

3-5 Methods

Method 1: Making a Hypothesis and Defining Variables and Controls.

Students will need an explanation of variables and control groups. Go over these concepts with your students before they try to form their hypotheses. See the Variables Lesson for ideas.

A hypothesis indicates what your students expect their experiment to show or demonstrate. It should address an independent variable (what the experimenter will change), and a dependent variable (what is expected to change as a result of the experiment).

For an experiment on factors that affect fossil formation, this might be a hypothesis:

Organisms with soft body parts are equally likely to form fossils as those with harder body parts.

In the table are examples of variables that might be involved in a science fair experiment on how fossils form:

Question	Independent Variable	Dependent Variable	Controlled Variable (remained the same)
How are fossils formed?	<ul style="list-style-type: none"> Dead organisms with hard body parts and dead organisms with soft body parts 	<ul style="list-style-type: none"> How much the organism decomposes over time. 	<ul style="list-style-type: none"> Temperature at which the organisms decompose. Amount of light exposure for decomposing organisms. Amount of air exposure for decomposing organisms. Amount of moisture exposure for decomposing organisms. Time allotted for organisms to decompose.

Help students develop their own hypotheses for their science fair experiments, and ask them to record these in their science fair journals or notebooks.

After students write their hypotheses, they need to identify the variables they are going to change, as well as those they will control. You might find it useful for students to create a draft experimental plan and run it by you and a small group of classmates for comments. When both you and they are comfortable with the plans, they should record these in their notebooks or journals along with lists of materials. Remind students that good science fair projects do not need to be expensive.

Science Journal Downloads:

- Variables portion of the science journal
- Hypothesis development portion of the science journal
- Draft a science fair plan portion of the science journal
- Materials list portion of the science journal

Method 2: Students run their controlled experiments.

After completing all these preparations, students finally are ready to conduct their experiments. Below is an example of an experiment a student might conduct to test this hypothesis:

Organisms with soft body parts are equally likely to form fossils as those with harder body parts.

The student:

1. **first looks at fossil samples** to get a sense of the types of organisms or parts of organisms that can become fossilized. The student records his or her observations in a notebook or journal.
2. **gathers organisms to test** for the experiment, such as one unpeeled shrimp, one cooked chicken wing, one clamshell, one green leaf, and one small twig.
3. **examines the organisms** and predicts which might decompose quickly and which more slowly. The student also records reasons for his or her predictions.
4. **puts each of the organisms** into a small zip-closing plastic bag and double-seals each bag with masking tape. The student labels the bags with the time, date and initials and puts the bags into a closet or other dark area.
5. **checks on the organisms** each day over the course of two weeks and records observations about decomposition in a notebook or journal. These observations can also include photographs and/or drawings.
6. **reviews his or her observations and draws conclusions** about which organisms are most likely to become fossils, due to slow rates of decomposition.
7. **uses data to support or refute the hypothesis.**

No matter what experiment your students are running, they should take photographs, make sketches, keep notes, and record observations throughout. Observations should include detailed descriptions or measurements of what happened when they manipulated their independent variables.

Guide students to record their observations in their science fair journal.

Science Journal Downloads:

- Observations portion of the science fair journal
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