How to Do a Science Fair Project

Step 1: Brainstorm Topic Ideas
Try asking yourself these questions as you brainstorm topics:

- What do I love to do?
- Why does “that” work?
- What do I really NOT like doing? Is there a way I could make it easier?
- Why is it so hard to...?
- Why does this taste, smell, feel, look so ....?
- Why does this break when I...?

Brainstorm here: Doodle, wordle, have fun!

Step 2: Turn to the next page and get started!
Creating and Using a Science Journal

Use Google Docs, or a sturdy notebook or composition book if possible. (Google Docs is preferred in 4th-5th grade.) Like a diary, write down all of the things you have done on your project each day. Be sure to include any and all details. A good scientist keeps careful, detailed records of findings and test results.

**The Journal should include:**

1. **Table of Contents at the Front**
   a. Leave a few blank pages before you start making your entries
   b. You’ll go back and number your pages when you’re done with the project

2. **Detailed descriptions of what you did and observed on your project each day,**
   including some or all of the following:
   a. Any procedure you carry out
   b. Amounts and quantities used
   c. Observations of color changes, growth, etc.
   d. Test results
   e. Questions you are pondering
   f. Ideas for what you might try differently the next time
   g. Sketches

3. **Date and time for each entry**

4. **Numbered Pages**

**Example of Science Project Journal Entries**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Procedures/ Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 5, 2005</td>
<td>10:45am</td>
<td>Began research on the different types of soil and how erosion occurs on a hillside. Checked out books on grass and shrubs. Worked on this for 45 minutes.</td>
</tr>
<tr>
<td>Jan. 9, 2005</td>
<td>4:25pm</td>
<td>Worked on cutting plywood sheets to build hillside slopes. Placed slopes on racks and hung growth lights over surfaces. Readied for soil, sod and shrubs. Worked on for 2 hours.</td>
</tr>
</tbody>
</table>
Writing the Testable Question or Problem Statement

The Testable Question or Problem Statement should explain what it is you are trying to discover or prove and be testable. Testable means it is both possible and practical to run an experiment to prove your hypothesis. Try to make your question or statement as original and creative as possible.

The statement should clearly address:

1. The problem that you are trying to solve with your experiment.
2. Why you want to do this experiment.
3. How you think the information gained from the experiment will help other people.

Example of a Problem Statement:
The purpose of this experiment was to find out how the density of plant cover affects soil erosion. I became interested in this experiment when the hillside next to our yard began to erode. The information from this experiment will help people to determine how many plants they should use on their hillside yards.

Fill in the blanks below to create a strong Problem Statement.

The purpose of this experiment was to...
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
I became interested in this experiment when ...
________________________________________________________________________
________________________________________________________________________
The information gained from this experiment will help others by...
________________________________________________________________________
________________________________________________________________________

Adapted from: Williamsclass.com Science Fair Guide
Writing the Hypothesis

The Hypothesis is an educated guess that tries to answer a question or solve a problem that you are trying to find out more about. The hypothesis is done after you do your research on a specific topic and before you do any experimenting.

**The Hypothesis should follow these rules:**

1. A hypothesis is a question, which has been reworded into a form that can be tested by an experiment.

2. There is usually one hypothesis for each question you have.

3. You must do at least one experiment to test each hypothesis. This is a very important step.

**Example of a Hypothesis:**

My hypothesis is that grass will be more effective at preventing soil erosion on the hillside than shrubs. I base my hypothesis on the idea that there are more roots in the grass than the shrubs.

Fill in the blanks below to create a quality Hypothesis.

**My hypothesis is:**

________________________________________________________________________
________________________________________________________________________

**I base my hypothesis on:**

________________________________________________________________________
________________________________________________________________________

Adapted from: Williamsclass.com Science Fair Guide
Writing the Materials List

The materials list is a complete list of all materials including details and amounts. Be sure to include quantities (how much), length, volume, and mass. List these in metric units. Be specific in your description of the item needed. Include photos or drawings of the materials if it helps the person to identify the material needed in the project.

