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**Boston Regional Science
and Engineering Fair**

***Judge’s Handbook***

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**The Science and Engineering Fair: What it is and your role in it**

The purpose of the fair is to give young people the opportunity to do science and engineering. Along with your role as an evaluator of student projects, you will be encouraging, motivating, and possibly teaching these young scientists and engineers. Even a participant whose project is of modest quality should feel a sense of accomplishment and be proud of what he or she did. Clearly, you have a critical responsibility in the success of this enterprise. Please do your best to make sure that the students remember the fair as a positive experience in their lives.

# The Boston Regional Science and Engineering Fair

The Boston Regional Science and Engineering Fair includes about 350 student participants from grades 6-12. They come from throughout Boston and can include students from public and pilot schools. They are selected after competing in local school science fairs. Approximately 30 winners in both the middle and senior high school divisions may be invited to compete in the Massachusetts State Science and Engineering Fair.

# Your relationship with the students

**What to expect from the students:** As stated above, the students you meet have won or placed in their school science and engineering fairs. They will be proud of their accomplishments and should be able to explain their projects clearly and concisely. This explanation should include what they did as well as their results and conclusions. Their displays should clearly show the intent and outcomes of experimentation and students should be able to answer questions about their projects at levels appropriate to their ages and grade levels. They should be able to describe the methodology and equipment employed and the thought processes that were used to develop their hypotheses, experimental designs, results, and conclusions.

You should not be surprised to find that projects vary widely in quality and sophistication. Some projects, particularly at the high school level, may be comparable to graduate work. The vast majority, of course, will be more elementary.

Some displays will be elaborate while others may be relatively simple. The purpose of the display is to clearly communicate the project’s purpose, hypothesis, methodology, results, conclusions and other information relevant to the investigation. A simple, clear and well-organized display is to be preferred over one that is elaborate but falls short of accomplishing this purpose. Although the fact that a display is attractive should be taken into account, scientific content and the ability to communicate that content are of primary importance.

**Confidentiality:** The judging process must remain confidential. Judges should not disclose any information regarding their findings and evaluations except to fair officials.

**Conflicts of interest:** If you find that you are acquainted with a student you have been assigned to judge or that you prefer not to judge an assigned project, inform fair officials so you can be assigned to another student.

**Rules and regulations:** Since all projects were screened before being accepted into the fair, you should assume that projects you judge are in compliance with all relevant rules and regulations.

**Treating students with respect:** In most cases, projects represent a significant initiative on the part of the students. Although a project may have flaws, you should treat it as the serious project it is meant to be. In doing so, listen carefully to the student’s description and explanation and ask questions in order to reveal his/her understanding of the project and its conclusions as well as the relevant science.

While evaluating the project fairly, provide praise for the accomplishments demonstrated along with your appraisal.

**Educational value of interviews:** The completion of a science and engineering fair project should result in significant learning. Although the primary purpose of the questions asked during judging will be to evaluate the project and its results, the student should emerge from the process with further insights, understanding and even ideas about additional investigations. The best questions will cause the student to think more deeply about the project and become aware of issues not previously considered. Questions that may cause the student to further pursue the subject are encouraged.

Your best tool in judging is your ability to ask questions. There are some questions all students should be able to answer, including variations on:

* How did you come up with the idea for this project?
* What did you learn from your background search?
* How long did it take you to build the apparatus?
* How did you build the apparatus?
* How much time (many days) did it take to run the experiments (grow plants, collect data)?
* How many times did you run the experiment with each configuration?
* Did you run the experiment under the same conditions, e.g. at the same temperature, time of day, lighting conditions?
* How does your apparatus (equipment, instrument) work?
* What do you mean by (terminology/jargon used by the student)?
* Do you think there is an application in industry for this knowledge/technique?
* Were there any books, online sources, or others that helped you with your project?
* What is the next experiment to do in continuing this study?
* Are there any areas that we have not covered that you feel are important?
* Do you have any questions for me?

Note: these are only suggestions to keep the dialog going. You may find other questions to be more useful in specific interviews.

