



THE JEWISH ACADEMY

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# 5TH-8TH GRADE SCIENCE FAIR GUIDE

For Parents & Students

Dear Parents:

Your child will have the chance to solve his or her own science mystery by doing a science project, a mandatory assignment for your child's class.

Since your child has the chance to pick his or her own science project question, from the physics of making music to the biology of tide pool animals, he or she will have the chance to experience the joy of discovery.

When starting a science project, a student chooses a question he or she would like to answer. Then, he or she does targeted library and Web research to gain the background information needed to formulate a hypothesis and design an experimental procedure. After writing a report to summarize this background research, the student performs the experiment, draws conclusions, and communicates the results to teachers and classmates.

Through time management and project planning, your child will take on the responsibility of completing a project over a least an 8-week period. Your child will discover his or her creativity by brainstorming science project questions and figuring out how to display the process and results. A science project, through its challenge to ask questions and discover, is truly a real-world experience in innovation, similar to what scientists do in their careers.

We will provide your child with sufficient support to succeed, so that he or she develops enthusiasm for scientific discovery. First, your child will accomplish each step of the project by doing homework assignments. We will review the assignments at key checkpoints along the way, so that you won't face helping your child do a project the last night before the fair. Second, we have included a basic guide (enclosed) of how to help without getting over-involved.

To get started, read through this *Guide to the Science Fair* packet.

You will have the opportunity to approve the project your student selects by signing a *Science Project Proposal Form*, one of the early assignments on the attached schedule.

If you have any questions, please email me [mhecht@tjastaff.com](mailto:mhecht@tjastaff.com) or text to (954) 231-1357.

Sincerely,

**Moshe Hecht**

Welcome to Science Fair! Please read the below step by step guide for participating in the Science Fair. All students in the school are required to participate. Science Fair Projects will be graded by each student's General Studies teacher. Projects will count as *two* test grades toward a student's overall Science grade.

There are five steps to participating in the Science Fair.

- STEP 1: Choose a Topic (5 points)
- STEP 2: Write a Research Paper (25 Points)
- STEP 3: Perform Your Experiment (40 Points)
- STEP 4: Write a Science Fair Report (20 Points)
- STEP 5: Design a Poster Board (10 Points)

**TOTAL POINT VALUE: 100 POINTS**

**The following are important dates for the Science Fair:**

- Jan. 7-** Science Fair Assigned
- Jan. 19-** Turn in Science Project Proposal Form (5 points)
- Feb. 17-** Research Paper Outline Due
- Mar. 3-** Research Paper Draft Due
- Mar. 3-** Turn in Question, Hypothesis, Materials, & Procedures Draft
- Mar. 10-** Research Paper Due (25 Points)
- Apr. 5-** Turn in Science Fair Report (20 Points)
- Apr. 5-** Turn in Science Fair Poster Board (10 Points)
- Apr. 7-** Date of the Science Fair

## **Guide to the Science Fair**

### **STEP 1: Choose a Topic**

Find a problem that you are interested in solving and turn in the following information to your teacher by assigned date. Student must fill in the Science Project Proposal Form and turn into their teacher by the assigned date.

**State the Problem**

The first step of the scientific method is to state the problem. There are multiple things you want to keep in mind when doing this.

1. Choose a problem that interests you. You will be working on this project for the next a month and a half! If you enjoy baking, look for a project on baking! Science fair projects follow the scientific method, but aren't necessarily 'science-y.'
2. Will you be working with a partner? You can only work with one partner. Please discuss this with your parents beforehand. You will need rides from your parents to and from one another's homes. You don't want to work with someone who lives 45 minutes away, it's just not the best idea. Also keep in mind the effect this may have on your friendship. I've seen great friends work together and it go smoothly and I've seen great friends work together and at the end, they weren't friends anymore.
3. Take time to research a topic. Even if you love the first idea you see, keep looking. I may not approve your idea or someone else may take it before you. You may also realize after reading other ideas, that the first one is no longer that exciting. Keep an open mind. Involve your parents. Talk it out.
4. Your idea must be testable! You are not building a time machine.
5. Your problem should not be subjective. Which jeans are most comfortable? This question is subjective, every person will have their own measure and own opinion.
6. Keep paper work in mind!!! Projects that involve a vertebrate animal must get paperwork filled out and signed by a licensed veterinarian. You will be responsible for this. Projects that test humans or involve bacteria have paperwork that must be filled out and signed by a medical doctor. This is your responsibility if you choose one of these projects.
7. The following are reliable websites for finding a project:
  - a. [www.sciencebuddies.org](http://www.sciencebuddies.org)
  - b. <http://www.juliantrubin.com/branchesofsciencefair.html>
8. If you cannot find a project on one of these sights, simply type 'science fair projects' into google and search that way. Be as specific as you can. "Science fair projects 7<sup>th</sup> grade baking," would get you good results.
9. Original ideas are always best!! Don't doubt yourself! Original ideas always do very well. If you can't think of an original idea, think of a way to make a spin on a project you read about.
10. Some categories are more popular than others. If you plan on competing, you may want to take this into consideration when selecting a project. Behavioral and Consumer Science have been very popular in recent years. Computer, Environmental, Biochemistry, and Mathematics and usually very small. Physics, Medicine and Health, Microbiology, Chemistry, Botany, and Zoology fluctuate from year to year.

