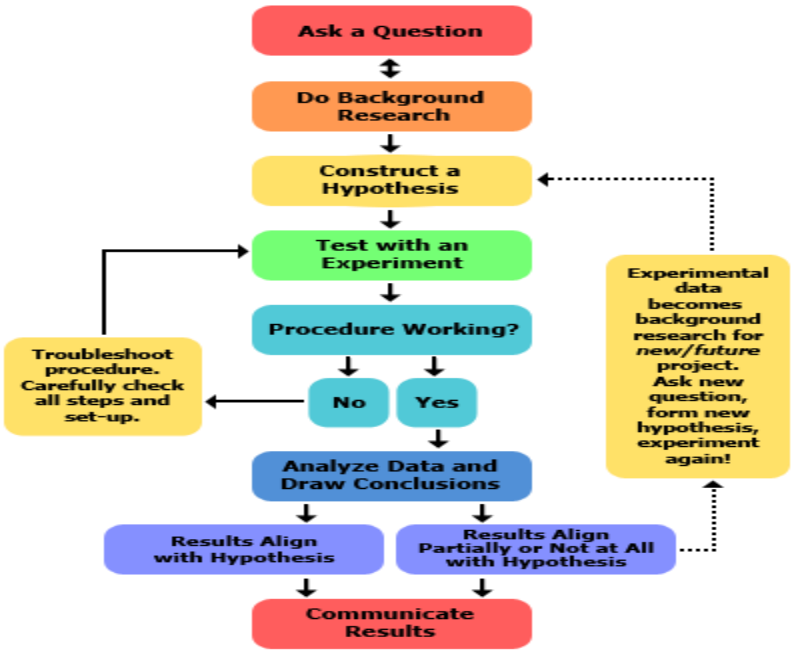
# Scientific research methodology




**What is the scientific reserach?**

The scientific method is the process of objectively establishing facts through testing and experimentation. The basic process involves making an observation, forming a hypothesis, making a prediction, conducting an experiment and finally analyzing the results. The principals of the scientific method can be applied in many areas, including scientific research, business and technology.

**Steps of the Scientific research**

**1. Ask a Question**

The scientific **method** starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where?

For a science fair project some teachers require that the question be something you can measure, preferably with a number.

**2. Do Background Research**

Rather than starting from scratch in putting together a plan for answering your question, you want to be a savvy scientist using library and Internet research to help you find the best way to do things and ensure that you don't repeat mistakes from the past.

For detailed help with this step, use these resources:


Background Research Plan

Finding Information

How to Write a Bibliography in APA and MLA styles With Examples

Research Paper

### 3. Construct a Hypothesis

A hypothesis is an educated guess about how things work. It is an attempt to answer your question with an explanation that can be tested. A good hypothesis allows you to then make a **prediction:**
"If _____*[I do this]* _____, then _____*[this]*_____ will happen."

State both your hypothesis and the resulting prediction you will be testing. Predictions must be easy **to measure**.


For detailed help with this step, use these resources:

Variables

Variables for Beginners

Writing a Hypothesis for Your Science Fair Project

### 4. Test Your Hypothesis by Doing an Experiment

Your experiment tests whether your prediction is accurate and thus your hypothesis is supported or not. It is important for your experiment to be a fair test. You conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same.

You should also repeat your **experiments** several times to make sure that the first results weren't just an accident.

For detailed help with this step, use these resources:

Experimental Procedure

Materials List

### 5. Analyze Your Data and Draw a Conclusion

Once your experiment is complete, you collect your measurements and analyze them to see if they support your hypothesis or not.

Scientists often find that their predictions were not accurate and their hypothesis was not supported, and in such cases they will communicate the results of their experiment and then go back and construct a new hypothesis and prediction based on the information they learned during their experiment. This starts much of the process of the scientific method over again. Even if they find that their hypothesis was supported, they may want to test it again in a new way.

For detailed help with this step, use these resources:

Data Analysis & Graphs

Conclusions

### 6. Communicate Your Results

To complete your science fair project you will communicate your results to others in a final report and/or a display board. Professional scientists do almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster

or during a talk at a scientific meeting. In a science fair, judges are interested in your findings regardless of whether or not they support your original hypothesis.

For detailed help with this step, use these resources:

Final Report

Abstract

Science Fair Judging

Exercise 1

- What are the stages of scientific research?
- What is the difference between each stage and another?
- What does the starting stage of scientific research include?
- How is information collected in scientific research?
- What is the hypothesis

Exercise 2

- Translate the words in bold into Arabic
- Translate the following words into English

الملاحظة- تحليل البيانات- المتغيرات- المؤشرات- أدوات البحث- الموضوعية

Exercise 3

- Give the verb for each noun

Testing- observation- gathering- creation- prediction- analyzing

Exercise 4

- Classify the following words in the table:

Quantitative- qualitative- objectives- mixed method- analysis- data collection- findings- topic- instruments- approach- problem

| **research** | **method** | **tool** |
|---|---|---|
| | | |