TULSA REGIONAL SCIENCE FAIR

TulsaSTEM.org
@TulsaSTEM
@TulsaSTEM

Judges' Guide

Judges make a memorable impact on the lives of very talented young people while encouraging their efforts. For some students, you are the first professional they have ever met who "does" science or engineering for a living. We ask that you view part of your "job" at the Science Fair as an ambassador for your profession. Students' perceptions of you can influence their career choices, so we believe it is beneficial to introduce yourself and describe your background as you meet students.

Judging the Tulsa Regional Science Fair (TRSF) is a commitment worth the effort, and we hope this information makes your experience enjoyable and rewarding!

About Tulsa Regional Science Fair:

There are two divisions in the science and engineering fair. The Junior division is reserved for middle school projects in grades 7, and 8, with the Senior division housing high school projects.
Projects in both divisions are subdivided into the following 11 categories:

- Animal Science
- Chemistry
- Engineering
- Environmental Sciences
- Mathematics & Computer Science
- Microbiology & Biochemistry
- Medical & Health Science
- Physical Science
- Physics & Astronomy
- Plant Science
- Social & Behavioral Sciences

Judging Schedule:

9-10am	**Project set up** | *Allan Chapman Student Union, Great Hall*
8:30-9am	**Judges check in** | *Allan Chapman Student Union, 2nd floor*
9-10am	**Judges' orientation** | *Alcove Theater*
10-11:30am	**Category Judging** | *Great Hall*
11:30-12pm	**Deliberations & Special Award Judging** | *Alcove Theater*
12-12:30pm	**Boxed Lunch:** Stay and eat with the students or take it with you!

Fairness

As a judge, it is essential to show the students that you are fair, impartial, and knowledgeable. This can be indicated through a few simple actions:

- You spend about the same amount of time with each student.
- You listen to the student's explanation and presentation on their project.
- Your questions asked are intended to find out more about the project and how it was completed -- not to call out an error in a way that could embarrass or intimidate the student.

Asking Questions

Your best tool in judging is your ability to ask questions. Be sensitive to what the student knows and their division, Junior or Senior. You can always ask questions that the student can answer and keep a conversation going for ten minutes. These are some questions all students should be able to answer, including variations:

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 did it take to run the experiments?	How many times did you run the experiment with each configuration?	How many experiment runs are represented by each data point on the chart?	Did you run the experiment under the same conditions?
How does your apparatus (equipment) (instrument) work?	What do you mean by (terminology or jargon used by the student)?	Do you think there is an application in industry for this knowledge (technique)?	Were there any books that helped you do your analysis?
When did you start this project?	What is the next experiment to do in continuing this study?	Are there any areas that we not have covered which you feel are important?	Do you have any questions for me?

- ⊗ One type of question to avoid is ***"Why didn't you do....?"***

Probing questions are helpful in stimulating the student's thought processes. A solution or extension to the work presented may be obvious to you with your experience, but the student may not understand why you're asking such a question. Instead, try ***"Could you have done... ?"*** or ***"What do you think would have happened if you had done....?"*** When phrased this way the question is an invitation for the student to think about the experiment in a different way, and can turn the question into a positive experience.

Guiding the Discussion

Sometimes we come across projects in technical areas with which we are intimately familiar, but the student did not understand. They may have made some incorrect assumptions, missed a key indicator in the data, came up with a false conclusion, or didn't look at or understand some common principles. It can be tempting to share your knowledge about the topic, to help the student appreciate what happened (or should have happened) in the experiment. You may try with your questions to lead the student toward the right answers, but ***please don't give the answers***. Remember to be sure that your discussion meets the following Tulsa Regional Science Fair objectives to involve the student in discovery:

- Your conversation should resemble a discussion with an esteemed colleague who is having difficulty with some research -- together, you talk through the situation to mutually arrive at improved answers.
- The student should be doing most of the talking.
- Coax and/or coach the student into realizing and describing the correct conclusions; it's the student's project, not ours.
- Encourage the student to conduct more experimentation in order to verify the new conclusions.

Improving Communication: Judge to Student

Since you are a judge, most students instinctively think of you as an intimidating figure. The more you can dispel this image, the more likely you are to help the student be less nervous, and get a better discussion. Again, simple things can make a difference:

- Make eye contact with the student.
- Use body language to show interest and engagement (facing the student(s), nodding, tilting your head, etc.)
- If you wear glasses, look at the student through them, not over the top of the frames.
- Whenever a student shows a good idea, clear chartsmanship, a clever way to get expensive results with inexpensive equipment, or anything you can compliment, be sure to use a compliment.
- Use a tone of voice that indicates interest or inquisitiveness, not skepticism or contempt.