# The Judging Process

**Preparing for judging:** During the fair, things will go pretty fast. It is, therefore, important that you are prepared when you arrive.

### Pre-Judging Activities

* Upon your arrival and after breakfast, there will be a meeting to review procedures and distribute judges’ folders containing the names of projects you will judge.
* Following the meeting, familiarize yourself with all projects in your division. The purpose of this time is to preview the projects so that your judging is more effective and efficient. **Remember that the students are competing against each other and should be judged accordingly**. Consider only the student’s work. They are neither professionals nor research fellows and it would be wrong to give them more credit than they deserve or to devalue their work because it is not in the Nobel Prize category.

### Judging Procedures

* Begin by introducing yourself and putting the student at ease.
* Ask the student to explain the project. He/she may have prepared a brief presentation.
* Following the initial presentation, ask questions designed to clarify aspects of the project, to determine how the student got the idea for the investigation and his/her level of understanding of both the project itself and its underlying science.
* As indicated above, you should ask questions to determine the student understands of the scientific principles that form the basis for the project. These questions should be appropriate to the student’s age and grade level. However, do not hesitate to probe the student’s depth of knowledge. Often you will be surprised at the level of scientific sophistication demonstrated by students.
* The time for each interview should be a reasonably uniform twenty minutes.
* Proceed from project to project. If the next student is still being interviewed by another judge, skip that project and come back to it at a later time.
* You will be using paper judging cards; please make sure to pass in your cards after two or three project interviews. Stations will be set up in a room with volunteers to electronically submit all paper copies.
* If a student is not at his exhibit, come back later and check with the adjacent student to see if the exhibitor is present.
* After your session with each exhibitor, initial the exhibit card on the table to verify that the project was judged.
* Some projects are team projects. All team members should be conversant on the project. Team projects are scored the same way as individual projects.

### Judging Criteria

It is critically important that judging be based on the scientific merit of the projects. This includes the project itself, the student’s knowledge of the scientific and/or engineering principles underlying it and his/her comprehension of the project’s basis, experimental design, outcomes and implications.

A good project must consist of **an investigation** and not be just a demonstration of technology or scientific principles, however impressive. Sometimes displays are eye-catching and polished. They should be given credit only to the extent that their content results in more effective communication of the purpose, hypothesis, methods, results, and conclusions reached in the investigation.

### Region VI Science and Engineering Fair Scoring Card (High School Version – Template)

**1. Scientific Approach (30 points)**

|  |  |
| --- | --- |
| **Science Project*** Clearly Stated Hypothesis
* Logical Experiment with Control
* Accuracy of Data and Observations
* Well-supported Conclusions
* Consideration of Future Research
 | **Engineering Project*** Identified Need or Problem
* Development of Clear Performance Criteria
* Well-constructed and Tested Prototype
* Retesting and Redesign
* Feasibility
 |

Score:               /30

**2. Understanding of Science and Engineering (20 points)**

|  |
| --- |
| * Application & Understanding of Scientific Method or Design Process
* Conclusions are Consistent with Data
* Knowledge or Scientific Literature Relevant to Project
* Connections to other Disciplines
 |

Score:               /20

**3. Innovation/Creativity (15 points)**

|  |
| --- |
| * Originality
* Use of Unique Methods, Designs or Materials
* Creative Approach to Problem-Solving
 |

Score:               /15

**4. Presentation (15 points)**

|  |
| --- |
| * Clarity of Auditory Presentation
* Effectiveness and Use of Visual Display
* Research Paper with Citations
 |

Score:               /15

**5. Laboratory Notebook (20 points)**

|  |
| --- |
| * Well-documented Entries
* Dated Records
* Evidence of Project Development
* Students in a team have their own laboratory notebook
 |

Score:               /20

**Additional Comments:  Project #: \_\_\_\_\_\_\_\_\_\_**

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**YOU MUST CALCULATE THE TOTAL SCORE**

**Judge’s Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Total Score:                /100**

***BE SURE TO SIGN THE SCIENCE PROJECT TABLE CARD***