*Choose Topic Grading:*

| <b>Grading Measures</b> | <b>Point Value</b>                                      | <b>Total Pts.<br/>(5)</b> |
|-------------------------|---|---------------------------|
| Topic turned in on time | no (0), yes (2)   |                           |
| Answers 4 questions     | no (0), less than stellar (1), yes (2), exceptional (3) |                           |
|                         | <b>Total points =</b><br><b>Max Points = 5</b>          |                           |

**Science Project Proposal Form**

**Student Name:** \_\_\_\_\_ **Grade:** \_\_\_\_\_

1) These are problems I am interested in...

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

2) My approved problem is...

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Check: \_\_\_ Yes \_\_\_ No *I received approval from my parent and teacher for the above problem.*

3) List 4-5 things you will need to read, write, and learn about in order to make an educated guess (hypothesis) that will answer your question?... Do not use Wikipedia, blogs, or any other type of opinions on the topics. Stick to encyclopedias and scientifically reliable websites, books, and articles.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

4) How I might experiment...Briefly describe your proposed experiment

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Parent Signature: \_\_\_\_\_

## **STEP 2: Write a Research Paper**

*Perform research on your problem and write a research paper with your hypothesis (educated guess) on the answer to the problem*

The purpose of writing a research paper is so that you can make an educated guess as to the answer of your problem. It is of the utmost importance that your research back up your hypothesis. A hypothesis is an educated guess to the problem you are trying to solve. When you present your project, you will need to explain how you arrived at your hypothesis.

If your problem is “Can toothpaste remove stains from clothing?” do not research this question. You are not reporting on someone else’s hypothesis, you are making your own. If this were your problem, you might write your research paper on one of the following questions... What removes a stain? How soap works? What type of solutions remove stains? What type of solution is toothpaste?

Research takes time. Read a lot. If you don’t understand what you’re reading, get something else. Ask for help. Make sure your paper is in your OWN words! Plagiarism is defined as three or more words in the same order as another author. This is cheating. If you can’t put it in your own words, then you don’t understand it well enough. Read more.

Your research paper should begin with a thought-provoking statement or question. Ever get a stain on your brand-new shirt? Use this opening paragraph to introduce the problem and why it is interesting or important. The body of the paper should include scientifically factual points that will combine to give you your hypothesis. In order to make an educated guess (also known as a hypothesis) on what the “answer” to your “problem” is, you must be educated on the topic. This is the purpose of this report. For example, you might find that non-polar substances dissolve non-polar substances. Oil, grease and lipstick are non-polar substances. Soap works because it has a non-polar end (of a molecule) that dissolves the grease and a polar end that dissolves in water. Toothpaste also has a polar end and a non-polar end. Your research will help you state your educated guess (also known as a hypothesis) at the end of your paper. The paper ends with your hypothesis. I believe that the non-polar end of toothpaste will dissolve a grease stain much like soap does. You may only use “I” statements in the opening and closing paragraphs. The body of your paper are facts you have researched.

## **Writing your Research Paper**

### **Paragraph 1:**

- ❖ Begin with an attention getter statement or question.
- ❖ Introduce where your idea came from or why it’s an interesting or important question to think about. How does it relate to real life?
- ❖ End the paragraph with your problem question.
- ❖ You may use “I” statements in this paragraph. You are talking to the reader.
- ❖ This paragraph does not contain ‘research’ other than the attention getter opener.

