

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Answer Key: Making Waves: A Light and Sound Adventure for 4th Grade

Students gain a detective's eye for energy by analyzing how vibrations become music and how shadows reveal the secrets of light.

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**1. Imagine you are watching a parade from a distance. You see the drummer hit the drum, but you don't hear the 'boom' until a second later. Why does this happen?**

**Answer:** A) Light waves travel much faster than sound waves.

Light energy travels at incredible speeds, while sound energy moves relatively slowly through the air, causing a delay between what we see and what we hear.

**2. Sound waves can travel through solid objects, like a wooden door, as well as through the air.**

**Answer:** A) True

Sound is a mechanical wave that requires a medium. It actually travels faster and more clearly through solids like wood or metal than through air!

**3. An object that allows some light to pass through but blurs the images, like a frosted bathroom window, is called \_\_\_\_\_.**

**Answer:** C) Translucent

Translucent materials scatter light as it passes through, which is why you can see light but not clear shapes.

**4. When you look into a calm lake and see the trees on the shore upside down in the water, which light behavior are you observing?**

**Answer:** B) Reflection

Reflection occurs when light waves bounce off a smooth surface, like a mirror or still water, back to your eyes.

**5. If you go into outer space where there is no air, you would still be able to hear a loud explosion nearby.**

**Answer:** B) False

Sound is a mechanical wave that needs a medium (like air, water, or solid) to travel. In the vacuum of space, there are no particles to vibrate, so it is silent.

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**6. A student blows across the top of a half-full glass bottle. To make the \_\_\_\_\_ higher, the student should add more water to shorten the air space.**

**Answer:** C) Pitch

Pitch is how high or low a sound is. Shorter columns of air vibrate faster, creating a higher frequency and a higher pitch.

**7. Which of these happens when a straw looks 'broken' or bent inside a glass of water?**

**Answer:** C) The light waves slow down and bend (refraction).

Refraction is the bending of light as it moves from one medium (air) into another (water) at a different speed.

**8. The height of a wave determines how much energy it has. In sound, we call this the \_\_\_\_\_, which makes the sound louder.**

**Answer:** D) Amplitude

Amplitude measures the height of a wave from its resting point. Higher amplitude means more energy, which results in a louder volume for sound or brighter light.

**9. When you wear a black t-shirt outside, it feels hotter because the black fabric absorbs most of the light energy from the sun.**

**Answer:** A) True

Dark colors absorb more light waves and turn that energy into heat, while light colors reflect more light energy away.

**10. Which of the following is caused by a sound wave reflecting off a distant surface and returning to your ears?**

**Answer:** C) An echo

An echo is a sound reflection. When sound waves hit a hard, flat surface far away, they bounce back, and you hear the sound repeated.