Judges Guide

The success or failure of any science and engineering fair depends to a large extent upon the quality of the judging. It is, therefore, vitally important for each judge to understand thoroughly the duties and obligations of judging.

A science and engineering fair is a competition based on the quality of projects done by students, the results of which are presented through exhibits at the fair.

The purpose of a fair is threefold:

- To stimulate in young people an active interest in science and engineering
- To provide an educational experience through being exposed to the judges and to the public
- To give public recognition to talented students for the work that they have done.

Fairs range in scope from the local level, which may involve one class, one school, or one district, to ones which may involve a large city, a county, a state, or even a nation. Science and engineering fairs operate on a step basis, with students who have won in small fairs participating in larger fairs as representatives of the fairs in which they have previously won. Thus, an individual might participate in a local fair, move on to a city fair, then to a regional fair and there be chosen to represent that fair in the International Science and Engineering Fair (ISEF).

AWARDS

The awards for the Alamo Regional Academy of Science and Engineering Fair are in two groups, the ARASE Fair Awards and the Special Awards.

ARASE Fair Awards are given in two divisions (Junior and Senior) in twelve disciplinary categories. Students choose the category in which they wish to compete.

Senior Awards are: 1st Grand Prize, Expenses to ISEF and Scholarships; 2nd Grand Prize, Option to ISEF and Scholarships; 3rd -

5th Grand Prizes, Rosette ribbon. Other Prizes: Rosette ribbons, medals and ribbons to all 1st, 2nd, 3rd; ribbons to 4th and 5th places in categories. Director and Honorable Mention ribbons to 6th and 7th places. Certificates to all eligible projects.

Junior Awards are: Prizes: Rosette ribbons; medals and ribbons to 1st, 2nd, 3rd; ribbons to 4th and 5th places in categories. Director and Honorable Mention ribbons to 6th and 7th places. Certificates to all eligible projects. Special Sixth Grade Awards, medals, and ribbons.

Special Awards

Special Awards are given for work in a variety of disciplines by organizations ranging from the Air Force to the Women's Faculty Association of the University of Texas Health Science Center.

Special Awards categories are determined by the organizations giving the awards, and may consist of a single category, or of several categories. Each participating organization determines the students eligible for its awards, and from among the eligible students, the winners.

Awards consist of cash, scholarships, a certificate or plaque, trips to a laboratory or to professional meetings, subscriptions to professional journals, books, equipment, etc.

JUDGES

Chairperson of Judges - The Chairperson of Judges has general responsibility for judging, including selection of Blue Team Judges, assignment to category, provision of necessary space and facilities for judges and provision of any other assistance needed. Judges are grouped into two divisions (Junior and Senior), their competencies corresponding to each category within the group.

Morning Judges -The judges for the first round of judging in the morning. The judges narrow the field of participants to the most outstanding in each category. This is the group from which the Blue Team judges select the Grand Prize winners.

Blue Team Judges - The judges for the Blue Team are selected by the Chairperson in collaboration with the Alamo Regional Academy of Science and Engineering.

Special Awards - The judges for the Special Awards are provided by the organizations involved, and vary in number depending upon the number of awards given. They are chosen by the organizations represented. In the case of military organizations, individuals who are members of reserve units may be called up for active duty to judge.

JUDGING AT THE FAIR

There are four basic requirements for judging at the Alamo Regional Academy of Science and Engineering Fair.

1. Every student should be interviewed by all judges for that category. This is, first of all, to ensure thorough evaluation of the student's research project. The exhibit by itself is never adequate for this purpose, and only by extensive questioning can the judge obtain a good grasp of what the student has done and what he/she knows about the subject. Secondly; it is important because the Fair is an educational experience as well as a contest, and the interviews with the judges are an important part of this experience. Students love to exchange "shop talk" with judges, and so an interview should continue even if a judge decides almost immediately that a project will not qualify for an award.

2. Every interview should be individual. We discourage group interviews, except as noted on page 22. Some judges will

protest that they are not familiar enough with the particular field of specialty of some students to ask pertinent questions. However, even if they are not expert, they can still obtain other kinds of information useful for evaluation through personal questioning of the student.

3. Every interview should last from 5 to 10 minutes. There is no substitute for careful consideration of the student and his/her project, and this is something that cannot be hurried. In addition, even if a student is not in the running, he/she should be talked to for the educational experience involved, and five minutes is a small amount of time for such an undertaking.