The Material List should follow these rules:

1. Be specific to amount, size and length.
2. Listed in metric units where appropriate.

Example of a Material List:

<table>
<thead>
<tr>
<th>Bad Material List:</th>
<th>Good Material List:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water</td>
<td>1. 20 Liters of Water</td>
</tr>
<tr>
<td>2. Watch</td>
<td>2. Stopwatch with second hand</td>
</tr>
<tr>
<td>3. Ruler</td>
<td>3. Metric Ruler with millimeters listed</td>
</tr>
<tr>
<td>4. Dirt</td>
<td>4. 3 cubic meters of potting soil</td>
</tr>
</tbody>
</table>

Fill in the blanks below to create a Materials List.

<table>
<thead>
<tr>
<th>Quantity:</th>
<th>Description of Item:</th>
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<tbody>
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</tbody>
</table>

Adapted from: Williamsclass.com Science Fair Guide
Procedure

The Procedure should follow these rules:
1. Label each step with a number or letter.
2. Write your procedure like a recipe listing ingredients and steps.
3. Be very specific with quantities, amounts and the order in which things need to be done or completed.
4. Identify the Control(s) (what stays the same or equal) and the Variable(s) (what changes or is different for each sample)

Example of a Procedures / Method list, with Control(s) and Variable(s):
1. Prepare three trays by putting an equal amount of potting soil in each tray. If you are using pans or cookie sheets, spread a layer of gravel on the bottom of the pan before adding the soil. This will allow for drainage since you will be watering all three pans while the grass is growing. (Control)
2. Set Tray 1 aside. In Tray 2, cover the soil with a layer of leaves and grass clippings. In Tray 3, sprinkle grass seed on the top of the soil. (Variable)
3. Place the three trays in a place where they are level and have similar light and temperature conditions. (The temperature must be above 50°F (10°C) for the grass to grow.) (Control)
4. Use the sprinkling can to give each tray the same amount of water. (Control) Continue watering all three trays approximately every 3 days until the grass in Tray 3 is about .5 inches (1.25 centimeters) tall. This may take one week or longer. You may have to adjust your watering schedule depending on how fast the soil dries. Check the soil daily to see if it looks and feels moist.

Fill in the blanks below to create a Procedure with Control(s) and Variable(s) identified.

1. __________________________________________________________________________
2. __________________________________________________________________________
3. __________________________________________________________________________
4. __________________________________________________________________________

Adapted from: Williamsclass.com Science Fair Guide
Writing the Results

Writing the Results will include both text and illustrative materials (also known as: the tables, charts or graphs). Use the text to explain and guide the reader through your key results, i.e., the information that answers the hypothesis you investigated. Use the tables, charts or graphs to help strengthen and explain what you are stating in your text.

Your results should follow these guidelines:

1. Include what you wanted to accomplish and prove during your experiment.
2. Describe and report what you discovered. Be sure to include any data that might have been collected. It is important to show this data even if it did not support your hypothesis. The process of completing the experiment with true data is what is important.
3. The function of the Results section is to objectively present your key results, without interpretation.

Example of how to write the results:

The original purpose of this experiment was to see how a seed’s germination is affected by the time of exposure to running water. The results of the experiment were that the duration of exposure to running water had a great effect on overall seed germination. (See chart #1). The seeds exposed to the 48-hour treatment had the highest percentage rate of germination (See chart #2). This was 2 times that of the 12-h group and 5 times that of our control group that was not exposed to the running water treatment.

Fill in the blanks below to create a Results page.

The original purpose of this experiment was to:  
________________________________________________________________________  
________________________________________________________________________  

The results of the experiment were:  
________________________________________________________________________  
________________________________________________________________________  

Adapted from: Williamsclass.com Science Fair Guide
**Pointers for your Tables / Graphs / Charts:**

- **Size:** A good rule of thumb is to size your figures to fill about one-half of a page. The judge should not have to get a magnifying glass to make out the details.

- **Using Color:** For a poster presentation, color can be helpful in distinguishing different data sets. Every aspect of your graph or chart should convey information. But be careful to not use too many colors or it may confuse your judge!

![Scores by Team per Season Graph](image1)

- **Font size:** When you are making a display board, where people may have a harder time reading the small print of a legend, using larger font is very helpful.

![The Number of Different Species of Available Animals at Steve's Pet Shop](image2)
Writing the Conclusion

What is a conclusion? A conclusion is a reexamination of your original hypothesis in regards to the data you have collected. Your conclusion will continue by describing how your results prove or disprove your hypothesis. Your conclusion included what questions you have developed in doing the experiment. It also includes how you might change your experiment if you were to continue this topic in order to explore those questions that you developed during the experiment.

