Name _____ Date _____ Class _____

Scientific Inquiry

Key Concepts

- How do scientists investigate the natural world?
- What role do models, laws, and theories play in science?

Scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on evidence they gather. **The processes that scientists use in inquiry include posing questions, developing hypotheses, designing experiments, collecting and interpreting data, drawing conclusions, and communicating ideas and results.**

Scientific inquiry often begins with a problem or questions about an observation. A scientific question is one that can be answered by making observations and gathering evidence. A **hypothesis** is a possible explanation for a set of observations or answer to a scientific question. In science, a hypothesis must be testable.

Any factor that can change in an experiment is called a **variable.** The variable that is purposely changed to test a hypothesis is called the **manipulated variable** (or independent variable). The factor that may change in response to the manipulated variable is called the **responding variable** (or dependent variable). All other variables should be held constant. An experiment in which only one variable is manipulated at a time is called a **controlled experiment.**

A controlled experiment produces data. **Data** are facts, figures, and other evidence gathered through observations. A data table provides an organized way to collect and record observations. One useful tool in interpreting data is a graph. Graphs can reveal trends or patterns in the data. After gathering and interpreting data, a scientist draws conclusions about the hypothesis.

An important part of the scientific inquiry process is communicating the results. **Communicating** is the sharing of ideas and experimental findings with others through writing and speaking.

Scientists use models and develop laws and theories to increase people's understanding of the natural world. A **scientific law** is a statement that describes what scientists expect to happen every time under a particular set of conditions. A scientific law describes an observed pattern in nature without attempting to explain it. Sometimes, a large set of related observations can be connected by a single explanation. A **scientific theory** is a well-tested explanation for a wide range of observations or experimental results.

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Scientific Inquiry

Understanding Main Ideas

1. Why is it important to control variables in an experiment?

_____

_____

2. When you begin an experiment, why should you create a table to record your data?

_____

_____

Building Vocabulary

Fill in the blank to complete each statement.

3. A(n) _____ is a possible explanation for a set of observations or answer to a scientific question.
4. Factors that can change in an experiment are called _____.
5. A _____ is a statement that describes what scientists expect to happen every time under a particular set of conditions.
6. Facts, figures, and other evidence gathered through observations are called _____.
7. The factor that may change in response to the manipulated variable is called the _____.
8. An experiment in which only one variable is manipulated at a time is called a(n) _____ experiment.
9. A _____ is a well-tested explanation for a wide range of observations or experimental results.
10. The one variable that is purposely changed to test a hypothesis is called the _____.

Match the term with its definition.

____	11. responding variable	a. the one variable that is purposely changed to test a hypothesis
____	12. manipulated variable	b. a factor that can change in an experiment
____	13. controlled experiment	c. the factor that may change in response to the manipulated variable
____	14. variable	d. an experiment in which only one variable is manipulated at a time

15. Is the following sentence true or false? If you do not control variables in an experiment, there will be no way to know which variable explains your results. _____

16. Scientists generally use a system of measurement called _____ to share quantitative data.

17. Circle the letter of each sentence that is true about graphs.
    a. A graph can reveal a trend in data.
    b. Graphs help scientists interpret data.
    c. Graphs are the only way to organize data.
    d. A graph can reveal a pattern in data.

18. A(n) _____ is a summary of what you have learned from an experiment.