4. Judges are encouraged to talk to students as much as possible, but with one limitation -- it should not be at the expense of the other judges. A judge should ask the questions necessary for the purpose of judging, but should not take up a student's time just talking if there are other judges who want to interview.

On the basis of the above requirements and experience in previous fairs, we estimate that the number of judges should be roughly around 15 per category. This number will permit careful consideration of all contestants and still provide enough persons so that the judging can be finished in the scheduled time.

LAYOUT

The exhibit area will be laid out by category within division so that all of the exhibits in any particular division and category will be together. There will also be a judges' discussion area. This area will have tables and chairs for the judges and Special Awards judges.

WHAT ARE WE JUDGING?

We are judging the following:

- Individual Project - A project completed by ONE student.
- Team Project - A project completed by a team of two (2) or three (3) students. All students must be present for morning judging.
- The quality of the work done on a project in science, engineering or mathematics by a student, and how well that student understands the project and the area in which he/she has been working. Only secondarily are we evaluating the physical display.
- A project which involves laboratory, field, or theoretical work, and not just library research or gadgeteering.
- A student's work, and not that of a Ph.D. candidate or a professional. Sometimes judges tend to overreact to students, either giving them far more credit than they deserve, or acting as though the work done by the student is worthless because it is not in the Nobel Prize category.
- A project as compared with the other projects in the same division and category, and not with other projects in the rest of the Fair.

JUDGING CRITERIA

Exhibits are judged on the following basis:

	INDIVIDUAL	TEAMS
Creative Ability	30 points	25 points
Scientific Thought/Engineering Goals	30 points	25 points

Thoroughness	15 points	12 points
Technical Skill	15 points	12 points
Neatness and Display	10 points	10 points
Teamwork	---	16 points

Creative Ability

1. Does the project show creative ability and originality in:
    - the question asked?
    - the approach to solving the problem?
    - the analysis of the data?
    - the interpretation of the data?
    - the use of equipment?
    - the construction or design of new equipment?
2. Obviously, no project would be creative and original in all these aspects and, in addition, one must keep in mind that one is dealing with students. Thus, one must ask whether something is creative and original in terms of a professional level or for a student. The latter is most probable, and means that it is very important to try to ascertain the nature of the assistance that the student has received. A student should not be penalized for taking help from others (all professionals receive help to some degree in some way). Credit for creative ability and originality should be in regard to what the student has contributed and not for what others have done for him/her. For example, did a student get an idea for the project from a textbook suggestion for research, or did he/she develop the idea as a result of reading or work that he/she has done? If the student developed

the idea alone, it would be considered more creative. A warning to judges should be made at this point. There have been projects which had elements in them which judges thought were original, but which actually came out of textbooks or laboratory manuals in newly developed curricula with which they were unfamiliar. This possibility should be kept in mind. Another source of help which should be evaluated is that received from a teacher or other adult. A student may have a very original approach for solving a problem, but it may have come out of suggestions made by a scientist or engineer with whom the student worked during the summer. This idea must be compared with something less sophisticated, but which came genuinely from the work or thinking of a student. The latter would be considered more creative.

3. Collections cannot be considered to be creative unless they are used to support an investigation and help to answer a question in some original way. Construction of equipment which involves the assembly of a kit cannot be considered to be creative unless some unusual approach or design is used.

4. For engineering, a clear distinction should be made between gadgeteering and a genuine contribution. A "Rube Goldberg" device may be ingenious, but if it is not really the most efficient way to solve a problem, if it is not acceptable to the potential user, if it is unreliable in its functioning, then it cannot really be considered to be a valuable creative contribution.

Scientific Thought/Engineering Goals

Scientific Thought:

1. Is the problem stated clearly and unambiguously?

2. Was the problem sufficiently limited so that it was possible to attack it? One of the characteristics of good scientists has been reported to be the ability to identify important problems that are capable of solution. Simply working on a difficult problem without getting anywhere does not make much of a contribution. On the other hand, neither does solving a very simple problem.

3. Was there a procedural plan for obtaining a solution?

4. Are the variables clearly recognized and defined? If controls were necessary, was there a recognition of their need and were they correctly used?

5. Are there adequate data to support the conclusions?

6. Are the limitations of the data recognized?

7. Does the student understand how the project ties in with related research?

8. Does the student have an idea of what further research is indicated?

9. Did the student cite scientific literature, or cite only popular literature (local newspaper, Reader's Digest, etc.)?

Note: It should be pointed out again that the student may have received assistance and that it is important to estimate the extent of this assistance and what contribution it made to the project.

