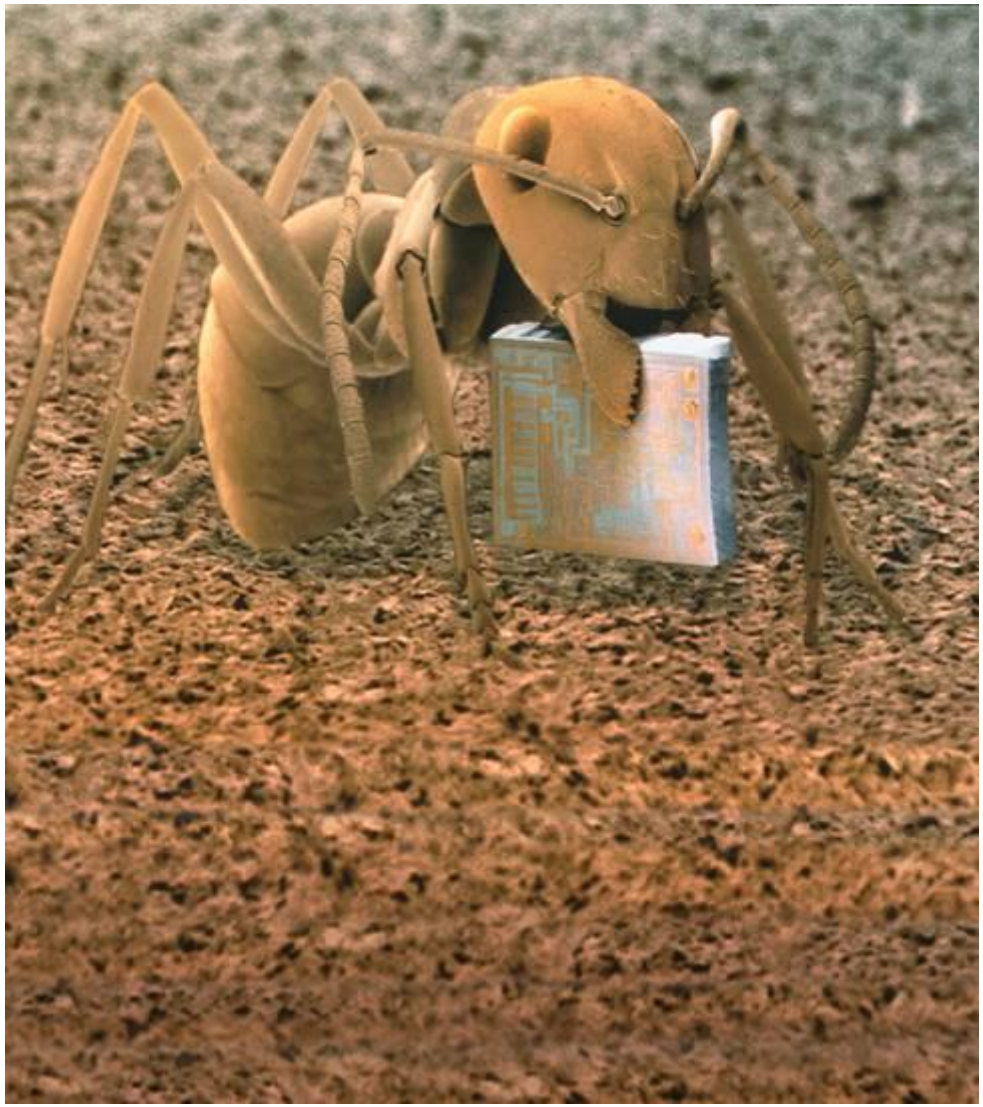
1-1 What Is Science?



What Science Is and Is Not

What is the goal of science?

The goal of science is to:

- **investigate and understand the natural world.**
- **explain events in the natural world.**
- **use those explanations to make useful predictions.**

Science is an organized way of using evidence to learn about the natural world.

The word *science* also refers to the body of knowledge that scientists have built up after years of using this process.

Thinking Like a Scientist

Scientific thinking begins with observation.

Observation is the process of gathering information about events or processes in a careful, orderly way.

The information gathered from observations is called **data.**

- Quantitative data are expressed as numbers, obtained by counting or measuring.
- Qualitative data are descriptive and involve characteristics that can't easily be measured.

Scientists use data to make inferences.

An **inference** is a logical interpretation based on prior knowledge or experience.

Explaining and Interpreting Evidence

A **hypothesis** is a proposed scientific explanation for a set of observations.

A hypothesis may be ruled out or confirmed.

A hypothesis must be proposed in a way that can be tested.

Hypotheses are tested by performing controlled experiments or by gathering new data.

Researchers often work in teams to analyze, review, and critique each other's data and hypotheses.

A review process helps ensure conclusions are valid.

To be valid, a conclusion must be based on logical interpretation of reliable data.

Science as a Way of Knowing

Science is an ongoing *process* that involves:

- asking questions
- observing
- making inferences
- testing hypotheses

Scientific understanding is always changing.

Good scientists are skeptics who question both existing ideas and new hypotheses.

Science and Human Values

An understanding of science and the scientific approach is essential to making intelligent decisions.

Scientists make recommendations based on data collected through research.

Decisions involve many factors besides scientific information, including:

- the society in which we live
- economic considerations
- laws
- moral principles

Citizens decide what to do when they vote.

1–1 Section QUIZ

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1–1 Section QUIZ

1 Observations involving numbers are known as

a. qualitative observations.

b. hypothetical observations.

A c. quantitative observations.

d. inferred observations.

2 Which of the following shows the interaction of science and human values?

A a. the debate over the best way to produce electricity

b. investigating how a manatee behaves

c. Determining what causes a disease

d. using a hypothesis to test an explanation

3 A scientist takes paint chips from 10 apartments in a large building. She tests for the presence of lead in the paint and finds it in all 10 samples. She then concludes that lead paint is probably present in all 120 apartments in the building. This conclusion is an example of

a. a scientific fact.

b. a scientific error.

c. proof.

A d. a reasonable inference.

4 A possible explanation for a set of observations is known as

a. data.

A b. a hypothesis.

c. an inference.

d. a result.

5 A good scientific hypothesis must be

a. correct.

A b. able to be tested.

c. obvious.

d. based on common sense.

END OF SECTION