Student Science Project Schedule

Sixth Grade
2016-17

Description of what's due:	Due Dates
"Project Proposal Form" **	Wednesday, January 25
"Background Research Plan Worksheet" **	Monday, January 30
"Bibliography Worksheet" **	Monday, January 30
Write a two paragraph summary of what you learned from your bibliography sources.	Friday, February 3
"Variable & Hypothesis Worksheet" **	Tuesday, February 7
List all materials necessary for the experiment. Write step-by-step procedures explaining how you will test your hypotheses.	Thursday, February 9
Write down your observations. Bring in your data table and data notes. (This may include any pictures you took)	Friday, March 3
Create at least one graph from your data. Write your conclusion paragraph.	Friday, March 3
Complete your display board. Be ready to present it to the class.	Friday, March 10

** These are specific worksheets that each student has received and needs to turn-in for a grade.

Tips and Suggestions:

- Use the *Topic Selection Wizard* at www.sciencebuddies.org to help you pick a project idea
- Keep all of your research, papers, data and resources in a central location (a notebook, three-prong folder, or three-ring binder)
    - Write down your procedure and observations
- Your experimental process should not be started later than one month before the due date.
- If possible, it is best to repeat your experiment more than one time (three times is best)
- Take pictures before, during and after you completed your project
- Use graph paper or a computer to create a neat and accurate graph

Parent's Guide to Science Projects

Information on the Scientific Method

Science projects should follow the six-step scientific method. These steps are shown on the chart below. A comprehensive Science Buddies Project Guide (www.sciencebuddies.org) provides direction on all of the steps.

Time Management

See your child's Student Science Project Schedule for all of the key due dates. Help your child meet these dates by getting out your family calendar and marking the interim due dates. Block out times for trips to the library and other work time. Look for any scheduling conflicts, such as vacations, and discuss issues with the teacher.

How to Help

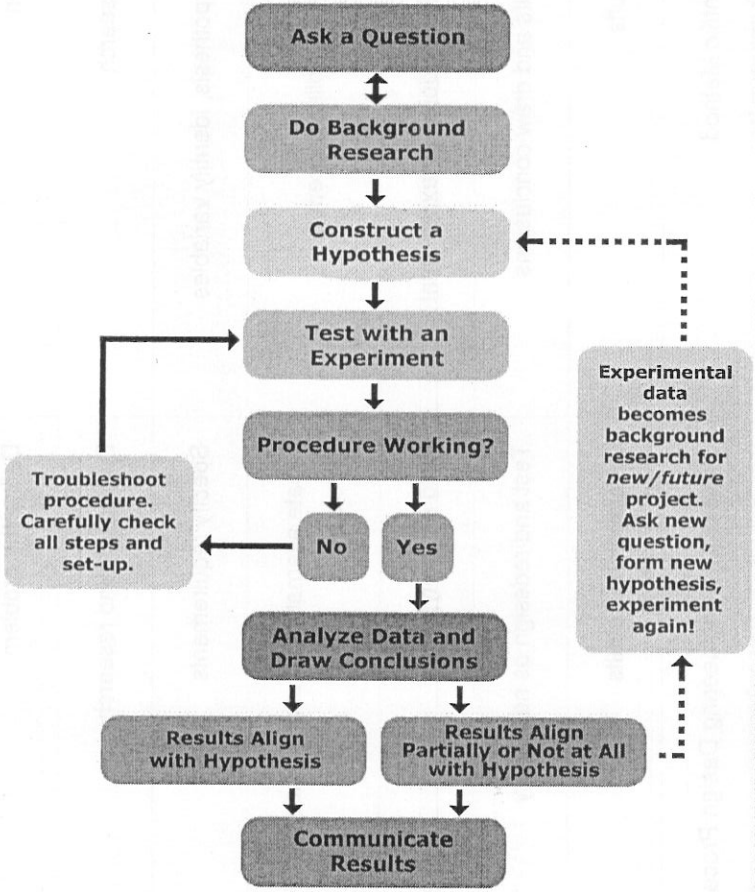
As your child works on his or her project, he or she will likely face stumbling blocks. To help, ask questions to help your child figure things out; don't just provide the answers. Open-ended questions, such as, "What else could you try to solve this?" or "What is stopping you from going on to the next step?" are best (Fredericks & Asimov, 2001, p.xiii). Sometimes just talking it out can help children get unstuck. If not, ask the teacher for help. Respect your child's independence in learning by helping at the right level.

