

Science Experiment Guide

This type of project is the most common type of STEAM fair project. An experiment is an investigation designed to test the student's hypothesis. Students will identify a problem or purpose, design an experiment to investigate this problem, and record and report the results. The student will draw conclusions based on the results.

Suggested Steps

Here are some suggestions on the steps you can take to work on your project. These are only some of the ideas and ways you design your experiment, model, invention or demonstration. Make sure to record all your information in your logbook. Writing down your research, plans, ideas, steps, successes and failures are all important parts of being a scientist!

Step 1: What is the Question or Problem I Want To Solve?

Think about what type of question you are going to answer OR type of problem you are going to solve. This is your objective, purpose or problem.

Examples:

- Science Question I am going to answer: "Which brand of diaper is the most absorbent?" This is a good question that would allow students to go through the scientific process manipulating only one variable: the type of diaper.
- Engineering Problem I am going to solve: "How can I prevent children from getting into cabinets where there are chemicals? This problem would allow the student to design a solution and test its effectiveness.

Step 2: Do Background Research to Help Support Your Investigation.

After asking your question or defining the problem, it is important to complete some research to better understand what your investigation is about.

How do you complete research? You need to read! The information you gather while completing your research will help you in developing your prediction, designing your experiment, collecting data, drawing conclusions, and communicating like a real scientist or engineer. Compile a list of all your research sources for your bibliography that is included in your written report. Make sure to include at least the title, author, and date published or accessed.

Step 3: State Your Hypothesis or Prediction or Define Your Requirements

The purpose of your hypothesis or prediction is to identify what you think will happen based on your background research. The prediction needs to be worded as an “If... then...because” statement explaining the cause and effect relationship that you are learning about. Evidence from your research needs to be used to support and justify your thinking.

Example:

- Science question I am going to answer: If I put 30mL of water in the Huggies diaper, then it will absorb the most water because Huggies diapers have an extra layer of polyfiber material.

Helpful Information For Older Students (4th – 6th Grade):

Variables: A variable is a fancy word for things that you will be changing or keeping the same throughout your investigation. There are 3 types of variables:

- Independent Variables: This is the variable that will be changed in your investigation. It represents the cause or reason for an outcome. To keep things simple, pick one independent variable for your science project.
- Dependent Variables: This is the measured or observed variable that will show an effect as you change your independent variable. Your research will determine whether its value or measurement *depends* on the independent variable.
- Constants or Controlled Variables: These are all the things that will be kept the same throughout your investigation to make sure your project works.

Examples:

Question I am going to answer: If I put 30mL of water in the Huggies diaper, then it will absorb the most water because Huggies diapers have an extra layer of polyfiber material.

- Independent variable: The different brands of diapers that are being tested
- Dependent variable: The amount of water absorbed (measured using mL) by each brand of diaper.
- Constant: temperature of the water, location in the diaper in which water is poured

Step 4: Gather Your Materials and Supplies You Need To Test or Try Your Project

What types of materials will be used to conduct your investigation? Make a list of all your supplies. Younger students might even be interested in drawing pictures!

Step 5: Design a Procedure to Test Your Hypothesis or Prediction

What steps will I use to carry out my investigation? This is where you list your steps in how you will conduct your experiment or design. It is very important that the steps in developing/designing your investigation are recorded precisely so another student can replicate the investigation. Are there safety concerns? In designing a solution, create alternatives and choose the best one to develop.

Step 6: Do the Experiment! Record Your Data and Results

Test your Prediction by doing the experiment OR Build a Prototype

Do the experiment! This is like a recipe – Create step-by-step instructions for what you will do to test your prediction. It should be so thorough that even a person, who knows nothing about science, could duplicate the experiment.

Analyze your results and draw Conclusions OR Test and redesign as necessary

Make sure to collect some data (information) to help either prove or disprove your hypothesis or prediction. When you are collecting data please be as precise as possible in using labels, dates, and even pictures. Once you finish collecting your data it is important to record your data/results into a table and then organize it into a chart or graph to show what you have discovered. Be sure to record your data in your logbook, and organize it into charts, tables, and graphs.

