LESSON MAKER PRO

Collision Energy Clues

Use speed changes to predict energy changes.

GRADE 4 · 4-PS3-3

4-PS3-3 "Ask questions and predict outcomes about the changes in energy that occur when objects collide. Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact..."

NAME _____ DATE _____

SPEED TELLS A STORY

Compare an object's speed just before and just after a collision. If it is faster, its motion energy increases. If it is slower, its motion energy decreases. If its speed stays the same, its motion energy stays the same.

WORKED EXAMPLE

A toy cart travels at speed 12. After hitting a block, it travels at speed 6. What happens to its motion energy?

1. Before the collision, the speed is 12.
2. After the collision, the speed is 6.
3. 6 is slower than 12, so the motion energy decreases.

Answer: The cart's motion energy decreased.

PRACTICE 5 problems

1 A marble rolls at speed 9, then rolls at speed 3 after a collision. What happens to its motion energy?

ANSWER _____

2 A ball moves at speed 2, then speed 8 after a collision. What happens to its motion energy?

ANSWER _____

3 A cart moves at speed 5 before and after a collision. What happens to its motion energy?

ANSWER _____

4 A red cart slows from speed 10 to speed 4. A blue cart speeds up from 0 to speed 7. What happens to each cart's motion energy?

ANSWER _____

5 A scooter slows from speed 7 to 0 after hitting a foam barrier. Write one question about its energy change, then answer it.

ANSWER _____

APPLY IT Show your work

1 During soccer, a rolling ball bumps a bench and then moves more slowly. Predict what happens to the ball's motion energy.

WORK SPACE

ANSWER _____

2 At robotics club, a moving robot car bumps a still robot car. The first car slows, and the second car starts moving. Predict the energy change for each car.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Two toy balls collide. Ball A slows from speed 3 to speed 1. Ball B speeds up from 0 to speed 2. A student says both balls had the same energy change. Is the student supported by the speed clues? Explain.

_____

_____

ANSWER KEY

Collision Energy Clues

GRADE 4 · 4-PS3-3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A marble rolls at speed 9, then rolls at speed 3 after a collision. What happens to its motion energy?	**Its motion energy decreases.**
2	A ball moves at speed 2, then speed 8 after a collision. What happens to its motion energy?	**Its motion energy increases.**
3	A cart moves at speed 5 before and after a collision. What happens to its motion energy?	**Its motion energy stays the same.**
4	A red cart slows from speed 10 to speed 4. A blue cart speeds up from 0 to speed 7. What happens to each cart's motion energy?	**The red cart's motion energy decreases. The blue cart's motion energy increases.**
5	A scooter slows from speed 7 to 0 after hitting a foam barrier. Write one question about its energy change, then answer it.	**Question: Did the scooter's motion energy decrease? Answer: Yes, it decreased.**

PART 2 · APPLY IT

1. **The ball's motion energy decreases.** The ball moves more slowly after the collision. A slower speed means less motion energy.
2. **The first robot car's motion energy decreases. The second robot car's motion energy increases.** The first car slows, so its motion energy decreases. The second car starts moving faster than before, so its motion energy increases.

CHALLENGE

No. Ball A's motion energy decreased because it slowed. Ball B's motion energy increased because it sped up.

Accept "energy" for "motion energy." Accept equivalent student questions in problem 5 if the question asks about the scooter's energy change and the answer says it decreased.