

Energy in Action

Trace stored and moving energy through a skate park test.

6.8.A "compare and contrast gravitational, elastic, and chemical potential energies with kinetic energy;"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each phrase that tells what stores a potential energy. Circle every mention of kinetic energy, then label it M for motion or C for a change to or from another energy form.

Maya Tests Energy

- ① At the skate park, Maya rolls her board up a ramp. A moving object has kinetic energy, the energy of motion. As Maya and her board climb, they slow down, so their kinetic energy decreases. At the same time, their gravitational potential energy increases because they are higher above the ground. This stored energy comes from the positions of Maya and the board in Earth's gravitational field. At the top, the board may stop for a moment. It then has little or no kinetic energy but still has gravitational potential energy.
- ② Later, Maya pulls back a rubber band launcher and holds it still. The stretched band has elastic potential energy because its shape has changed. When she releases it, the band pushes a small cart forward. Its elastic potential energy decreases while the cart's kinetic energy increases. A battery-powered cart can also gain kinetic energy. Chemical potential energy is stored in substances, such as battery materials and food. When chemical reactions occur, some stored chemical energy can transfer to other forms, including motion. Elastic energy depends on a changed shape, while chemical energy depends on substances.
- ③ Energy changes during an activity, but it is not created from nothing. When Maya's board rolls down the ramp, gravitational potential energy can become kinetic energy as the board speeds up. When the moving cart hits a cushion, some kinetic energy can become elastic potential energy as the cushion compresses. In real situations, friction and air resistance transfer some energy to the surroundings, often as thermal energy or sound. Comparing the forms means identifying whether energy is stored by height, changed shape, or substances, or whether it belongs to an object in motion.

2 ANSWER WITH EVIDENCE Use the passage

1 As Maya rides her board up the ramp, how does her kinetic energy compare with her gravitational potential energy?

2 When Maya releases the stretched rubber band, what happens to its elastic potential energy and to the cart's kinetic energy?

3 How can the battery-powered cart gain kinetic energy, and how is chemical potential energy different from kinetic energy?

4 What do gravitational, elastic, and chemical potential energy have in common? What makes each type different?

3 YOUR TURN Your own words

Design a toy launcher that uses a battery-powered motor to lift a ball and a spring to launch it. Fill in the table with one example of each energy form in your design and explain what stores the energy or shows that it is kinetic.

ENERGY FORM	EXAMPLE IN THE TOY LAUNCHER	WHAT STORES IT OR SHOWS IT

PART 1 • READ AND MARK

Underline each phrase that tells what stores a potential energy. Circle every mention of kinetic energy, then label it M for motion or C for a change to or from another energy form. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	As Maya rides her board up the ramp, how does her kinetic energy compare with her gravitational potential energy?	Her kinetic energy decreases as she slows down, while her gravitational potential energy increases as she gets higher.
2	When Maya releases the stretched rubber band, what happens to its elastic potential energy and to the cart's kinetic energy?	The rubber band's elastic potential energy decreases, and the cart's kinetic energy increases as the cart moves forward.
3	How can the battery-powered cart gain kinetic energy, and how is chemical potential energy different from kinetic energy?	A chemical reaction can transfer stored chemical energy to motion, so the cart gains kinetic energy. Chemical potential energy is stored in substances, while kinetic energy is energy of motion.
4	What do gravitational, elastic, and chemical potential energy have in common? What makes each type different?	All three are stored potential energy. Gravitational potential energy depends on height, elastic potential energy depends on a changed shape, and chemical potential energy depends on substances.

PART 3 • YOUR TURN (SAMPLE ANSWER)

ENERGY FORM	EXAMPLE IN THE TOY LAUNCHER	WHAT STORES IT OR SHOWS IT
Gravitational potential energy	Ball held high above the floor	The ball's height in Earth's gravitational field stores energy.
Elastic potential energy	Compressed spring	The spring's changed shape stores energy.
Chemical potential energy	Battery	Battery materials store energy for a chemical reaction.
Kinetic energy	Ball moving after the spring releases	The moving ball has energy of motion.

Accept scientifically accurate descriptions that distinguish stored energy from energy of motion. For the table, students may use a different toy design if it includes all four energy forms and correctly identifies why each form has energy.