**Example of a conclusion:**

My hypothesis was that grass would be more effective at preventing soil erosion on the hillside than shrubs. I base my hypothesis on the idea that there are more roots in the grass than the shrubs. The results indicate that this hypothesis should be considered false. The dense amount of shrub cover shielded the underlying dirt better than the grass. Because of the results of this experiment, I wonder if different kinds of shrubs have the same effect on preventing erosion. If I were to conduct this science fair project again I would try both deciduous as well as coniferous shrubs.

**Fill in the following lines to create a successful Conclusion:**

My hypothesis was:
________________________________________________________________________
________________________________________________________________________

The Results indicate that this hypothesis should be considered:
________________________________________________________________________
________________________________________________________________________

Because of the results of this experiment:
________________________________________________________________________
________________________________________________________________________

If I were to conduct this science fair project again I would:
________________________________________________________________________
________________________________________________________________________

Adapted from: Williamsclass.com Science Fair Guide
Citing References and Using Research

The Reference section is an alphabetical list of the sources that you used to research your topic, design the experiment and form the hypothesis. Look at the format that each example is typed. Use this format exactly when you cite your references.

Research should be summarized in your own words whenever possible. If you ever use the exact words from a source, you must use quotation marks. Both summaries and exact quotes must have the reference source stated on your board.

Examples of how to cite your references:

BOOKS

● SINGLE AUTHOR
  Author (Last Name, First Name). Title of Book. City: Publishing Company, Date.

● BOOK BY TWO OR MORE AUTHORS
  First Author (Last Name, First Name) and Second Author (First Name, Last Name). Title of Book. City: Publishing Company, Date.

ENCYCLOPEDIAS

"Title of Article." Complete Title of Encyclopedia, year.

WEBSITES

Author (Last Name, First Name). "Title of Work." Date posted on WWW (Latest date if available). URL/and full address (date you obtained information).

NOTE: Wikipedia, Google, and other search engines are NOT considered strong references and do NOT count as references for the Science Fair.

Adapted from: Williamsclass.com Science Fair Guide
PERIODICALS

● **MAGAZINE ARTICLE WITH AUTHOR**
  Author (Last Name, First Name). "Title of Article." Title of Magazine. Volume or Edition (Month and Year of Publication), page(s).
  Severy, Merle. "Bee World." National Geographic. 172 (November 1997), 552.

● **MAGAZINE ARTICLE WITHOUT AUTHOR**
  "Title of Article. "Title of Newspaper. Volume or Edition (Month and Year of Publication) page(s).

● **NEWSPAPER ARTICLE WITH AUTHOR**
  Author (Last Name, First Name). "Title of Article." Title of Newspaper. Date.

● **NEWSPAPER ARTICLE WITHOUT AUTHOR**
  "Title of Article." † Title of Newspaper. † Date.

OTHER SOURCES

● **INTERVIEW**
  Last Name, First name. Interview. Interview location. City, State, Month, Day, Year.

● **DVD**
  Title of program. city: Production or Publishing company. Date, Type of media.

● **TV PROGRAM**
  Title of Program. Staton. Month, Day, Year, City, State. Type of Program.

Adapted from: Williamsclass.com Science Fair Guide
Writing the Acknowledgments

What is an Acknowledgment? This is the space where you thank those that have given you help with your project. If you received any significant help in thinking up, designing, or carrying out the project, or received materials from someone who did you a favor by supplying them, you should acknowledge their help and the service or material provided. You never know if you might need their help again in the future and thanking them is one way of possibly receiving their help again.

**Example of an Acknowledgment:**

I would like to thank the following: My Mom and Dad, for their encouragement and advice; Don Franklin at Home Building Supplies, for supplying so much invaluable information and materials; and Mr. Donaldson, for help with my English and writing.

Other expressions you might use include:

1. I am (most/very) grateful to ...
2. I wish to (warmly) thank the following ...
3. This paper could not have been written without the invaluable help of ..
4. I acknowledge my gratitude to ...

*Note*: **ALL photographs must have the photographer’s name credited by each photo**

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