Helping at the Right Level at Every Step

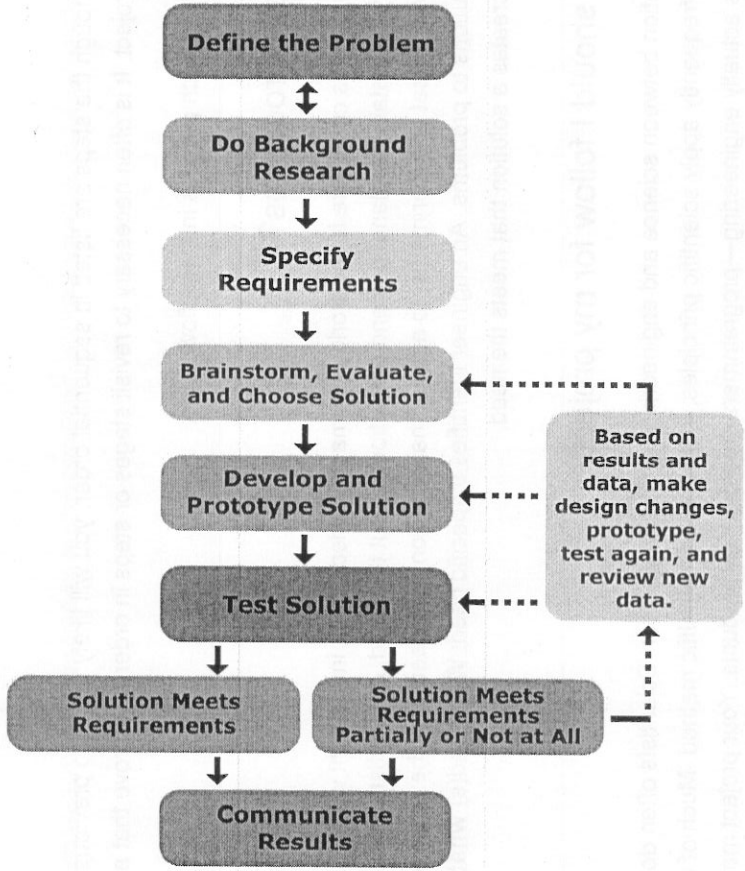
Project Step	Helping at the right level:	Going too far:
Ask a question.	• Discussing with your child whether a project idea seems practical	• Picking an idea and project for your child: A topic not of interest will turn into a boring project.
Do background research.	• Taking your child to the library • Helping your child think of keywords for Internet searches	• Doing an Internet search and printing out articles
Construct a hypothesis.	• Asking how the hypothesis relates to an experiment the child can do	• Writing the hypothesis yourself
Test the hypothesis by doing an experiment.	• Assisting in finding materials • Monitoring safety (you should always observe any steps involving heat or electricity)	• Writing the experimental procedure • Doing the experiment, except for potentially unsafe steps • Telling your child step-by-step what to do
Analyze data and draw a conclusion.	• Asking how your child will record the data in a data table • Reminding your child to tie the data back to the hypothesis and draw a conclusion	• Creating a spreadsheet and making the graphs yourself, even if your child helps type in values • Announcing the conclusion yourself
Communicate your results.	• If a presentation is assigned, acting as the audience • If a display board is assigned, helping to bring it to school	• Writing any of the text on the display board • Determining the color scheme and other graphic elements

Comparing the Scientific Method and the Engineering Design Process

Scientific Method



Engineering Design Process



www.sciencebuddies.org

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SCIENCE BUDDIES

Comparing the Engineering Design Process and the Scientific Method

The Scientific Method	The Engineering Design Process
State your question	Define the problem
Do background research	Do background research
Formulate your hypothesis, identify variables	Specify requirements
Design experiment, establish procedure	Create alternative solutions, choose the best one and develop it
Test your hypothesis by doing an experiment	Build a prototype
Analyze your results and draw conclusions	Test and redesign as necessary
Communicate results	Communicate results
Steps of The Scientific Method (http://www.sciencebuddies.org/science-fair-projects/project_scientific_method.shtml#samples)	Steps of The Engineering Design Process (http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml)

Keep in mind that although the steps are listed in sequential order, you will likely return to previous steps multiple times throughout a project. It is often necessary to revisit stages or steps in order to improve that aspect of a project.

