

1-PS4-2 Waves and Their Applications in Technologies for Information Transfer

Students who demonstrate understanding can:

- 1-PS4-2. Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.** [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Constructing Explanations and Designing Solutions</p> <p>Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. 	<p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> Objects can be seen if light is available to illuminate them or if they give off their own light. 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Observable features of the student performance by the end of the grade:	
1	Articulating the explanation of phenomena
a	Students articulate a statement that relates the given phenomenon to a scientific idea, including that when an object in the dark is lit (e.g., turning on a light in the dark space or from light the object itself gives off), it can be seen.
b	Students use evidence and reasoning to construct an evidence-based account of the phenomenon.
2	Evidence
a	Students make observations (firsthand or from media) to serve as the basis for evidence, including: <ol style="list-style-type: none"> i. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with no light. ii. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with light. iii. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects (e.g., light bulbs, glow sticks) that give off light in a space with no other light.
b	Students describe* how their observations provide evidence to support their explanation.
3	Reasoning
a	Students logically connect the evidence to support the evidence-based account of the phenomenon. Students describe* lines of reasoning that include: <ol style="list-style-type: none"> i. The presence of light in a space causes objects to be able to be seen in that space. ii. Objects cannot be seen if there is no light to illuminate them, but the same object in the same space can be seen if a light source is introduced. iii. The ability of an object to give off its own light causes the object to be seen in a space where there is no other light.