must realize that projects that do have data accumulated in a controlled experiment where the computer’s role is merely to serve as a tool to analyze the data, draw pretty graphs, and do statistical conclusions DO NOT BELONG IN THE COMPUTER SCIENCE category. Such projects more properly fit the judging criteria for the specific science field such as biology or physics in which the project was done and should be transferred there before being judged. The PJAS State Judging Committee feels that a small modification of a pre-existing (canned) program is not a suitable project to present in our competition. Pre-existing programs may be used, however, if they are a small part of the student’s own work. 6 A wide disparity exists between schools in their offerings of formal computer science courses. It is the task of the judges to identify students who have gone beyond the standard opportunities provided by their schools.

**STATEMENT OF THE PROBLEM**

a) Is the objective of the project clearly stated?

b) Does the problem chosen have relevance or practical application in today’s world?

c) Did the student use appropriate computer vocabulary?

d) Did the student show depth of understanding of relevant programming concepts and principles?

e) Does the project entail creative thinking in approach techniques?

**METHODS**

a) Was there unity, coherence and inherent logic in the sequence of the presentation?

b) Does the student follow accepted procedures, using either structured programming or object-oriented programming? Is the underlying logic sound?

c) Did the student explain the project design using a high level diagram?

d) Did the student include an explanation of difficult, unique and/or significant section(s) of the program?

**FULFILLMENT OF PURPOSE**

a) Did the student show the results of his work? Was the objective obtained?

b) Does the student have a quality product?

c) Did the project include exceptional features and/or coding?

d) Does the presenter know of areas for further expansion or improvement of the project?

**PRESENTATION**: The presentation should, preferably, be in the form of a free talk employing good oral communication skills. The time restrictions in the rules necessitate planning and rehearsal.

a) Is the talk well organized and flowing in a logical pattern?

b) Do the audiovisual aids enhance the audience's understanding?

c) Is the student's competency with the principles such that he can answer questions with clarity, and elaborate where necessary to make a point?

d) If the student is employing special medium, such as a VCR or computer screen, is its value to the speech significant? Was its use limited to less than 10% of the total speech? It is acceptable for a student to show key parts of code line by line. However, the presentation should not consist of a student explaining his/her program line by line. A high-level method should be used instead.

**JUDGE’S OPINION**: Evaluate the complexity and quality of the project with respect to the age and grade level of the student and the amount of previous experience with computers. Remember schools vary considerably in what computer offerings they can make available to students. General Notes on the Use of Visuals

a) No 3-D objects are permitted. Nothing may be passed to the judges.

b) Acceptable presentation media include digital visuals or overhead transparencies.

c) Judges are reminded in their briefing that schools vary considerably in the types of equipment that they have available to make visuals. Content is important, not color and visual enhancements.

d) PJAS presentations are an educational activity. For this reason, presentation visuals (transparencies/slides) must be clearly visible to all in the presentation room. 7

e) Before using any specialized media, please review the pertinent section of the Short Course: PJAS Presentation and Scoring Rules, #4 – Presentation Specifics. This Short Course (revised 3/13) is an excerpt from Pennsylvania Junior Academy of Science Rules and Regulations for Conducting and Judging of Student Research