You can see the steps of each process in these flowcharts:

Why are there two processes?

Both scientists and engineers contribute to the world of human knowledge, but in different ways. Scientists use the scientific method to make testable explanations and predictions about the world. A scientist asks a question and develops an experiment, or set of experiments, to answer that question. Engineers use the engineering design process to create solutions to problems. An engineer identifies a specific need: **Who** need(s) **what** because **why**? And then, he or she creates a solution that meets the need.

Which process should I follow for my project?

In real life, the distinction between science and engineering is not always clear. Scientists often do some engineering work, and engineers frequently apply scientific principles, including the scientific method. Much of what we often call "computer science" is actually engineering—programmers creating new products. Your project may fall in the gray area between science and engineering, and that's OK. Many projects, even if related to engineering, can and should use the scientific method.

Variables & Hypothesis Worksheet

Name: _____

Variables *(Fill in the table with the appropriate information from your own experiment)*		
Independent Variable (*What will you be changing in the experiment. Note: There should only be one item listed here*)	**Dependent Variables** (*What will you be measuring or observing*)	**Controlled Variables** (*What will you be keeping the same during the experiment*)

Your Hypothesis

(Fill in the blanks with the appropriate information from your own experiment.)

If [*I do this*] _____

_____,

then

[*this*] _____

_____

will happen.

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Background Research Plan Worksheet

Name: _____

1. What is the **question** you are going try to answer with an experiment? _____

_____

2. List the **keywords** and phrases from your question and the topic in general. (Hint: Use an encyclopedia to help you)

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

3. Now use your keywords to build some **questions to guide your background research**. Develop at least two or three from each "question word." Don't worry about whether you already know the answer to the question—you'll find the answers when you do your background research. And don't forget to "network" with knowledgeable adults who can help guide you toward good materials!

Question Word	Possible Questions (you can think of others)	Substitute your keywords (or variations of your keywords) for the blanks in the previous column. Write down the relevant questions and use them to guide your background research.
Why	Why does ____ happen? Why does ____ ____? Why _____?	
How	How does ____happen? How does ____ work? How does ____ detect ____? How does one measure ____? How do we use _____? How _____?	

Question Word	Possible Questions (you can think of others)	Substitute your keywords (or variations of your keywords) for the blanks in the previous column. Write down the relevant questions and use them to guide your background research.
Who	Who needs _____? Who discovered _____? Who invented _____? Who _____?	
What	What causes _____ to increase/decrease? What is _____ made of? What are the characteristics of ____? What is the relationship between ____ and ____? What do we use _____ for? What _____?	
When	When does _____ cause _____? When was _____ discovered? When _____?	
Where	Where does _____ occur? Where does _____ get used? Where _____?	

4. To analyze the results from experiments you might need to know some **key formulas or equations**. Think about your own experiment and write down any step or task that requires a formula or equation. Don't worry about whether you already know what the formula or equation is—you'll find the actual equation when you do your background research.

   List steps or tasks that may require a formula or equation:

_____ _____ _____ _____

_____ _____ _____ _____

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2007/02/08

Bibliography Worksheet

SCIENCE BUDDIES

Note: You won't fill in every item depending on the type of source. **Name:** ______________________

This source is a: ☐ Book ☐ Magazine ☐ Newspaper ☐ Website ☐ Other________		
Author's Last Name	First Name	Middle Initial
Date Published	Title of Publication or Website	
Title of Article (periodicals, encyclopedias, websites)		
Place Published (books only)	Publisher (books only)	Editor (if applicable)
Edition (if applicable)	Volume Number (periodicals or encyclopedias)	Page Number(s)
Website is a ☐ Company ☐ Organization ☐ Government ☐ Newspaper/Magazine ☐ Other________		
The URL is http:// (websites only)		Last Date of Access (websites only)

