

**2016-2017 SHPS Science Fair**  
**Fifth Grade Preparation Packet**

*For the science fair this year, students will have the choice of either completing an **EXPERIMENTAL PROJECT** (this is the traditional science fair route used in years past) or an **ENGINEERING (S.T.E.M.)PROJECT** (a new addition to this year's science fair). Once students have selected the type of project they will be doing, they will use the process laid out in the following instructions to successfully complete their project, design a tri-fold display board, and develop a presentation for their fellow classmates. If you have any questions, please let me know.*

*Mrs. Coulter  
 Fifth Grade Science Teacher  
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**Important Dates**

<b>Experimental Tasks</b>	<b>Engineering (S.T.E.M.) Tasks</b>	<b>Due Date</b>	<b>Teacher Check Off</b>
Testable Question	Ask	Oct. 11	
Hypothesis	Imagine	Oct. 11	
Materials List	Plan	Oct. 18	
Procedure	Plan	Oct. 18	
Data Chart or Graph	Create	Nov. 8	
Analysis	Test	Nov. 8	
Conclusion	Improve	Nov. 8	
Completed Board	Completed Board	Nov. 15	
Classroom Presentation	Classroom Presentation	Nov. 15-16	
Boards on Display in Gym	Boards on Display in Gym	Nov. 16-18	

# EXPERIMENTAL PROJECT INSTRUCTIONS

## Part 1 - Testable Question and Hypothesis (Due 10/11/16)

1. *Testable Question* - Since all projects **must** be experimental in nature, they must all begin with a testable question. A testable question is one that can only be answered by designing and performing an experiment (see examples of ideas at [www.sciencebuddies.org](http://www.sciencebuddies.org)). *Please note: if you are using animals as the test subjects in your experiment you will be required to provide detailed information regarding how you will protect their health and well being during the experimental process. Your teacher will have the final say as to whether or not you are permitted to use animals as subjects as part of your science fair project.*

### Testable Question:

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2. *Hypothesis* - After having thoroughly researched your question, you should have some educated guess about the results of your experiment. This educated guess, which should be an answer to your testable question, is called the *hypothesis*.

The hypothesis must be worded so that it can be tested in your experiment using an *If...then...because* statement. For example: **If** a plant receives only sunlight instead of artificial light from a bulb, **then** the plant will grow taller **because** the energy from sunlight will produce food for the plant. (See more examples at [www.sciencebuddies.org](http://www.sciencebuddies.org))

### Hypothesis:

If \_\_\_\_\_  
\_\_\_\_\_, then \_\_\_\_\_  
because \_\_\_\_\_

## Part 2 - Materials List and Procedure (Due 10/18/16)

1. *Materials* - Make a list of materials that will be used in the experiment. The list of materials should be comprehensive enough so that anyone would know exactly what they would need in order to duplicate your experiment – BE SPECIFIC.

### Example:

- 100% cotton cloth samples
- Ketchup/Coffee/Ink/Grass/Soil
- Commercial detergent #1
- Commercial detergent #2
- Vinegar
- Vinegar and baking soda mixture
- Water
- Soap
- Wash basin
- Timer/stopwatch
- Rubber glove

### Material List:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

2. *Procedure* - List the steps needed to carry out the experiment. Again, the steps should be in sufficient detail so that your experiment can be replicated (i.e., anyone should be able to redo your exact experiment based on your procedure steps - think of it like a recipe).

### Example:

1. Place a ketchup stain approximately 4 inches in diameter on 100% cotton fabric. Prepare 4 identical stain samples in addition to the first sample. Label the samples (vinegar, vinegar and baking soda mixture, commercial detergent #1, commercial detergent #2)
2. Place 10mL of stain remover on the ketchup stain sample. Wait 3 minutes. Scrub for 1 minute. Repeat with each of 4 stain removers. (vinegar, vinegar and baking soda mixture, commercial detergent #1, commercial detergent #2)
3. On the fifth sample, do not put on any stain remover. Leave the ketchup stain as is. Scrub for 1 minute. Use permanent marker to write the word ketchup on each sample.

