

Waves on the Move

Compare how materials and conditions affect wave speed.

SC.7.P.10.3 "Recognize that light waves, sound waves, and other waves move at different speeds in different materials."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that tells how a wave's speed changes. In the margin, write L for light, S for sound, or O for another wave beside each sentence you underline.

Speed Depends on the Path

- ① At a science museum, a laser beam travels through air, then enters a glass block. The light keeps moving forward, but it slows a little in glass because the material interacts with the light wave. Light travels fastest in empty space, called a vacuum. It also moves at different speeds in water, air, and glass. When light changes speed as it enters a new material, its path can bend. This bending helps lenses focus light.
- ② Sound does not travel through a vacuum because it needs particles to pass along its vibration. In air, sound waves make gas particles bump nearby particles. In water or a solid, the particles are closer together, so sound often travels faster than it does in air. A worker can hear an approaching train by placing an ear near a steel rail, because sound moves quickly through the steel. The exact speed also changes with a material's temperature and condition.
- ③ Other waves also depend on their materials and conditions. A pulse sent along a tight rope moves faster than a pulse on the same rope when it is loose. Greater tension lets the disturbance travel more quickly. Water waves change speed when the water becomes shallower or deeper. A wave moving from deep water into shallow water slows, and its direction may change. In each case, the wave source can stay the same, but a change in material or condition changes the wave's speed.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Why does light slow a little when it enters a glass block?

2 According to the passage, how does sound speed in water or a solid compare with sound speed in air?

3 How does tightening a rope affect the speed of a pulse traveling along it?

4 What happens to a water wave moving from deep water into shallow water?

3 YOUR TURN _____ Your own words

Plan a fair test that compares the speed of one kind of wave in two different materials or conditions. Write three sentences that name the wave, explain what you would change and keep the same, and state a prediction about which wave speed would be greater.

PART 1 • READ AND MARK

Underline each sentence that tells how a wave's speed changes. In the margin, write L for light, S for sound, or O for another wave beside each sentence you underline. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Why does light slow a little when it enters a glass block?	The glass material interacts with the light wave.
2	According to the passage, how does sound speed in water or a solid compare with sound speed in air?	Sound often travels faster in water or a solid than in air.
3	How does tightening a rope affect the speed of a pulse traveling along it?	A pulse travels faster on a tight rope because greater tension lets the disturbance travel more quickly.
4	What happens to a water wave moving from deep water into shallow water?	It slows, and its direction may change.

PART 3 • YOUR TURN (SAMPLE ANSWER)

I would compare the speed of sound through equal-length tubes filled with air and water. I would use the same sound source and place a sensor at the same distance in each tube. I predict that sound will travel faster through the water than through the air.

Accept equivalent explanations that correctly compare wave speeds using information from the passage. For the open response, accept any feasible fair test with one changed material or condition, controlled factors, and a scientifically supported prediction.