This source is a: ☐ Book ☐ Magazine ☐ Newspaper ☐ Website ☐ Other________		
Author's Last Name	First Name	Middle Initial
Date Published	Title of Publication or Website	
Title of Article (periodicals, encyclopedias, websites)		
Place Published (books only)	Publisher (books only)	Editor (if applicable)
Edition (if applicable)	Volume Number (periodicals or encyclopedias)	Page Number(s)
Website is a ☐ Company ☐ Organization ☐ Government ☐ Newspaper/Magazine ☐ Other________		
The URL is http:// (websites only)		Last Date of Access (websites only)

This source is a: ☐ Book ☐ Magazine ☐ Newspaper ☐ Website ☐ Other________		
Author's Last Name	First Name	Middle Initial
Date Published	Title of Publication or Website	
Title of Article (periodicals, encyclopedias, websites)		
Place Published (books only)	Publisher (books only)	Editor (if applicable)
Edition (if applicable)	Volume Number (periodicals or encyclopedias)	Page Number(s)
Website is a ☐ Company ☐ Organization ☐ Government ☐ Newspaper/Magazine ☐ Other________		
The URL is http:// (websites only)		Last Date of Access (websites only)

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Science Project Proposal Form

Name: _____

The question I plan to investigate in my experiment (*please phrase as a question*):

Science Fair Project Question Checklist	
1. Your teacher may put some restrictions on projects. Have you met your teacher's requirements?	Yes / No
2. Is the topic interesting enough to read about, then work on for the next couple months?	Yes / No
3. Can you find at least 3 sources of written information on the subject?	Yes / No
4. Can you measure changes to the important factors (variables) using a number that represents a quantity such as a count, percentage, length, width, weight, voltage, velocity, energy, time, etc.? Or, just as good, are you measuring a factor (variable) that is simply present or not present? For example, • Lights **ON** in one trial, then lights **OFF** in another trial • **USE** fertilizer in one trial, then **DON'T USE** fertilizer in another trial	Yes / No
5. Can you design a "fair test" to answer your question? In other words, can you change only one factor (variable) at a time, and control other factors that might influence your experiment, so that they do not interfere?	Yes / No
6. Is your experiment safe to perform?	Yes / No
7. Do you have all the materials and equipment you need for your science fair project, or will you be able to obtain them quickly and at a very low cost?	Yes / No
8. Do you have enough time to do your experiment more than once before the science fair?	Yes / No
9. If you are planning to enter a science fair outside of your school: • Does your project meet all the rules and requirements for the science fair? • Have you checked to see if your science fair project will require approval from the fair before you begin experimentation?	Yes / No Yes / No

I have discussed the project idea and the checklist with my parent(s) and I am willing to commit to following through on this project.

_____

Student Signature **Date**

I have discussed the project idea and the checklist with my student and I believe he or she can follow through with this project.

_____

Parent Signature **Date**

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Engineering Project Proposal

Name: _____

What is the **problem** you intend to solve? [*Who*] need(s) [*what*] because [*why*]:

Engineering Project: Problem Checklist	
1. Your teacher may put some restrictions on projects. Have you met your teacher's requirements?	Yes/ No
2. Is the topic interesting enough to read about and work on for the next couple months?	Yes/ No
3. Can you find at least threesources of written information on the subject?	Yes/ No
4. Can you think of a way to measure whether your solution is better than what already exists? It is always best if you can measure your improvement numerically: cheaper in dollars, faster in time, etc.	Yes/ No
5. Can you design a solution that is safe to build, use, store, and dispose of?	Yes/ No
6. Do you have all the materials and equipment you need for your solution, or will you be able to obtain them quickly and at a very low cost?	Yes/ No
7. Do you have enough time to complete your design and make it before the due date? Allow time for doing additional research and fixing problems. It is very rare for everything to work correctly the first time.	Yes/ No
8. If you are planning to enter a science fair outside of your school: • Does your project meet all the rules and requirements for the science fair? • Have you checked to see if your science fair project will require approval from the fair before you begin construction?	Yes/ No Yes/ No

I have discussed the project idea and the checklist with my parent(s), and I am willing to commit to following through on this project.

_____

Student Signature **Date**

I have discussed the project idea and the checklist with my student, and I believe he or she can follow through with this project.

_____

Parent Signature **Date**

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