

Energy on the Move

Trace how mechanical waves transfer energy through matter.

PS.6.b "mechanical waves need a medium to transfer energy;"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that identifies a medium. Circle the words that tell how energy moves through that material, so you can distinguish moving energy from moving matter.

What Carries a Mechanical Wave?

- ① At a football game, a drumbeat can travel from the band to your ears because it moves through air. The drumhead pushes nearby air particles. Those particles push their neighbors, passing energy outward in a pattern called a sound wave. The air particles do not ride all the way from the drum to your ear. Instead, each particle moves back and forth near its starting place while the energy travels. Air is the medium, the material that carries the wave's energy.
- ② A wave can also move through water. When a pebble lands in a pond, it transfers energy to nearby water. Ripples spread as water particles move mostly up and down, then pass energy to other particles. A rope carries a wave when one person shakes it and the rope's sections pull on nearby sections. In both cases, water or rope is the medium. The energy can travel across the material even though the material itself does not travel across the pond or rope.
- ③ Mechanical waves cannot cross empty space because a vacuum has no particles or other material to pass along their energy. Astronauts can speak to one another by radio, but they cannot hear unprotected voices through the vacuum outside a spacecraft. Radio waves are electromagnetic waves, so they do not need a medium. Voices and drumbeats are mechanical sound waves, so they do. Inside the spacecraft, sound can travel through air, walls, or other materials because those materials provide particles that can interact.

2 ANSWER WITH EVIDENCE Use the passage

1 What is the medium for the drumbeat, and what do the air particles do to transfer energy?

2 Compare the pond ripple and the rope wave. Name the medium in each example and describe how energy moves through it.

3 Why can a mechanical wave not travel through an empty vacuum?

4 Why can astronauts communicate by radio through space but not hear unprotected voices through the vacuum?

3 YOUR TURN Your own words

Choose a mechanical wave not described in the passage. In exactly 3 sentences, explain what provides the medium, how the material passes energy along, and why the wave could not continue across an empty region of vacuum.

PART 1 • READ AND MARK

Underline each sentence that identifies a medium. Circle the words that tell how energy moves through that material, so you can distinguish moving energy from moving matter. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What is the medium for the drumbeat, and what do the air particles do to transfer energy?	Air is the medium. Air particles push nearby particles while moving back and forth near their starting places.
2	Compare the pond ripple and the rope wave. Name the medium in each example and describe how energy moves through it.	Water is the medium for the ripple, and rope is the medium for the rope wave. Water particles or rope sections move and pass energy to nearby particles or sections.
3	Why can a mechanical wave not travel through an empty vacuum?	A vacuum has no particles or other material to pass the mechanical wave's energy along.
4	Why can astronauts communicate by radio through space but not hear unprotected voices through the vacuum?	Radio waves are electromagnetic waves and do not need a medium. Voices are mechanical sound waves and need a material medium to transfer energy.

PART 3 • YOUR TURN (SAMPLE ANSWER)

I flick one end of a slinky stretched across a table. The slinky's coils push and pull nearby coils, passing energy along the metal while each coil moves near its place. If the wave left the slinky and entered an empty vacuum, it could not continue because no material would pass its energy onward.

Accept any accurate mechanical-wave example that clearly names a material medium and explains energy passing between nearby parts of that material. The vacuum explanation must state that an empty vacuum lacks material or particles to transfer mechanical-wave energy.