Step 7: Communicate Your Conclusion and Results

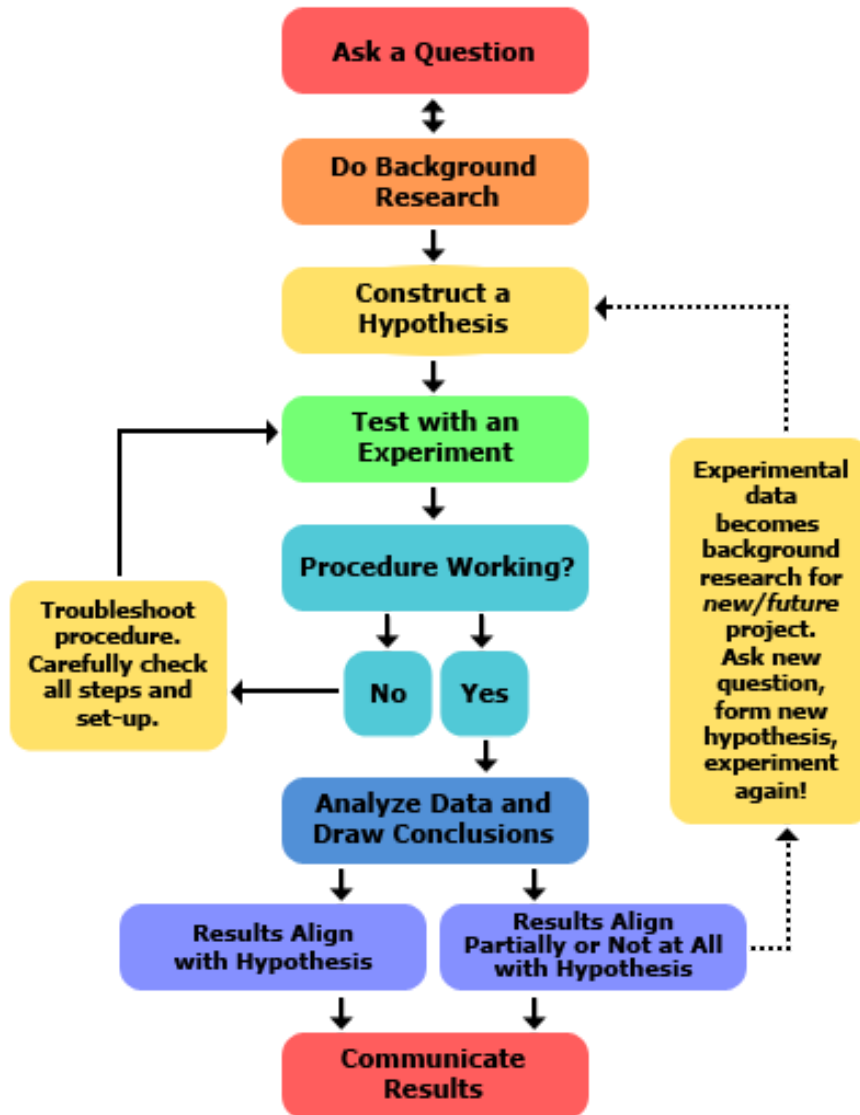
Was your hypothesis or prediction right or wrong? Your conclusion should be a summary of your results and state whether or not your investigation supported your hypothesis.

Use the questions below to help guide you in sharing what you learned.

- Did your results support your hypothesis? Identify and explain the types of data you used to prove or disprove your hypothesis.
- What did you learn from the trials you conducted in your investigation?
- What types of problems did you encounter throughout your investigation?

- If you conducted this investigation again, what would you do differently?
- How does your investigation make connections to real life?

Scientific Method



Tri-fold Board Suggestions

There are numerous ways to display your project for the STEAM Fair. Below are just some ways to organize the various parts of your science project.

Scientific Process Projects