4. Wash each sample using soap and water in a basin.
5. Compare the samples to see which stain remover worked the best.
6. Repeat the experiment using different stains (coffee, ink, grass, and soil)

**Procedure:**

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

(Attach additional paper if needed)

**Once Part 1 and 2 are complete, it is now time to conduct your actual experiment. Keep notes or a journal with detailed descriptions of what happened and photographs to collect evidence of your results.**

*Parts 3 and 4 can only be completed once your experiment is done!*



3. *Conclusion* - This is a one sentence statement of your final outcome of the experiment and whether your hypothesis was correct or not. For example: After completing my experiment I have concluded that my hypothesis was incorrect, plants exposed to only sunlight do not grow taller than plants exposed to artificial light.

**Conclusion:**

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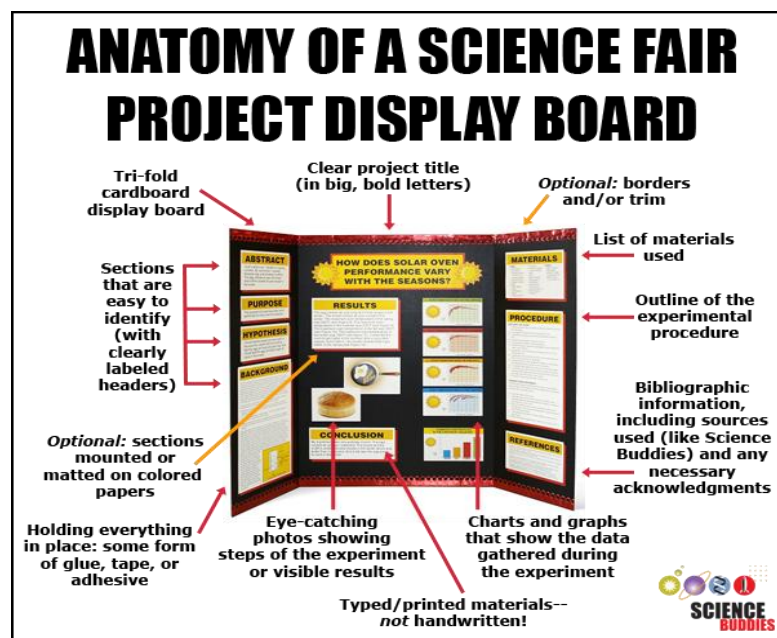
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**Part 4 - Complete Science Board and Practice Presentation (Due 11/15/16)**

*Science Board* - This is an example of how to put together your board. Your board should be organized in a way that your audience can easily follow along with your steps in completing your investigation. Be sure your layout makes sense going top to bottom and left to right.

*Board Requirements:* Name and Grade, Title, Testable Question, Hypothesis, Materials, Procedures, Data Chart or Graph, Analysis, Conclusion, Photographs (at least 3).

*Board Recommendations:* Use a standard, three-panel display board that unfolds to be 36" tall by 48" wide, information on the board should be typed or very neatly written on separate sheets of paper, then glued to the board, and choose a background color to go with the theme of the board. For example, plants use green, water use blue, etc.



# ENGINEERING (S.T.E.M.) PROJECT INSTRUCTIONS

## Part 1 – Ask and Imagine (Due 10/11/16)

1. *Ask* - Finding an idea for your engineering (or S.T.E.M.) project requires you to identify a problem or a need that you yourself, another person, or a group of people have. Think of a problem or a need that exists in today’s world that you would like to provide a solution for (see examples of ideas at [www.sciencebuddies.org](http://www.sciencebuddies.org)). Once you have found an idea for your engineering project, ask yourself to following questions and answer them in the space below:

### Ask:

1. **What** is the problem or need?

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2. **Who** has the problem or need?

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3. **Why** is it important to find a solution?

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4. **How** have others tried to solve it?

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2. *Imagine* - After having thoroughly researched your need/problem, you should have some ideas about how you are going to develop your own solution. This next step is when you will brainstorm, sketch, draw, journal, etc. in order get your creative juices flowing about those ideas.

### Imagine:

Create a *design journal* in which you state your problem or need and then brainstorm ideas about how one would go about solving it. Use a spiral or composition notebook to brainstorm, draw or sketch diagrams, outline ideas, free write multiple solutions, etc. Take your time and think of as many ideas as possible. Just one or two ideas will not be enough! Then show the teacher your journal of ideas and imagination for credit.

