Cart Energy Clues

Use changes in motion to trace energy transfers.

MS-PS3-5 "Engage in argument from evidence to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (SEP: 7; DCI: PS3.B; CCC: Energy/Matter)"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each change in the cart's speed, and circle what another object does when energy transfers to or from the cart.

A Push, a Bumper, and a Bounce

1. At a school science fair, Mina tests a small cart on a level track. She first gives the cart a push with her hand. The cart goes from rest to rolling forward. Its kinetic energy, the energy of motion, increases as it speeds up. Mina argues that energy did not appear from nowhere: while her hand pushes the cart, energy transfers from her body to the cart. The push and the change in speed are evidence for her claim.

2. Next, the cart reaches a spring bumper fixed at the end of the track. The cart pushes into the spring, which becomes shorter, and the cart slows until it stops for an instant. Because the cart's kinetic energy drops, energy must leave the cart. The spring's compression shows that it receives and stores some of that energy. A little energy also spreads to the surroundings as sound and warming. The cart and the bumper are different objects, so energy stored in the bumper has moved out of the cart.

3. Then the compressed spring expands and sends the cart rolling backward. The cart's speed rises from zero, so its kinetic energy rises again. The spring becomes longer as it releases stored energy to the cart. Mina points to both changes as evidence: a faster cart and a spring that is no longer as compressed. The cart does not get back all the energy it gave up during the crash, because some energy went to the surroundings. For each change in the cart's motion, Mina names a source or receiver of energy.

2 ANSWER WITH EVIDENCE

Use the passage

1. What evidence supports the claim that energy transfers to the cart during Mina's push?

2. The cart slows as it pushes into the bumper. What evidence shows where some of the cart's energy goes?

3. When the cart rolls backward, what evidence supports the claim that energy transfers from the spring to the cart?

4. A visitor says the cart's energy vanished when it stopped for an instant. Use evidence from the passage to challenge that claim.

3 YOUR TURN

Your own words

Invent a scene with a moving object other than a cart that speeds up or slows down. In three or four sentences, state how its kinetic energy changes, name an object that gives or receives energy, and cite two observable details that support your claim.

ANSWER KEY

Cart Energy Clues

GRADES 6-8 · MS-PS3-5

PART 1 · READ AND MARK

Underline each change in the cart's speed, and circle what another object does when energy transfers to or from the cart. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What evidence supports the claim that energy transfers to the cart during Mina's push?	**Mina's hand pushes the cart, and the cart speeds up from rest. Its kinetic energy increases as energy transfers from Mina to the cart.**
2	The cart slows as it pushes into the bumper. What evidence shows where some of the cart's energy goes?	**The spring becomes shorter as the cart slows. Its compression shows that the bumper receives and stores some energy from the cart.**
3	When the cart rolls backward, what evidence supports the claim that energy transfers from the spring to the cart?	**The spring expands while the cart speeds up from rest. The spring releases stored energy, and the cart's kinetic energy increases.**
4	A visitor says the cart's energy vanished when it stopped for an instant. Use evidence from the passage to challenge that claim.	**The spring compressed as the cart slowed, showing that it received and stored some of the cart's energy. Some energy also went to the surroundings as sound and warming.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A soccer ball slows as it hits a goal net, so its kinetic energy decreases. The net receives energy from the ball. The ball's lower speed and the net stretching backward support my claim.

Accept arguments that connect a change in kinetic energy to energy transferred to or from a named object. Evidence should include the change in motion and a relevant action or change in the other object.