

Chapter 2

THE SCIENTIFIC PROCESS

Chapter 2 Assessment

Vocabulary

Select the correct term to complete the sentences.

control variable	experimental variable	prototype
deduce	hypothesis	repeatable
engineer	inquiry	scientific method
engineering cycle	natural laws	technology
experiment	objective	theory
experimental technique	procedure	trials

Section 2.1

- To _____ is to figure something out from known facts using logical evidence.
- A scientific explanation supported by lots of evidence collected over a long period of time is a(n) _____.
- Scientific evidence that is _____ can be seen by others if they repeat the same experiment in the same way.
- Learning by asking questions and seeking the answers is called _____.
- A(n) _____ is a possible scientific explanation that can be tested by comparison with scientific evidence.
- _____ evidence describes only what actually happened in an experiment as exactly as possible.
- Scientists believe the universe follows a set of "rules" known as _____.
- The _____ is a process of learning that begins with a hypothesis and proceeds to collect evidence to confirm or disprove the hypothesis.

Section 2.2

- When you run an experiment multiple times, you conduct several _____.
- The thing you are testing (changing) in an experiment is the _____.
- Something you keep the same from trial to trial in an experiment is called the _____.
- A step-by-step account of all that you do when conducting a particular experiment is called the _____.
- The way you release a cart on a ramp while conducting an experiment is an example of _____.
- A(n) _____ is a situation specifically set up to investigate relationships between variables.

Section 2.3

- A(n) _____ is a working model of a design that can be tested to see if it works.
- A process used to build and test devices that solve technical problems is _____.
- _____ is the application of science to meet human needs and solve problems.
- A professional who uses scientific knowledge to create or improve technology is a(n) _____.

Concepts

Section 2.1

- Explain the difference between a theory and a hypothesis.
- For each example, write whether it could be considered scientific evidence (S) or not (N).
 - _____ An artist's watercolor painting of an oak leaf
 - _____ The time for a car to drive once around a track
 - _____ The number of each different color of candy-coated chocolate in a bag of candy.
- Indicate which of the following hypotheses are testable and scientific (S) and which are not (N).
 - _____ Your brain produces undetectable energy waves.
 - _____ Life forms do not exist in other galaxies.
 - _____ Earth completes one rotation every 24 hours.
- A student designs an experiment and gets favorable results after one trial. The student should:
 - Write a paper and publish the results.
 - Redesign the experiment to get more-favorable data.
 - Repeat the experiment several times to verify the results.
 - Form a new experiment that supports a related hypothesis.

Section 2.2

- Explain the difference between experimental variables and control variables.
- What is the difference between experimental technique and procedure? Give an example to support your explanation.

- After testing, a hypothesis appears to be false. This indicates that:
 - the experiment is a failure.
 - the results are of no use.
 - the design of the experiment was bad.
 - the data may be useful, but further testing and redesign of the experiment may be needed.

Section 2.3

- Science and technology are related, but they are not the same. What is the difference?
- Scientist and engineer are two different career options. How does their work differ?

Problems

Section 2.1

- Suppose you turn on your digital music player and it doesn't work. Describe how you could use the scientific method to figure out what's wrong.

Section 2.2

- Design an experiment using a ruler, a stopwatch, a tennis ball, a 1-meter long piece of string, a rubber band, tape, and 10 pieces of paper. Document a question, a hypothesis, the independent variable, the dependent variable, the control variables, and the procedure for your experiment.
- A botanist wants to understand if exposure to St. John's wort, a flowering roadside plant, causes skin irritation. In this experiment, several types of plants, including St. John's wort, are rubbed onto the arms of 10 volunteers. A skin rash develops in all 10 individuals. Can the scientist clearly say that St. John's wort causes skin irritation? Why or why not? Identify any variables and state any changes that could be made to make this experiment more valid.

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4. Monique wants to see what happens when she drops a marble from different heights into a baking tray that has a thick layer of very soft modeling dough pressed inside. She predicts that the closer the marble is to the dough when she drops it, the deeper the marble's indentation will be.
- What is Monique's hypothesis?
 - What is the experimental variable?
 - What are two control variables?
 - What evidence will be collected?
 - Write a step-by-step procedure for the experiment.
 - Do you think the data Monique collects will confirm or disprove her hypothesis? Explain your reasoning.

Section 2.3

5. You have an idea for making a homemade shoe that will allow you to walk on open egg cartons without crushing any eggs. How could you use the engineering cycle to design and test your idea?

Applying Your Knowledge

1. Write a caption for the illustration below. Your caption should include one or more vocabulary terms from the chapter that BEST describe the illustration.

