

SCIENCE PROJECT HOW TO:

CHOICE #1

Choice #1 – Science Experiment

Experience the thrill of **answering a scientific inquiry** (question) through experimentation. Students should choose a question that can be answered with results from an experiment or investigation of their own design. Discover the answer to that burning question you've had on your mind!

A Science Experiment should emphasize the positive experience of **learning through experimenting** by following the steps of the Scientific Methodology.

Scientific Methodology Steps (Remember: "I Have Einstein's Rules Clear")

1. IDEA – QUESTION

- Choose a topic you find interesting – a hobby, a sport, any part of your life
- Observe, research and think about...
 1. How something works
 2. How 2 things affect each other
 3. How an animal behaves
 4. What changes behavior
- Narrow the topic to a specific question with one variable (thing) that changes.
 1. Do not use yes/no questions.
 2. Decide what you will measure after you change the variable.
 3. Use the SPAM (Simple, Practical, Answerable, Measurable) model taught in class.

- Possible questions include:

How does _____ affect _____?

humidity	growth of mold
color of material (fabric)	absorption of heat
type of soil	water retention
weather	humans' mood
"newness" of a tennis ball	bounce height
air pressure	basketball bounce
time of day	temperature
sight	sense of taste
freezing/refrigerating popcorn	how much pops
gender	what pictures people remember
changing the insulator	melting time of ice
changing the temperature	plant growth
cup material	how long water stays hot
ice shape	fast ice melts
initial water temp	how long it takes to freeze
amount of salt in water	buoyancy

What is the effect of _____ on _____?

Temperature	size of a balloon
Detergent	germination of seeds
Earthworms	plant growth
Saliva	sense of taste

2. HYPOTHESIS

A hypothesis is an educated guess about how things will work. Think about how or why something happens, then predict what your experiment will show. A typical format is:

“If [I do this] , then [this] will happen.

For older students, we encourage you to take it one step further and add what reasoning you base your hypothesis on.

i.e. “If [I do this] , then [this] will happen because [reason] .”

It’s OK, if your hypothesis is different than your actual result.

3. EXPERIMENT

Design an investigation to test your hypothesis. It is important to conduct a test with only one variable (factor, trait, or condition that can exist in differing amounts or types).

- **Materials**

- a. What items and tools/equipment do you need to conduct your experiment?

- **Procedure**

- a. What are the steps used to obtain data to answer the question? Make sure your steps are detailed enough so someone else can recreate your experiment exactly as you intended.

- b. Remember to make everything the same except for the one thing you are changing so you can measure if the change makes a difference. For example, if you are measuring the number of times your cat plays with the big ball compared to how many times he plays with the little ball, both balls should be the same in bounciness, color, and smell. Therefore, the only difference is the size.

Plan ahead and use time wisely, especially if the experiment is to be conducted over a period of time.

4. RESULTS - COLLECT AND PRESENT DATA

- Record data and extra observations.
- Show data in a way that shows how things are related. For example, show how the ball size compared to how many times the ball was played with.
- Display your data clearly, to show the answer to your question. What type of graph or chart would be best?

5. CONCLUSION – ANALYZE AND INTERPRET RESULTS

- Explain how you came up with your question and hypothesis.
- Review your results. What conclusion do your results lead you to?
- Use scientific facts and your observations to explain what happened. (i.e. Answer the “Why” questions.)
- Think about the design and process you used and answer the following:
 1. What changes could be made to the design to make it an even better experiment?
 2. What further experiments could you do to take your thinking further?
 3. What other questions did this experiment make you ask?
 4. How can your finding be applied to real life?

Science Experiment Project Display Board

Once you have completed your experiment, you must create a project display board to communicate your work to others. Use a standard, tri-fold display board no larger than 36" tall and 48" wide. Display boards can be purchased at a store that carries office supplies like Fred Meyer, Office Depot or Office Max. You may also purchase a display board in the office for a nominal fee.

Example Experiment Board Layout

IDEA What is your idea/question? Why did you choose this experiment?	TITLE	PROCEDURE What are the detailed steps of this experiment?
HYPOTHESIS Your guess.	Student Name Teacher Name Grade	CONCLUSION * Why? * What did you learn? * How can it be made better?
MATERIALS What and how much did you use?	DATA/RESULTS	
	picture	picture
	picture	
	charts, graphs, pictures, photographs	charts, graphs, pictures, photographs

“Green” Science Experiments

The Bonny Slope Earth Sustainability Committee will be recognizing “Green” Science projects. All students who submit a Science experiment related to environmental sustainability subjects such as recycling, renewable energy, conservation, and “green” technology will be receive a special insignia on their project board. If you have any questions regarding this recognition, please contact Don Carder, Science Fair Committee Lead, at bsco.sciencefair@yahoo.com

Science Experiment - Project Planning Guide

	Complete this column with your information	Things to Consider
Idea/Question		<ul style="list-style-type: none"> •Is your question simple, practical, answerable, and measurable? •Have you worded your question so it can be tested with one variable?
Hypothesis		<ul style="list-style-type: none"> •Have you made an educated guess?
Experiment Variable Materials Procedure		<ul style="list-style-type: none"> •Do you have only one variable that you can change (e.g., independent variable)? •Have you listed all the equipment and materials and described them in sufficient detail? •Have you included a step-by-step list of all procedure steps? •Have you described how to change your variable and how to measure that change? •Could someone repeat your experiment based on your written procedure?
Results		<ul style="list-style-type: none"> •Did you review your data for completeness and mistakes? •Are all tables and graphs clearly labeled?
Conclusion		<ul style="list-style-type: none"> •Did you summarize your results? •Did you explain WHY you believe your results occurred? •Did you state whether your hypothesis was proven true or not? •Did you evaluate what worked and what didn't work in your experiment? •Did you suggest changes in procedure or possibilities for further study?

Project Board

- Does your display board include (at least) all of the above sections?
- Are all sections clearly labeled?
- Does the title capture the viewer's attention?
- Did you proofread your board?
- Do you use pictures, charts, graphs?
- Is the text large and neat?
- Do you know your board well enough to be able to discuss it and answer questions about it?