### **Paragraphs 2, 3, 4, or however many body paragraphs you have.**

- ❖ Do NOT use “I” in these paragraphs
- ❖ Each paragraph gives researched information about one of the topics you researched.
- ❖ It is OKAY for paragraphs to not relate to each other.
- ❖ I am NOT concerned with the lengths of your paragraphs or papers. Go for quality, not quantity. That said, you need enough information to make an educated guess (hypothesis) that is based on something you learned.

### **Closing Paragraph:**

- ❖ You may use “I” statements again.
- ❖ Restate your problem.
- ❖ Summarize what you learned in the body paragraphs, pulling all the important points together.
- ❖ End with your hypothesis.
- ❖ **Nowhere in your paper do you discuss your experiment. THIS IS IMPORTANT. This paper it to provide you with background information to develop a hypothesis.**

### *Research Paper Grading:*

| Grading Measures                     | Point Value     | Total Pts.<br>(25) |
|--------------------------------------|-----------------|--------------------|
| Opening paragraph introduces problem | no (0), yes (1) |                    |

|  |  |  |
|--|--|--|
| Body of paper contains adequate background information and understanding                   | no (0), less than stellar (1), yes (2), exceptional (3)  |  |
| Closing paragraph pulls information together and ends in a hypothesis that makes sense     | no (0), somewhat (1), yes (2)  |  |
| Correct spelling and grammar, times new roman, size 12 font.                               | no (0), somewhat (1), yes (2)  |  |
| At least 5 sources   | no (0), yes (2)  |  |
| Correct format used in bibliography  | no (0), yes (2)  |  |
| Student demonstrated effort in this assignment (measured at the discretion of the teacher) | No assignment turned in (0), Assignment turned in with little effort (8) Assignment turned in with great effort (13) |  |
|  | <b>Total points =<br/>Max Points= 25</b>   |  |

### STEP 3: Perform Your Experiment

Here are some tips to help you have a successful experiment experience...

1. Take pictures
2. Keep a journal. Write everything down. Everything.
3. The more data the better!
4. Something not go right? Write it down. Try again.
5. You must collect numerical data in some form! If you are giving a survey, you need to find a way to convert this into some type of 'score.' Numbers are necessary.
6. All measurements MUST be metric! If you need help converting, see me!
7. Depending on the experiment, if it requires you to 'rate' something for numerical data, consider having others do this 'rating' for you. Example: Which laundry detergent works best? Create a rating scale of how 'clean' pieces of cloth are after washed in different detergents, then have other (multiple) adults rank them using your scale. This prevents you from having a biased opinion. Judges like this.
8. Experiments must have a control or be controlled. What does this mean? If you're measuring how urine effects the growth of grass, you need 'control' pots that will not receive any urine. If you're seeing how the air pressure within a soccer ball effects how far it will go when kicked, you need to create a mechanism that will 'kick' the ball with the same amount of force each time. Judges almost always ask about how you controlled your experiment. Put some thought into it.
9. The notebook: This almost deserves its own category. You MUST have a raw data notebook. A raw data notebook is hand written. Put the DATE on every entry. Write down everything... what you did, what happened, what worked, what didn't, how you'll change it, NUMBERS!, write down ANYTHING you measured. Never erase anything. Scientists never erase. If there is data you won't use, strike it with ONE line. ALL of your measurements should be hand written in your raw data notebook. You'll use this notebook to make your data tables and graphs.

*Perform Your Experiment Grading:*

| Grading Measures   | Point Value           | Total Pts.<br>(40) |
|--|-----------------------|--------------------|
| Students are expected and trusted that they performed this experiment. For example, if you said you planted trees for a month, we are taking your word for it because we trust that you are honest. Better to tell the truth and talk to your teacher and ask for an extension if need than to not tell the truth. | 40 Points             | 40                 |
|  | <b>Total points =</b> |                    |

### STEP 4: Write a Science Fair Report

Students must answer write a typed report answering the following questions.

