

# Irwin Academic Center STEM

(Science, Technology,  
Engineering and Math)

Fair 2018

Step By Step for Procedures



**Goal:** The STEM Fair Project is designed to increase students' understanding and application of the scientific method. Through investigations that

**answer an experimental question, students showcase their knowledge through a self-selected project.**

**The following pages can help guide the students and parents to instruct students in a step-by-step process for each step of the scientific method.**

The following dates are check-ins with your child's teacher to ensure they are on track to finish by the due date. However, students should start working on their project and experiment during the holiday break.

### **Important Due Dates:**

#### **April 13, 2018 – item due:**

- Scientific question
- Hypothesis

#### **April 20, 2018 – item due:**

- Write up for Step #4 (materials and procedures)

#### **April 27, 2018**

- Complete project due
- Oral presentation ready

## **Steps and Procedures**

### **Step 1: Choose Your Problem/Topic Question**

Your first step is to select a topic that interests YOU. Remember that you will be spending quite a bit of time on this project. What do YOU want to know?

As you think about your topic, list some questions that you have. Next, narrow your questions down to **one question that you can test by experimentation**. This is the scientific question to be solved. It is best expressed as an “open-ended” question -- a question that is answered with a statement, not just a yes or a no. One example might be, “How does light affect the reproduction of bread mold on white bread?”

**Do NOT** confuse projects with experiments. Making a model of a volcano or the solar system is NOT a science fair project. **Your topic must be testable through experimentation.**

You must turn your topic question into your teacher by April 13, 2018.

### **Step 2: State your hypothesis.**

A hypothesis is a statement that tries to answer your testable question. Even though the hypothesis is only a single statement, it is the key to a successful project.

All of your project research is done with the goal of expressing a problem or testable question, proposing an answer to the question – this is the hypothesis -- and designing the project experimentation. Your experiments are done to test your hypothesis.

Your hypothesis should be written in statement (not question) form. For example: “I believe that increasing the amount of phosphorus in the plant’s food will cause increased plant mass.”

Don’t go back and change your hypothesis even if your experimentation does not support it. Real scientists do not always “get it right the first time.” Experiments are not about right and wrong. If time permits, repeat or redesign the experiment to confirm your results.

This is due: April 13, 2018

### **Step 3-Research → INCLUDE RISK & SAFETY**

*Your research should be conducted before, during and after your experiment.*

*True Scientists are always researching, learning and trying new things. You need to do a certain amount of research to come up with your scientific question. Then, you need to do further research to solidify your hypothesis and you may need to continue researching as you experiment and try to interpret your results.*

You should consult a variety of resources for this step (some books, magazines, and an interview for example). When you put together your display board, there will be a section for you to include a short report summarizing the information that you have learned through your research.

Make a list of the books, magazines, and other resources that you use when researching information for your science fair project.

#### **Step 4: Materials and Procedures**

Your procedure should be listed very specifically, step by step. Someone else should be able to read your procedure and use the materials from your list to conduct the same scientific experiment that you conducted. List the Procedure separate from the list of materials you used.

Write the procedure and materials out and submit it to your teacher for review – before continuing with the experiment. The format of this step should be as follows:

*Name*

*Science Fair Problem/Topic Question:*

*Hypothesis:*

*Variables: independent (one only, this is what you are changing up in the experiment)*

*dependent (one, this is what you are measuring)*

*Controlled (multiple)*

*Materials: (remember to be very specific!)*

*Procedures: (Step by step!)*

The write-up for Step 4 is due April 20th, 2018.

#### **Step 5 of the Scientific Method....**

##### **Conduct your experiment!**

This is the fun part....the time that you have been waiting for....be like Nike....JUST DO IT!

Take your step 4 (you remember....your materials and procedures) and place it in front of you and actually gather the materials and follow the steps that you have written! Do the experiment. There are some things that you must do in order to do a good job with this step!

- 1) Remember that it's important to control your variables! Make sure that all parts of your experiment are equal and that the only thing that is changing is the variable you are testing!
- 2) Take accurate measurements as you get results from your experiments! Make sure you use the correct forms of measurements as you get your results. Length=inches, meters, etc. Volume=cups, liters, etc.
- 3) Keep a daily experiment journal. Describe page by page what happened in your experiment each time you took measurements, did a part of your experiment, etc.

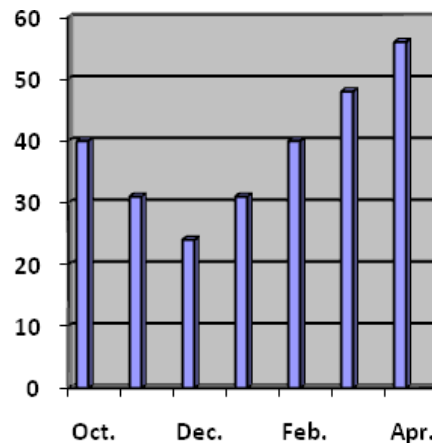
The evidence that will be needed to show that you have completed this step will be your journal. The journal should be either a composition notebook OR you can create a journal notebook using a folder with metal brad in it to hold notebook paper. For each entry, you must use a clean sheet of paper and place the date of entry on the top of the page. For the entry itself, describe what you did during your experiment as you worked on it, any, observations that you made about changes in the experiment (for example...plant leaves wilting, boards cracking, nails rusting, etc.) Be specific! The more detailed the journal is, the better it becomes because you will remember what you did each day of your experimentation. Don't forget to record in your journal your results as you get them.

