

**Science Knowledge Study Guide**8<sup>th</sup> Grade**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)  

<b>Continuous testing and observation</b> <b>Debate (argumentation)</b> <b>Confirmation (repetition &amp; replication)</b>	}	<b>All contribute to the EMPIRICAL EVIDENCE</b>
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- 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.**
- Why do scientists often rely on models?  
**Scientific models are great tools for scientists to help them communicate or study ideas, objects, or processes.**
- What are the characteristics of science?  
**Science is: Consistent – Observable – Natural – Predictable – Testable – Tentative (CONPTT)**
- In what ways is science limited?  
**Science is limited to studying the NATURAL world; offering natural explanations for natural phenomena.**
- Compare “science” to “pseudoscience”.  
**While scientific disciplines exhibit all of the characteristics of CONPTT, pseudosciences often exhibit some but not all of them. Pseudoscience often claims to be scientific or to use scientific methods, but fails to meet the standard of science (often failing to be natural, testable, or predictable).**

**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. F Astrology (using the alignment of stars and planets to predict personal fortune) is a type of science.  
**Astrology is a pseudoscience, which uses scientific data to reach non-scientific conclusions. It is not testable.**
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 Science is always the best tool to use when learning about our world.  
**Science is one of the tools we use to learn about our world. However, science is limited to the natural world; there are some jobs which science is not suited for, such as faith, artistic expression, or philosophy.**