- Question-** State your problem or question.
- Hypothesis-** State your hypothesis.
- Materials-** List the materials used for your experiment.
- Procedures-** List the procedures for your experiment.
- Data-** Make a data table and graph using the data you collected from your experiment.
- Conclusion-** State whether your hypothesis was correct or incorrect and why?

|                    |  |
|--------------------|--|
| <b>Question:</b>   | <p><b>State your problem or question.</b></p> <p>The first step of the scientific method is to state the problem.</p>  |
| <b>Hypothesis:</b> | <p><b>State your hypothesis.</b></p> <p>A hypothesis is where you write in your “guess” (also known as a hypothesis) to your problem.<br/>         For example, if your problem was problem is “Which brand of soda is most effective in dissolving rust?”- you might write, “I hypothesize (guess) that Sprite will be most effective in dissolving rust.”<br/>         Your hypothesis should be between one and two paragraphs. It depends on the project. Make sure you defend your hypothesis. The length of the hypothesis is in no way related to the quality of the project. I’ve read completely wonderful three sentence hypothesis and completely terrible two paragraph hypothesis. Length does not equate to quality.</p> |
| <b>Materials:</b>  | <p><b>List the materials used for your experiment.</b></p> <p>Materials:</p> <ol style="list-style-type: none"> <li>1. This must be a list</li> <li>2. It must be numbered</li> <li>3. Not bulleted, numbered</li> <li>4. List everything you will need for the experiment</li> <li>5. Will you need a pencil?</li> <li>6. A notebook?</li> <li>7. Test subjects?</li> <li>8. When in doubt, list it</li> <li>9. Take nothing for granted</li> </ol>   |
| <b>Procedure:</b>  | <p><b>List the procedures for your experiment.</b></p> <p>Basically, write out in an ordered (sequential) way what you did in the experiment.</p> <ol style="list-style-type: none"> <li>1. This must be a list</li> <li>2. This must be numbered</li> <li>3. Not bulleted, numbered</li> <li>4. You do not need to write in sentences</li> <li>5. Be as specific as possible</li> <li>6. Assume the person doing the experiment off of your instructions knows nothing</li> <li>7. Explain everything</li> </ol>  |



|  |   |
|--|---|
|  | <p>5. Did anything surprise you about the results?</p> <p>6. If you were to do this experiment again, would you change anything?</p> <p>7. How could you make this experiment better?</p> <p>8. What extensions can you offer to this experiment?</p> <p>9. Why are your results important?</p> <p>10. Do you think your results are conclusive? Do you think they ‘proved’ anything? Why?</p> <p>11. How are your results useful in real life?</p> <p>How can we use these results to better our lives or society?</p> |
|--|---|

Format of *Science Fair Report Outline*

- Fill in in bullet point format

|             |  |
|-------------|--|
| Question:   | <p><b>State your problem or question.</b></p> <ul style="list-style-type: none"> <li>• FILL IN</li> </ul>  |
| Hypothesis: | <p><b>State your hypothesis.</b></p> <ul style="list-style-type: none"> <li>• FILL IN</li> </ul>   |
| Materials:  | <p><b>List the materials used for your experiment.</b></p> <ul style="list-style-type: none"> <li>• FILL IN</li> </ul>                                   |
| Procedure:  | <p><b>List the procedures for your experiment.</b></p> <ul style="list-style-type: none"> <li>• FILL IN</li> </ul>                                       |
| Data        | <p><b>Make a data table and graph using the data you collected from your experiment.</b></p> <ul style="list-style-type: none"> <li>• FILL IN</li> </ul> |
| Conclusion: | <p><b>State whether your hypothesis was correct or incorrect and why?</b></p> <ul style="list-style-type: none"> <li>• FILL IN</li> </ul>                |

Format of *Science Fair Paper Guidelines*

- Paper must be Written in paragraph form
- Transfer information in your outline to the written paper
- Create the following headings: Questions, Hypothesis, Material, Procedures, Data, Conclusion
- Font size 12, Times New Roman

*Write a Science Fair Report Grading:*

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| <b>Creative Thought</b>  |   |   |   |   |   |
| The project demonstrates complexity, quality and depth of understanding. | 0 | 1 | 2 | 3 | 4 |
| The topic or the approach is original.                                   | 0 | 1 | 2 | 3 | 4 |
| <b>Scientific Thought</b>  |   |   |   |   |   |
| The project has a clear and simple question.                             | 0 | 1 | 2 | 3 | 4 |
| The project has a clear hypothesis.                                      | 0 | 1 | 2 | 3 | 4 |
| There is evidence of literary research.                                  | 0 | 1 | 2 | 3 | 4 |
|  |   |   |   |   |   |

