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

Students who demonstrate understanding can:

**MS-PS4-2.** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]

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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

**Developing and Using Models**

Modeling in 6–8 builds on K–5 and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop and use a model to describe phenomena.

### Disciplinary Core Ideas

**PS4.A: Wave Properties**

- A sound wave needs a medium through which it is transmitted.

**PS4.B: Electromagnetic Radiation**

- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object’s material and the frequency (color) of the light.
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends.
- A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media.
- However, because light can travel through space, it cannot be a matter wave, like sound or water waves.

### Crosscutting Concepts

**Structure and Function**

- Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.