Engineering Goals:

1. Does the project have a clear objective?

2. Does this objective have relevance to the needs of the potential user?

3. Is the solution workable? Unworkable solutions may be interesting but are of no value from a practical point of view. Acceptable to the potential user? Solutions which will be

rejected or ignored are of no value. Economically feasible? A solution which is so expensive that it cannot be utilized is of no value.

4. Can the solution be successfully utilized in design or construction of some end product?

5. Does the solution represent a significant improvement over previous alternatives?

6. Has the solution been tested to see if it will perform under the conditions of use? (This may be difficult for many students, but it should at least be considered.)

Thoroughness:

1. Does the project carry out its purpose to completion within the scope of the original aims?

2. How completely has the problem been covered in the project?

3. Are the conclusions based on a single experiment, or on replication?

4. If it is the kind of project where notes were appropriate, how complete are they?

5. Is the student aware of other approaches or theories concerning the project?

6. How much time was spent on the project?

7. Is the student familiar with the scientific literature in the field in which he/she was working?

Note: Citations are not considered to be an important consideration in engineering (as opposed to science) and so a student should not be penalized for lack of citations.

Technical Skills:

1. Does the student have the skills required to do all the work necessary to obtain the data which support the project? Laboratory skills? Computation skills? Observational skills? Design skills?

2. Where was the project done? Home? School laboratory? University laboratory? What assistance was received from parents, teachers, scientists, or engineers?

3. Was the project carried out under the supervision of an adult, or did the student work largely on his/her own?

4. Where did the equipment come from? Was it built independently by a student? Was it obtained on loan? Was it part of a laboratory in which the student worked?

Neatness and Display:

1. How clearly is the student able to discuss the project? Is he/she able to explain its purpose, procedure, and conclusions in a clear and concise manner? Discount a glib tongue but try to make allowances for nervousness which may result from talking to an authority. Watch out for memorized speeches with little understanding of principles.

2. Has the written material been expressed well by the student? Remember that such material could have been prepared with the assistance of another person.

3. Are the important phases of the project presented in an orderly manner?

4. How clearly are the data presented?

5. How clearly are the results presented?

6. How well does the project display explain itself?

7. Is the presentation done in a forthright manner, without cute tricks or gadgets?

8. Was all the work done by the student or was assistance received from his/her art class or others?

Teamwork: (*Team Projects only*)

1. Are the tasks and contributions of each team member clearly outlined?

2. Was each team member fully involved with the project, and is each member familiar with all aspects?

3. Does the final work reflect the coordinated efforts of all team members?

Judging:

From **9:00 a.m. to 1:00 p.m**. Please have score cards in **BEFORE 1:30 p.m.** Interviews with students: There is never enough time for judging, which raises the question as to whether judges should interview in groups or as individuals. Interviewing in groups speeds up the interviewing process, but it means that the students may have an encounter in which one judge asks all the questions while the others just listen. This is certainly not a very good experience for the student, and it is probably not very good for judging. When possible, we feel that students should be interviewed by one or two judges at a time rather than in a larger group. If the situation is such that the judges feel that they should interview in a group, each judge should try to ask questions. Because of the number of judges, there are always problems of a number of judges coming together at a single exhibit. If this should happen, some of the judges should try to go to another exhibit and come back later when there are not as many

other judges present. No student should be passed over regardless of what you think of his/her exhibit. Judging should be considered to be an educational process as well as a selection process, and so a student should be given as much time as possible. Students will appreciate your encouragement and suggestions on how to improve their research. Remember, the students do get the individual score sheets back.

JUDGES' CONDUCT

When interviewing, judges should remember that the Fair is not only a competition -- it is also an educational and motivating experience. Most students say that they enjoy talking to the judges, and that in many cases, it is the high point of their experience at the Fair. As a general rule, the judge represents professional authority to the student being evaluated and, therefore, it is imperative that the judges conduct themselves in an appropriate manner. The way in which questions are asked, suggestions offered, and constructive criticism made should always be in a tone which will provide definite encouragement for continued effort. The judge must NEVER tear down, treat lightly, or display boredom towards projects which are personally considered unimportant. Always give credit to the individual for having expended the effort necessary to present and prepare a project which was sufficiently better than the others in the student's school fair to be chosen to come to the Alamo Regional Academy of Science and Engineering Fair.