Improving Communication - Judge to Student:

USE YOUR KNOWLEDGE OF PROBLEM-SOLVING & SCIENTIFIC METHOD

Many of these students are exceptionally bright, and it is easy to think -- when facing an incredibly impressive display and a supremely confident student -- that this student's research is beyond your knowledge. If a project is really and truly completely outside your experience, you are still knowledgeable in the area of problem-solving and the scientific method. Concentrate on these aspects rather than the details of a particular project.

KEEPING ASKING QUESTIONS UNTIL IT MAKES SENSE

Young people often develop their conversation skills through interactions with peers, focusing on topics they know well. When teenagers encounter unfamiliar discussions, they often lose interest and appear bored. To convey understanding, consistently show interest and ask questions, even seemingly basic ones. This encourages students to believe you comprehend the conversation. Keep posing questions until the information becomes clear, even if you initially struggle to grasp it.

REVIEW WITH OTHER JUDGES FOR ADDITIONAL INPUT

No matter how you handle this situation, please do not tell the student how little you understand (we don't want a student to tell a parent that the judges didn't know anything about the topic). Remember, you are not the only judge who will talk to this student. If something is not completely clear, bring it up in the judging meeting; judges who are familiar with the applicable science will have sorted it all out.

ASK THE STUDENT TO GO DEEPER TO GAUGE THEIR UNDERSTANDING

Some students may lack the necessary knowledge for their project due to receiving assistance or doing minimal work. To identify this, ask for explanations of the terms they use. Don't assume they understand technical terminology or equipment. Address these concerns during the judging session, as others on the panel may share similar reservations.

Scoring & Rubrics

Science

- Research Question (10 pts)
- Design and Methodology (15 pts)
- Project Execution (20 pts)
  - Data collection, analysis, and interpretation
- Creativity (20 pts)
- Presentation (35 pts)
- Poster (10 pts)
- Interview (25 pts)

Engineering

- Research Problem (10 pts)
- Design and Methodology (15 pts)
- Project Execution (20 pts)
  - Construction and testing
- Creativity (20 pts)
- Presentation (35 pts)
- Poster (10 pts)
- Interview (25 pts)

Social and/or scientific value is also emphasized

Examine the quality of the student's work and how well they understand the project & area of study in each category listed on the scoring sheets. Focus on awarding points for things done; not penalizing the student for NOT doing something. How do you choose the best? Here are some key items that experienced judges and mentors often see in an "outstanding" project:

- Evidence of substantial background research
- Clear hypothesis or design objective
- Good use of graphs and tables to present their data
- Repeated experiments (done more than once or twice)
- Statistical analysis (keep in mind the grade level of the student)
- Student understanding of sources of error

Consistent Scoring:

Each judge has a unique scoring style, but our normalization process minimizes differences, ensuring a more accurate selection of the best project. Judges should consistently score their own projects without worrying about matching others. After judging, review and adjust scores for a more consistent evaluation. Revision of scores is encouraged for a more accurate ranking.

TULSA REGIONAL SCIENCE FAIR

TulsaSTEM.org
@TulsaSTEM
@TulsaSTEM

Scoring Considerations

- The quality of the student's work is what matters, not the amount of work;
- Team projects are judged like other projects -- it is the quality of the work that matters (an individual project of equal quality to that of a team project may be ranked higher because of the comparatively greater effort required by the individual);
- A less sophisticated project that the student understands gets higher marks than a more sophisticated project that is not understood;
- Access to sophisticated lab equipment and endorsements from professionals does not guarantee a high-quality project. Did the student understand what was going on?
- It's okay if the student ends up disproving the objective or hypothesis of the experiment.

High Marks:

- Unique engineering prototypes
- Genuine scientific breakthroughs
- Discovering knowledge not readily available to the student
- Correctly interpreting data
- A clever experimental apparatus
- Repetitions to verify experimental results
- Predicting and/or reducing experimental results with analytical techniques
- In engineering categories, experiments applicable to the "real world."
- Ability to portray and explain the project and its results

Low Marks:

- Ignoring readily available information (e.g., not doing basic library research)
- An apparatus (e.g., model) not useful for experimentation and data collection
- Improperly using jargon, not understanding terminology, and/or not knowing how equipment or instrumentation works
- Presenting results not derived from experimentation (e.g., literature search)

As a Science Fair judge, your primary role is to help select projects for advancement. However, it's crucial to recognize that this event is a milestone in every participant's life. Ensure that all participants remember the Tulsa Regional Science Fair as a positive experience. We appreciate your willingness to serve students and teachers in this important endeavor.

THANK YOU

for your support in inspiring and prepare all youth for a STEM-enabled future!

Tulsa Regional Science Fair is a program of:

Tulsa Regional STEM Alliance