

Energy on the Move

Track stored energy, transformations, and wave motion.

6.8 "Force, motion, and energy. The student knows that the total energy in systems is conserved through energy transfers and transformations. The student is expected to: compare and contrast gravitational, elastic..."

NAME _____ DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each sentence that describes an energy transfer or transformation, circle each type of potential energy, and label the two wave types 1 and 2.

A Coaster, a Rope, and Sound

- ① At the top of a roller coaster hill, the car and Earth have gravitational potential energy because they are separated by height. As the car rolls down, that stored energy changes mostly into kinetic energy, the energy of motion. A stretched rubber band stores elastic potential energy because its shape is changed. Food and battery chemicals store chemical potential energy in their bonds. Each type of potential energy is stored energy, but kinetic energy depends on an object's motion.
- ② Energy is not created or destroyed in a closed system, although it can move between objects or change form. In a coaster ride, an electric motor transfers energy to a chain that lifts the car. Electrical energy changes to kinetic energy in the motor and chain, then to gravitational potential energy as the car rises. On the way down, gravitational potential energy changes to kinetic energy. Friction transfers some energy to the track and air as thermal energy and sound, so the car does not return to its first height.
- ③ Energy can also travel as waves. In a transverse wave, such as a wave sent along a rope, the material moves up and down while the wave travels forward. The material's motion is perpendicular to the wave's direction. In a longitudinal wave, such as sound moving through air, air particles push together and spread apart in the same direction the wave travels. Their back-and-forth motion is parallel to that direction. Waves transfer energy from place to place, but the particles usually remain near their starting positions.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What shared feature makes gravitational, elastic, and chemical energy potential energy? How is kinetic energy different?

2 Trace the energy changes from the electric motor lifting the coaster car until the car rolls down the hill.

3 Why does the coaster car not return to its first height? Explain how this still follows energy conservation.

4 Compare the motion of material in a transverse wave and a longitudinal wave.

3 YOUR TURN _____ Your own words

Choose either a battery-powered speaker or a plucked guitar string. Make a three-panel sketch that shows stored energy, moving parts, and a wave. Label at least four energy forms or transfers, identify the wave as transverse or longitudinal, and show one energy transfer to the surroundings.

		
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PART 1 • READ AND MARK

Underline each sentence that describes an energy transfer or transformation, circle each type of potential energy, and label the two wave types 1 and 2. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What shared feature makes gravitational, elastic, and chemical energy potential energy? How is kinetic energy different?	All three are stored energy. Kinetic energy is the energy of an object's motion.
2	Trace the energy changes from the electric motor lifting the coaster car until the car rolls down the hill.	Electrical energy changes to kinetic energy in the motor and chain, then to gravitational potential energy as the car rises. Gravitational potential energy changes to kinetic energy as the car rolls down.
3	Why does the coaster car not return to its first height? Explain how this still follows energy conservation.	Friction transfers some energy to the track and air as thermal energy and sound. Energy is still conserved because it changed form or moved to other parts of the system.
4	Compare the motion of material in a transverse wave and a longitudinal wave.	In a transverse wave, material moves perpendicular to the wave's direction. In a longitudinal wave, material moves parallel to the wave's direction as it compresses and spreads apart.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: A battery stores chemical potential energy, which changes to electrical energy. Panel 2: Electrical energy transfers to the speaker cone and becomes kinetic energy as the cone vibrates. Panel 3: The vibrating cone transfers energy to air as a longitudinal sound wave. Some energy also transfers to the surroundings as thermal energy.

Accept equivalent descriptions of stored potential energy, kinetic energy, energy transfers, and transformations. For the open task, accept either system if the labels show a reasonable energy pathway, identify the wave type correctly, and include energy transferred to surroundings.