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| <b>Experimental Methods</b>  |   |   |   |   |   |
| The procedure is precise and fully explained.                            | 0 | 1 | 2 | 3 | 4 |
| The experiment has controls or is controlled.                            | 0 | 1 | 2 | 3 | 4 |
| Only one variable is tested at a time.                                   | 0 | 1 | 2 | 3 | 4 |
|  |   |   |   |   |   |
| <b>Data</b>  |   |   |   |   |   |
| There is adequate data to support the conclusions.                       | 0 | 1 | 2 | 3 | 4 |
| Graphs and data tables are present.                                      | 0 | 1 | 2 | 3 | 4 |
| All significant measurements are in metric.                              | 0 | 1 | 2 | 3 | 4 |
| Journal of raw data is available.  | 0 | 1 | 2 | 3 | 4 |
|  |   |   |   |   |   |
| <b>Analysis</b>  |   |   |   |   |   |
| Data and conclusion verify the hypothesis.                               | 0 | 1 | 2 | 3 | 4 |
| There is a practical application or meaningful extension to the project. | 0 | 1 | 2 | 3 | 4 |

### STEP 5: Design a Poster Board

Tips for your Poster Board:

Don't put anything on your board until you have everything for your board. Use rubber cement. Buy rubber cement now. The stores run out come Science Fair season. Elmer's glue doesn't work. You'll think it's working, and then the day of the fair stuff will start falling off everywhere.

Pick two to three major colors and one to two minor colors. Choose wisely and stick to them. White will almost always be a major color because paper is white. If you use too many colors the board will look messy. Studies show that black, white, and red together make up the most eye catching combination.

Be creative. Think of your board as a giant scrap book page. Consider a border. Tilt background paper. Add different patterned paper. Layer.

Be neat. Be neat with the glue and use a paper cutter, not scissors.

Some cool things I've seen in the past...

A board turned into a cow (No joke, it had a tail and spots and a head and everything!)

A board with the silhouette of a bride and groom behind everything

A board with all the graphs printed on photo paper

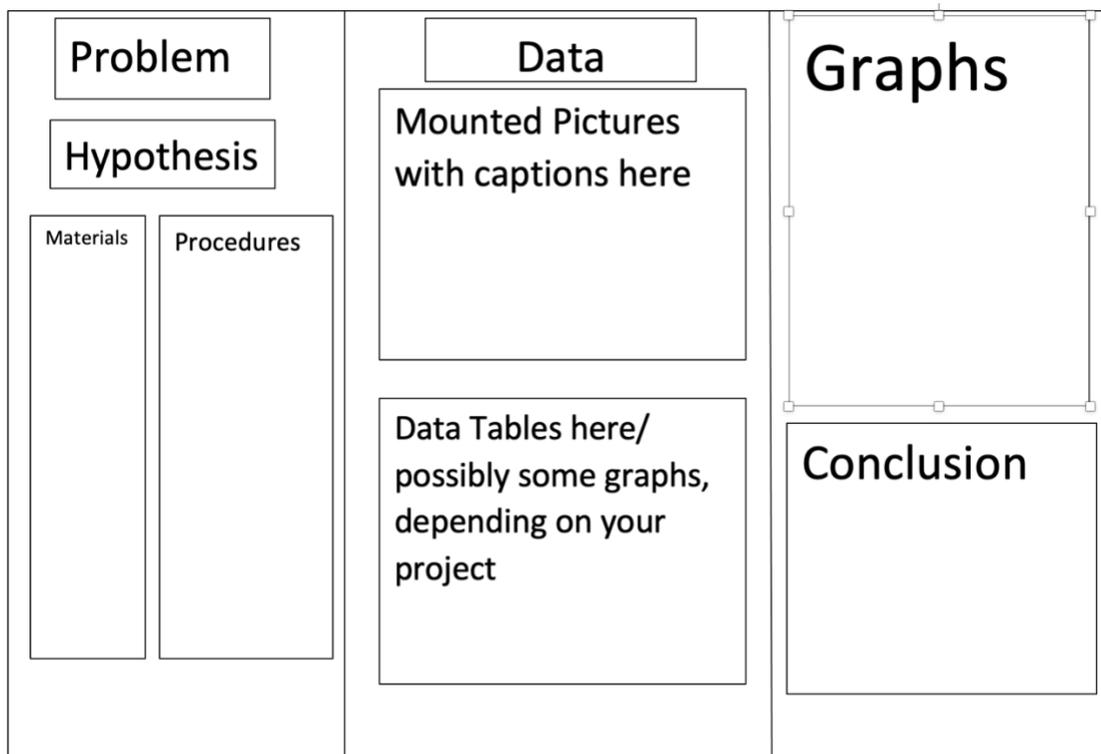
A board that had drawings of chicken eggs rolling down the sides of the board

