

## 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

#### Constructing Explanations and Designing Solutions

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.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

### Disciplinary Core Ideas

#### PS4.B: Electromagnetic Radiation

- Objects can be seen if light is available to illuminate them or if they give off their own light.

### Crosscutting Concepts

#### Cause and Effect

- 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"> <li>The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with no light.</li> <li>The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with light.</li> <li>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.</li> </ol>
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"> <li>The presence of light in a space causes objects to be able to be seen in that space.</li> <li>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.</li> <li>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.</li> </ol>