Hypothesis or Theory?

TEACHER NOTES AND ANSWERS

Teaching Tips
Draw a Venn diagram on the board to compare and contrast hypotheses and theories. Work with students to fill in the information to complete the organizer. *(Hypothesis: can be stated before research is conducted; can begin as an opinion or even a guess; tries to predict the specific results of research or an experiment. Theory: is developed from the results of research; is accepted because it has been tested many times by different groups; provides a general explanation for how and why things happen the way they do. Both: are tools used by scientists.)*

Answers
1. hypothesis
2. theory
3. hypothesis
4. theory
5. Possible answer: If the force acting on an object is increased, then the acceleration of the object will increase.
6. Possible answer: A hypothesis is a testable statement that can be used as the basis for an experiment, while a theory is a broad explanation based on a large amount of data accumulated over a long period of time.
7. hypothesis
8. hypothesis
9. neither
10. theory
11. theory
12. theory
Worksheet: Hypothesis or Theory?

Read the text below and answer the questions that follow.

As scientists make observations and carry out investigations, they generate, analyze, and compare data. Their observations, analyses, and comparisons can lead to the formation of hypotheses and theories. Both hypotheses and theories are tools used by scientists, but they are very different from one another. How can you distinguish one from the other?

Hypotheses are testable statements that must be able to be supported or not supported by observational evidence. Scientists frequently write hypotheses as “if...then” statements. A hypothesis usually serves as a basis for a single experiment and, therefore, relates only to a limited amount of data. If a hypothesis is supported by the data, it may be considered correct, but only for that experiment. Many more experiments would have to be performed and much more data collected in support of the hypothesis before the hypothesis can be used to predict results of other experiments and explain observations.

Theories, on the other hand, are explanations that are based on vast amounts of data accumulated over long periods of time. Theories usually incorporate the observations, data, and explanations of many scientists. Theories are broad generalizations that can explain a body of information and observations and can accurately predict the results of many experiments. Although scientific theories are occasionally modified as the result of new scientific information, they have been repeatedly verified by many individuals, and are highly reliable explanations for natural phenomena. New scientific theories are introduced only occasionally, because they are based on such large amounts of information.

Complete each statement below, using the term hypothesis or theory.

1. A scientist observes that penguins move efficiently though water. The scientist makes a ____________ that if a boat is designed with a propulsion system that moves like a penguin, then the boat will be more efficient than traditional boats.

2. Scientists have developed a ____________ to explain the characteristics and behavior of light that is based on work performed by many scientists.

3. A student notices that sound travels quickly underwater. She develops a ____________ that sound will move more quickly through water than it moves through air.

4. Scientists use a ____________ to interpret the results of investigations about the structure and behavior of atoms.
Write short answers to the following questions.

5. A student places a toy car on a table, pushes the car, and measures the acceleration. The student then places the same car on the table, pushes with more force, and again measures the acceleration. Write one hypothesis on which this investigation might be based.

________________________________________________________________________

________________________________________________________________________

6. You read a newspaper editorial that uses the words *hypothesis* and *theory* interchangeably. What is one difference between the meanings of these terms that you could point out to the writer of the editorial?

________________________________________________________________________

________________________________________________________________________

For each description, circle the appropriate term.

7. often used as the basis for a single experiment

   hypothesis  theory  neither

8. often written as an “if…then” statement

   hypothesis  theory  neither

9. a guess about what will happen, not based on any previous observations or knowledge

   hypothesis  theory  neither

10. developed over a long period of time using the work of many scientists

    hypothesis  theory  neither

11. a broad explanation that applies to a wide range of results

    hypothesis  theory  neither

12. repeatedly verified by the work of many scientists

    hypothesis  theory  neither