Waves at Work

Trace how sound and light carry energy

P.8.6.1 "Interpret the characteristics and behaviors of sound and light waves to determine the relationship between matter and energy; determine the medium for transmission for each wave"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentence that explains how sound energy moves through air, and circle the sentence that shows light crossing a vacuum. Number two places where a wave transfers energy to matter.

A Tap and a Beam

1. At a science museum, a guide taps a metal rail beside a large aquarium. The rail vibrates, making nearby air vibrate too. Those moving air particles pass energy to other air particles, so visitors hear a ping. The sound needs matter to travel, whether that matter is a solid, liquid, or gas. A visitor who presses an ear against the rail hears the tap through the metal as well. In the empty space between planets, there are no particles to carry such sound.

2. Next, the guide shines a flashlight through the aquarium's glass and water. The light crosses both materials and reaches a pale stone inside. Some light reflects from the stone into visitors' eyes, letting them see it. The stone absorbs some light energy, which can slightly warm it. Light can travel through matter, but it does not require matter as sound does. Sunlight reaches Earth across the nearly empty space between the Sun and Earth, carrying energy through a vacuum.

3. The guide angles the flashlight toward the water's surface, and its beam changes direction as it enters the water. Light changes speed when it passes from air into water, which causes this bending. The guide then taps a spoon underwater. A student with an ear close to the tank hears a faint sound because some sound energy passes from water through glass and into air. At each boundary, some sound energy may reflect instead. Both waves transfer energy, but only sound must travel by vibrations of matter.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why can visitors hear the rail's ping through air but not across empty space?

2. What does sunlight's trip to Earth show about light's need for a material medium? Name two materials the flashlight's light passes through at the aquarium.

3. How do reflection and absorption at the stone affect what visitors see and what happens to the stone?

4. Trace the materials that carry sound from the underwater spoon to the student's ear. Why are these materials needed?

3 YOUR TURN

Your own words

Two spacecraft drift apart in space with no physical connection. A lamp flashes inside the first craft, and a bell rings there. In three sentences, predict what a person in the second craft can see and hear through its window, explain what each wave needs to travel between the crafts, and describe one way the light transfers energy to matter.

ANSWER KEY

Waves at Work

GRADE 8 · P.8.6.1

PART 1 · READ AND MARK

Underline the sentence that explains how sound energy moves through air, and circle the sentence that shows light crossing a vacuum. Number two places where a wave transfers energy to matter. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why can visitors hear the rail's ping through air but not across empty space?	**Vibrating air particles carry the sound energy to visitors. Empty space has no particles to carry the sound.**
2	What does sunlight's trip to Earth show about light's need for a material medium? Name two materials the flashlight's light passes through at the aquarium.	**Light does not need a material medium because it can cross a vacuum. At the aquarium, it passes through glass and water.**
3	How do reflection and absorption at the stone affect what visitors see and what happens to the stone?	**Reflected light reaches visitors' eyes so they can see the stone. The stone absorbs some light energy, which can slightly warm it.**
4	Trace the materials that carry sound from the underwater spoon to the student's ear. Why are these materials needed?	**Sound travels through water, glass, and air. It needs matter whose particles can vibrate and pass along energy.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The person can see the flashing lamp through the window but cannot hear the bell. Light can cross the vacuum between the crafts, but sound needs matter to carry vibrations and cannot cross that vacuum. The person's eyes absorb some light energy, allowing the flash to be seen.

Accept other accurate examples of light energy being absorbed by matter in Part 3. The response should distinguish light's ability to cross a vacuum from sound's need for a material medium.