

The **scientific method** is a process for experimentation that is used to accept or reject a **cause-and-effect** relationship.

Scientific Method			Example
Step 1.	Form a hypothesis.	Present a testable statement that states a cause-and-effect relationship . If <u> (cause) </u> , then <u> (effect) </u> .	If teenagers eat peanuts , then they will not get as hungry as those students who eat candy.
Step 2.	Conduct an experiment.	Conduct an experiment to accept or reject the hypothesis. The experiment must compare the experimental group that receives the treatment to a control group that does not .	Two groups of thirty male and female students from four different middle schools will be given a snack at two o'clock in the afternoon. The group will keep a record of when they become hungry. ▶ Experimental group will be <u>given peanuts</u> (120 calories). ▶ Control group will be <u>given a candy bar</u> (120 calories).

Not an example of a hypothesis:

Why does it rain?

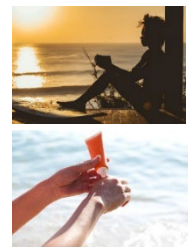
People usually order hamburgers and French fries together.

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Which is an example of a hypothesis that states a cause-and-effect relationship? Explain.

A If teenagers wear sunscreens A and B; then, they will be able to read a book.

B If teenagers wear sunscreen A; then, they will not get sunburned as much as teenagers who wear sunscreen B.



Is this a good experiment to prove that Sunscreen A is better than Sunscreen B? Explain.

The back of the right hand of two groups of thirty male and female students from four different parts of town will be exposed to the sun for thirty minutes. The researchers will keep a record of how red the back side of the right hand gets.

- ▶ Fifteen students will be rubbed with Sunscreen A (0.01 ounce).
- ▶ Fifteen students will be rubbed with Sunscreen B (0.01 ounce).

A yes

B no

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Step 3.	Collect and record data.	Analyze the results from the experiment carefully.	<ul style="list-style-type: none"> ▶ The students who ate peanuts became hungry within 2.5 hours. ▶ The students who ate candy became hungry within 1.4 hours.
Step 4.	Draw a conclusion.	Compare the information from the experimental and control group to determine if the hypothesis has been accepted or rejected.	Students who eat peanuts do not get hungry as soon as students who eat candy.

CFU

Which results will enable you to accept the hypothesis that Sunscreen A is better than Sunscreen B in preventing sunburns? Explain.

A The back side of the hands of the students who wore Sunscreen A was pink in color.

B The back side of the hands of the students who wore sunscreen B was red in color.

- 1 Read the hypothesis carefully.
- 2 Complete the steps of the scientific method. (write)
- 3 Connect all the steps of the scientific method. (oral)

Scientific Method	Observation #1	Observation #2
<p>Step 1. Form a hypothesis. If__(cause)__, then_(effect)__</p>	<p>If cheese is left at room temperature, then it will mold very fast.</p>	<p>If students watch five hours of television per week, then they will receive poor grades.</p>
<p>Step 2. Conduct an experiment.</p>		
<p>Step 3. Collect and record data.</p>		
<p>Step 4. Draw a conclusion.</p>		

Skill Closure

- 1 Read the experiment.
- 2 Identify the steps of the scientific method. (write)

Experiment**Scientific Method**

If you plant a bean seed in the direction of the sun, it will germinate faster.

The bean plants are measured every day.
 Experimental Group:
 25 beans are planted right side up.
 Control Group:
 25 beans are planted upside down.

Concept Closure**Write an explanation.**

Jackie's hypothesis for her project is:

If tomato plants start to wilt, don't pay any attention to them.
 Why is this not a hypothesis?

Summary Closure

What did you learn today about connecting all steps of the scientific method?

Word Bank

process
 4 steps
 experimentation
 accept/reject
 cause-and-effect

Match the steps of the scientific method to the experiment.**Form a hypothesis.**

The temperature in the Styrofoam cups decreased less than the temperature in the paper cups.

Draw a conclusion.

Ten cups with lids are used. Their temperature will be taken every five minutes.

- Experimental group: Water at 4°C or 39°F will be placed in five Styrofoam cups. (8 ounces)
- Control group: Water at 4°C or 39°F will be placed in five paper cups. (8 ounces)

Collect and record data.

If liquids are placed in a Styrofoam cup, they will stay colder for a longer period of time.

Conduct an experiment.

Styrofoam cups kept water colder than the paper cups.

lab recommendations

Resources:

<http://www.experiment-resources.com/mold-bread-experiment.html><http://chemistry.about.com/od/sciencefairprojectideas/a/7thgradeproject.htm><http://www.fun-science-project-ideas.com/7th-Grade-Science-Projects.html>