# Waves Without Air

Use observations to compare light and sound waves.

**S8P4** "Obtain, evaluate, and communicate information to support the claim that electromagnetic (light) waves behave differently than mechanical (sound) waves."

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Circle the claim in the passage. Underline two observations that support it, and number two details that make the comparison a fair test.

### A Test in a Vacuum Chamber

1. During a museum demonstration, a lamp and an electric bell are placed inside a clear vacuum chamber. Before air is removed, visitors see the lamp shine and hear the bell ring. A pump then removes most of the air. The lamp remains visible through the chamber wall, but the bell can no longer be heard outside. This observation supports a claim: light can travel through empty space, while sound needs matter, such as air, to carry its vibrations.

2. The two waves are produced in different ways. A changing electric and magnetic field carries light energy, so light from the Sun crosses the nearly empty space between the Sun and Earth. Sound begins when an object vibrates and makes nearby particles vibrate. Each particle pushes the next, carrying sound through air, water, or solids. In space, where particles are extremely scarce, ordinary sound cannot travel from one astronaut to another without equipment that changes sound into radio waves.

3. Scientists evaluate this evidence by checking whether the test compares only one important condition. In the chamber demonstration, the bell and lamp both had electrical power before and after air was removed. The clear wall also allowed light to reach the observers. These details make the comparison stronger. A careful communicator states the claim, gives the observation as evidence, and explains the link: removing air stopped sound from reaching listeners, but it did not stop light from reaching their eyes.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. What claim does the vacuum chamber observation support?

2. Which observation from the chamber is evidence that light traveled after most of the air was removed?

3. Why does keeping electrical power on for both the bell and lamp make the comparison stronger?

4. Explain how the example of astronauts in space supports the claim that sound and light behave differently.

## 3 YOUR TURN

Your own words

Write a four-sentence explanation for a museum sign about the vacuum chamber test. State the claim, use an observation as evidence, explain how the evidence supports the claim, and name one detail that made the test fair.

**ANSWER KEY**

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**GRADE 8 · S8P4**

## PART 1 · READ AND MARK

Circle the claim in the passage. Underline two observations that support it, and number two details that make the comparison a fair test. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | What claim does the vacuum chamber observation support? | **Light can travel through empty space, while sound needs matter, such as air, to carry its vibrations.** |
| 2 | Which observation from the chamber is evidence that light traveled after most of the air was removed? | **The lamp remained visible through the chamber wall after most of the air was removed.** |
| 3 | Why does keeping electrical power on for both the bell and lamp make the comparison stronger? | **It shows that the change in what observers heard or saw was connected to removing air, not to turning off either device.** |
| 4 | Explain how the example of astronauts in space supports the claim that sound and light behave differently. | **Light can cross the nearly empty space between the Sun and Earth, but ordinary sound cannot travel between astronauts because there are too few particles to carry vibrations.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

Light and sound waves behave differently because light can travel through empty space, while sound needs matter. In the vacuum chamber, the lamp stayed visible after most air was removed, but the bell could not be heard. This shows that removing air blocked sound from reaching listeners but did not block light from reaching their eyes. Keeping electrical power on for both devices made the comparison fair.

Accept equivalent wording that distinguishes electromagnetic light from mechanical sound and uses accurate passage evidence. For the open response, require a claim, a relevant observation, a logical explanation, and one valid fair-test detail.