Make sure you include accurate measurements of these results. Take or draw pictures as you conduct your experiment. Record these measurable results in the form of tables and graphs where appropriate.

**Sun Ray Angles at Noon**

Month	Average Monthly Angle (degrees,
October	40
November	31
December	24
January	31
February	40
March	48
April	56

**Sun Ray Angles at Noon**



**Example of a Bar Graph**

**Example of a Table**

**Step 6-Write your project conclusion.**

The project conclusion is a summary of the results of the project experimentation and a statement of how the results relate to the hypothesis. Reasons for experimental results that are different from the hypothesis are included. Also, the conclusion can include ideas for further testing.

*If your results do not support your hypothesis:*

You might say, for example, "As stated in my hypothesis, I believe that light is not necessary during the germination of bean seeds. My experimentation supports the idea that bean seeds will germinated without light. It is possible that some light reached the 'no light' containers that were placed in a dark closed. If I

were to improve on this experiment, I would place the ‘no light’ containers in a light-proof box and/or wrap them in light-proof material, such as aluminum foil.”

### Step 7-Share your results with the “scientific” community!

After you have written your project conclusion, you should assemble your items for your project board. Your project board will include copies of all the steps you have conducted so far. You are just rewriting the information so that it is in a presentable format.

Your project board should consist of a backboard, the project report, and anything that represents your project, photographs, surveys, etc. It must tell a story of the project in such a way that it attracts and holds the interest of the viewer. It has to be thorough, but not too crowded, so keep it simple.

Your project board should be a standard tri-fold board (purchase at office supply stores or even Lowes Home Supply. For items placed on the backboard, select colors that stand out but don’t distract the viewer from the material being presented. For example, if everything is in fluorescent colors, the bright colors, instead of your work, will be what catch the eye.

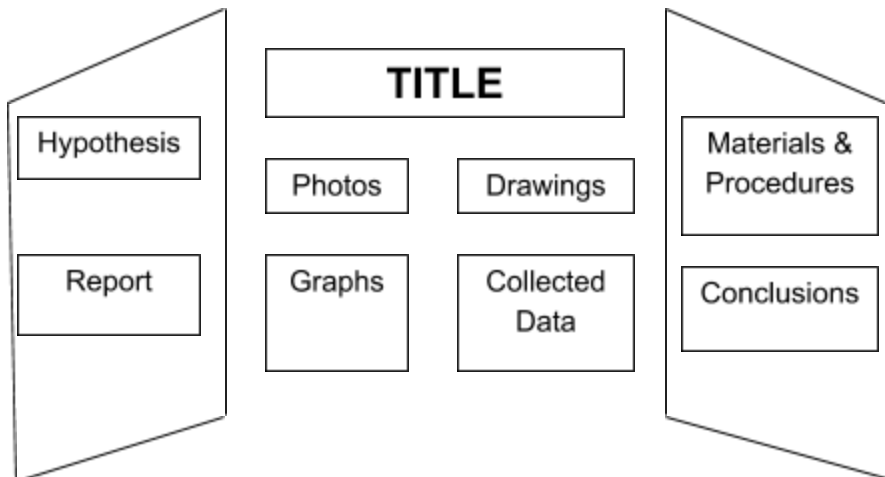
The title and other headings should be neat and large enough to be read at a distance of about 3 feet (1m). A short title is often eye-catching. You can purchase at office supply stores, self-sticking letters, of various sizes and colors for the title and headings and stick them to the backboard. You can cut your own letters out of construction paper or stencil the letters for all the headings directly onto the backboard. You can also use a word processor to print the title and other headings.

Some teachers have set rules about position of the information on the backboard. The following headings are examples: Problem, Hypothesis, Experiment (materials and procedure), Data, Results, Conclusion, and Next Time. The project title should go at the top of the center panel, and the remaining material need to be placed neatly in some order. An example of a display is below.

**The completed project (three-panel board with all sections / steps complete ) is due:**

April 27, 2018

## Suggested Layout of the Three Panel Board



Information placed on index card on back of the display board/lower middle panel.

Student Name	
Project Title	
Grade Level	Teacher
School	

### Helpful Science Fair-related websites

<http://users.rcn.com/tedrowan/primer.html>

<https://www.education.com/science-fair/fifth-grade/>

<https://www.simplycircle.com/science-fair-projects-5th-grade/>

<https://www.sciencebuddies.org/science-fair-projects/project-ideas/fifth-grade>

<https://www.pinterest.com/explore/5th-grade-science-projects/>

<https://www.mpmschoolsupplies.com/ideas/science-fair-projects/grade-5/>

# STEM Fair Project Rubric

## Project/Three Panel Board:

\_\_\_\_\_ Neatness/Catches the eye (10 points)

## All steps present:

\_\_\_\_\_ Introduction (topic & hypothesis) (10 points)

\_\_\_\_\_ Research (10 points)

\_\_\_\_\_ Materials and Procedure (15 points)

\_\_\_\_\_ Results (graphs, tables, pictures) (20 points)

\_\_\_\_\_ Conclusions (10 points)

\_\_\_\_\_ References (5 points)

\_\_\_\_\_ **TOTAL (80 points)**

## Presentation:

\_\_\_\_\_ Statement of project purpose (5 points)

\_\_\_\_\_ Explanation of procedure (5 points)

\_\_\_\_\_ Explanation of what you might do differently next time (5 points)

\_\_\_\_\_ Practiced and prepared (5 points)

\_\_\_\_\_ **TOTAL (20 points)**

**Final Project Grade:** \_\_\_\_\_ **(100 points)**

**Teacher Comments:**