

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 through 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