

Scientific investigation



In science, a theory is a reasonable explanation of observed events that are related. A theory often involves an imaginary model that helps scientists picture the way an observed event could be produced. A good example of this is found in the kinetic molecular theory, in which gases are pictured as being made up of many small particles that are in constant motion.

A useful theory, in addition to explaining past observation, helps to predict events that have not as yet been observed. After a theory has been publicized, scientists design experiments to test the theory. If observations confirm the scientists' predictions, the theory is supported. If observations do not confirm the predictions, the scientists must search further. There may be a fault in the experiment, or the theory may have to be revised or rejected.

Science involves imagination and creative thinking as well as collecting information and performing experiments. Facts by themselves are not science. As the mathematician Jules Henri Poincare said: "*Science is built with facts just as a house is built with bricks, but a collection of facts cannot be called science any more than a pile of bricks can be called a house.*"

Most scientists start an investigation by finding out what other scientists have learned about a particular problem. After known facts have been gathered, the scientist comes to the part of the investigation that requires considerable imagination. Possible solutions to the problem are formulated. These possible solutions are called hypotheses.

In a way, any hypothesis is a leap into the unknown. It extends the scientist's thinking beyond the known facts. The scientist plans experiments, performs calculations, and makes observations to test hypotheses. For without hypotheses, further investigation lacks purpose and direction. When hypotheses are confirmed, they are incorporated into theories.

1. Which of the following is the main subject of the passage?

- (A) The importance of models in scientific theories
- (B) The place of theory and hypothesis in scientific investigation
- (C) The sorts of facts that scientists find most interesting
- (D) The ways that scientists perform different types of experiments

2. The word "related" in line 1 is closest in meaning to

- (A) connected
- (B) described
- (C) completed
- (D) identified

3. The word “this” in line 3 refers to
(A) a good example (B) an imaginary model
(C) the kinetic molecular theory (D) an observed event
4. According to the second paragraph, a useful theory is one that helps scientists to
(A) find errors in past experiments (B) make predictions
(C) observe events (D) publicize new findings
5. The word “supported” in line 7 is closest in meaning to
(A) finished (B) adjusted
(C) investigated (D) upheld
6. Bricks are mentioned in lines 12-13 to indicate how
(A) mathematicians approach science (B) scientific experiments have led to improved technology
(C) science is more than a collection of facts (D) building a house is like performing experiments
7. In the fourth paragraph, the author implies that imagination is most important to scientists when they
(A) evaluate previous work on a problem (B) formulate possible solutions to a problem
(C) gather known facts (D) close an investigation
8. In line 18, the author refers to a hypothesis as “a leap into the unknown” in order to show that hypotheses
(A) are sometimes ill-conceived (B) can lead to dangerous results
(C) go beyond available facts (D) require effort to formulate
9. In the last paragraph, what does the author imply is a major function of hypotheses?
(A) Sifting through known facts
(B) Communicating a scientist’s thoughts to others
(C) Providing direction for scientific research
(D) Linking together different theories
10. Which of the following statements is supported by the passage?
(A) Theories are simply imaginary models of past events.
(B) It is better to revise a hypothesis than to reject it.
(C) A scientist’s most difficult task is testing hypotheses.
(D) A good scientist needs to be creative.