## Part 2 – Plan (Materials and Blueprint) (Due 10/18/16)

Review your *design journal* and pick one idea that you believe has the most potential to solve your particular problem or need. Then begin preparing a plan to design/invent that solution.

1. *Materials* - Make a list of materials that will need in order to develop or create your design/invention and the materials you will need to test it out. The list of materials should be comprehensive enough so that anyone would know exactly what they would need in order to duplicate your design/invention – BE SPECIFIC.

### Example:

#### (materials for design)

- Cotton balls
- Strips of felt material
- Pieces of nylon
- Coffee filters
- Sponge
- Yarn
- Rubberbands

#### (materials to test my design)

- Tin pan
- Water
- Food Coloring
- Cooking Oil

### Material List:

#### (materials for design)

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#### (materials to test my design)

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2. *Blueprint* - Create a blueprint in which you take your initial brainstorming and develop it into a detailed description of your design/invention. This can be a detailed diagram of a specific product you're designing, a small sized model of what you intend to create, or the steps you will be taking in order to reach a solution to a problem. Be as detailed as possible so that someone else would be able to create the same solution by following your blueprint.



## **Blueprint:**

Use the same *design journal* as you did during the imagination step to draw, outline, or diagram a blueprint of the design/invention you will be creating in order to solve the need or problem you have picked. Then show the teacher your journal and the blueprint you have created for credit. If you are creating a smaller sized model of an actual product, please bring that model in for credit.

## **Part 3 – Create, Test, and Improve (Due 11/8/15)**

1. *Create and Test*: Follow the plan you have developed and create your design/invention, then test it out to see if it works!

### **Create and Test**

To receive credit for this section, please provide detailed notes in your *design journal* as to what occurred when you tested your design/invention as well as photographs. Photos should be glued into the journal as well as copied to use for the display board.

2. *Improve* – Once you have tested your design/invention, you will use the results and the notes you took during the testing to answer the following questions.

### **Improve:**

1. Did my design/invention work the way I thought it would the first time?

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2. What would make my design/invention better? What could be done differently?

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3. How can I improve my design/invention to work or work even better?

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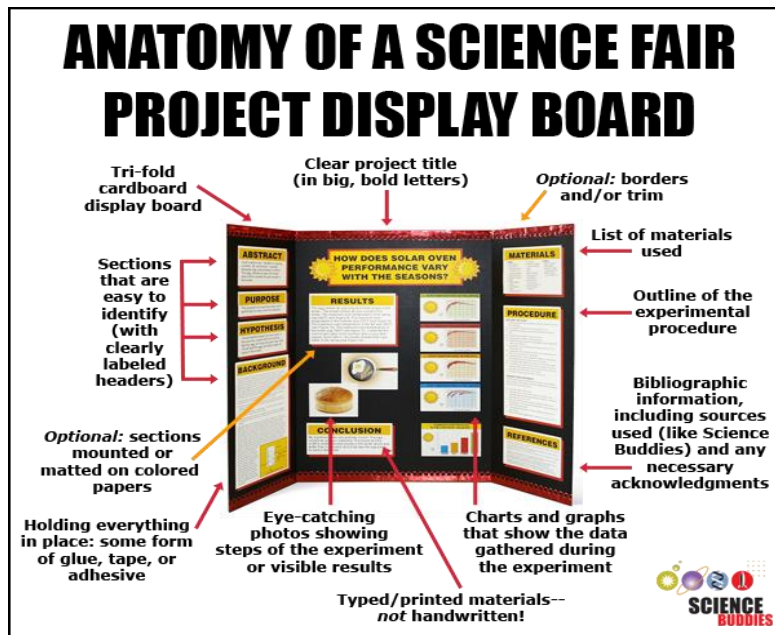
4. Make the necessary changes to your design/invention, and then test it again. Take detailed notes in your *design journal* and take new photographs of the improvements made.

## Part 4 - Complete S.T.E.M. Board and Practice Presentation (Due 11/15/16)

*S.T.E.M. Board* - This is an example of how to put together your board. Your board should be organized in a way that your audience can easily follow along with your steps in designing/inventing a solution to your problem. Be sure your layout makes sense going top to bottom and left to right.

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