

Performance Task

21.3 The Dual Nature of Light 28.

Our scientific understanding of light has changed over time. There is evidence to support the wave model of light, just as there is evidence to support the particle model of light.

1. Construct a demonstration that supports the wave model of light. Note—One possible method is to use a piece of aluminum foil, razor blade, and laser to demonstrate wave interference. Can you arrange these materials to create an effective demonstration? In writing, explain how evidence from your demonstration supports the wave model of light.
2. Construct a demonstration that supports the particle model of light. Note—One possible method is to use a negatively charged electroscope, zinc plate, and three light sources of different frequencies. A red laser, a desk lamp, and ultraviolet lamp are typically used. Can you arrange these materials to demonstrate the photoelectric effect? In writing, explain how evidence from your demonstration supports the particle model of light.

Teacher Support

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- Performance Task addresses NGSS HS-PS4-3—Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.
1. Demonstrations chosen will vary. However, the demonstration should show interference or diffraction of light using the wave model. The method suggested implies that the student should use the razor blade to cut two parallel slits within the aluminum foil. If the slit spacing is appropriate, and the slits are parallel, an interference pattern will be created when a laser light is made to shine through the aluminum foil. This demonstration works best in a completely dark room with a flat surface less than one meter behind the foil. A pie tin may be used in place of the foil to help create the parallel lines.
 2. Demonstrations chosen may vary, though it is likely easier for students to draw a picture for the particle model. The method suggested implies that the student should charge a zinc plate negatively and attach it to the top of the electroscope. The gold leaf of the electroscope should not fall when struck with the light from the red laser or desk lamp; however, it should fall when the UV light is incident. A coulomb meter may be used in place of the electroscope and zinc plate. More information can be found here.