

Science Knowledge Study Guide

Physical Science Advanced

Provide a short response to the following prompts.

- Describe how scientific knowledge is affected by new evidence (if the new evidence does NOT support the current understanding).
Scientific knowledge grows and changes as new evidence is uncovered.
- What is scientific knowledge built from? (list 3 things)

<p>Continuous testing and observation</p> <p>Debate (argumentation)</p> <p>Confirmation (repetition & replication)</p>	}	All contribute to the EMPIRICAL EVIDENCE
---	---	---
- Why is it important that we use phrases such as “the results suggest...” or “the evidence supports...” rather than using words such as “prove” or “proof”?
Using words such as “prove” violate the tentative nature of science. They imply that scientific knowledge is concrete and unchanging. However, scientific knowledge must remain open to change.
- Under what circumstances will a scientific theory become a law? Explain.
A scientific theory will NEVER become a scientific law; it cannot, nor is it supposed to. A scientific theory and a scientific law are two different things with different purposes (an apple will never become an orange).
- Why are scientific theories rarely discarded (completely abandoned), even when new evidence doesn't fit within the current theory?
Scientific theories are rarely completely discarded because they are heavily-tested and well-supported explanations. It is rare that new evidence completely invalidates a theory; rather, it is more likely that the theory can be “tweaked” or changed slightly to accommodate the new evidence.
- What represents the BEST explanation that science can offer?
Scientific theories represent the best explanations science has to offer. Because they are heavily-tested and well-supported, and because they are able to be updated to fit new evidence, scientific theories are always our best attempt at an answer given what we currently know.
- Compare the purpose of a scientific theory to the purpose of a scientific law.
A scientific law's purpose is to describe a phenomenon that happens consistently under set conditions. A scientific theory's purpose is to explain the phenomenon, including why or how it happens.
- Why do scientists often rely on models?
Scientific models are great tools for scientists to help them communicate or study ideas, objects, or processes.
- Identify some limitations of scientific models.
Models can inadvertently lead to misconceptions because they cannot accurately represent every aspect of the thing they are modelling.
Models can introduce error due to the fact that they cannot account for every factor affecting the thing and are based on our assumptions about it.
- What are the characteristics of science? In what ways is science limited?
Science is limited to studying the NATURAL world.
Science is: Consistent – Observable – Natural – Predictable – Testable – Tentative (CONPTT)

Respond to each of the following statements by marking “T” if it is true or “F” if it is false. If it is False, find a way to rewrite the statement so that it is true.

11. F A scientific theory is an idea that has not yet been supported with enough evidence to become a law.
Scientific theories do not ever become scientific laws. Theories explain laws.
12. T Scientists often use models as a way to study and communicate complex ideas.
13. F The tentative nature of scientific knowledge is considered a weakness of science.
The tentative nature of science is a strength, it means our current explanation is always our best.
14. T Scientists prefer to use phrases such as “the results support...” rather than to say they have “proven” an explanation correct.
15. F Science can solve any problem or answer any question.
Science can only study the natural world. It must have the characteristics of CONPTT.
16. T Science can only provide tentative answers or explanations.
17. T If a hypothesis is tested and shown to be inaccurate, scientists view this as a success.
18. T Science is only concerned with understanding how the natural world works.
19. T If a scientific explanation is shown to be inaccurate, it may be modified (changed).
20. F A scientific law represents the best explanation science has to offer based on what we currently know.
A scientific theory represents the best explanation science has to offer.
21. F Scientific explanations are indisputable (not open for debate), so scientific knowledge rarely changes.
Scientific explanations are tentative, meaning they are open to change to fit new evidence.
22. F A scientific theory is an educated guess that a scientist has about a scientific explanation.
A scientific theory is a heavily-tested and well-supported explanation.
23. T Scientists use confirmation to increase the reliability of their evidence.
24. T Scientific knowledge is built from continuous testing, debate, and confirmation of scientific explanations.
25. F The law of gravity explains why objects always fall toward the center of the Earth.
***The law of gravity describes how objects always fall toward the center of the Earth.
The theory of gravity explains why objects fall toward the center of the Earth.***