Give yourself two full weekends to create your board. You've worked for 4 ½ months on this project, do your project justice.

Make a cool cap. Put time into it.

Pictures: Mount them. All of them. Give them all captions. Use phrases like "Photo taken by scientist's parent" or "Photo shows scientist measuring growth. Photo credit: Scientist's teacher"

### Sample Board Lay-Out



| <b>Visual Presentation (20)</b>   |   |
|---|---|
| Arrangement follows scientific method left to right   | no (0) yes (2)                            |
| Attractive, neat arrangement of information. Use a paper cutter for straight edges. No handwritten text | no (0) somewhat (2) yes (3) excellent (4) |
| Photos are mounted and have explanatory captions and photo credits                                      | no (0) yes(3) excellent (4)               |
| Pictures and/or diagrams are mounted and help explain project   | no (0) yes(3) excellent(4)                |
| Color is used in display and enhances presentation  | no (0) somewhat (2) yes (3) excellent(4)  |
| Spelling is correct throughout  | no (0) yes (2)                            |
| <b>Total points =20</b>   |   |

### **STEP 5: Present your research paper, science fair report, and poster board**

Bring a copy of your research paper, science fair report, and poster board to the Fair. Set it out in front of your board. If you have graphs, data or pictures, consider putting them all into a book and setting that out, too. If you grew plants, bring them. If you have pictures on a lap-top, bring it and put it on slideshow. If you measured muffins on a triple beam balance, bring a muffin and set in out on a triple beam balance. If you grew plants bring a long, fake vine and drape it over your board. You chose 2 main colors for your board? Great! Now find an outfit that matches your board and wear it. Bring dress up clothes to school and change immediately after school. You'll have plenty of time. Brush your teeth. Look professional and act professional. Don't goof off, you're a scientist defending his/her work.

You've worked on this project for many weeks and put together a stellar board. Now is your chance to defend your work and explain why YOU have the best project. The judge doesn't know you, so if you're normally shy, they would have no idea. Don't be shy. Speak loudly, make eye contact, and introduce yourself. Shake their hand. Be enthusiastic. They know nothing about your project, so explain everything. Don't read off your board! In general, you want to explain your project using the scientific method. Follow your board from left to right. Point things out on your board, mainly pictures and graphs. When you get to the end of the scientific method and you have nothing else to add, ask if they have any questions. They will probably have several. Answer them to the best of your ability and be honest. If you don't understand their question, then say that. If

you just don't know the answer, then say that. If you have a guess, then say that. Do the best you can. Smile. Stay at your board. You may be getting multiple judges. I will dismiss you when you're done.

| <b>Oral Presentation (10)</b>                      |                               |
|--|-------------------------------|
| Was understandable                                 | no (0), somewhat (1), yes (2) |
| All parts of the scientific method were included:  | no (0) yes (2)                |
| Student could adequately answer a student question | no (0) yes (2)                |
| Student could adequately answer a teacher question | no (0) yes (2)                |
| Student showed understanding                       | no (0) yes (2)                |
|  | <b>Total points =10</b>       |

### **Be a Good Sport**

You won? Congratulations! That is wonderful! Thank everyone that helped you. Thank your parents. Thank your teachers.

Science Fair can be very competitive. You didn't win? It's okay. You worked hard and hopefully learned something along the way. Now go congratulate your friend that won. It's okay to be sad. It is completely understandable. It's personal. You pour yourself into your project. Not everyone wins. Don't blame the judges, the order you presented in, your untimely cold, the weather, forgetting your lucky socks, your parents, or yourself. Be a good sport. Don't let that define who you are as a person. Life isn't about what happens, it's about how we react to what happens.