After the Collision

Use motion and energy evidence to classify two-dimensional collisions.

HS-PSII-1.4 "Classify interactions between two objects moving in two dimensions as elastic, inelastic, and completely inelastic."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the before-and-after motion evidence at each station, circle its kinetic energy totals, and write elastic, inelastic, or completely inelastic beside the station.

The Collision Lab

1. In a science museum's collision lab, two objects can approach from different directions and leave on new paths. To classify a collision, compare their motion before and after contact. If the objects stick together and move with one velocity, the collision is completely inelastic. If they separate, compare their total kinetic energy, the energy of motion. Equal totals indicate an elastic collision; a smaller total after contact indicates an inelastic collision. Some kinetic energy may become sound, heat, or deformation. A bounce alone does not prove a collision is elastic. Momentum also has direction, so the objects' paths matter.

2. At station A, two smooth pucks slide across a level air table. One approaches from the west, and the other approaches from the south. After contact, they separate along paths to the northeast and southeast. Sensors report a combined kinetic energy of 12 joules just before contact and 12 joules just after. At station B, two foam disks slide in from the east and north. They collide, then separate toward the northwest and southwest. Their combined kinetic energy changes from 10 joules before contact to 7 joules afterward. The sensors record totals for both objects, not energy for each one.

3. At station C, two magnetic pucks slide across a smooth table. One moves east and the other moves north. On impact, their magnets latch, and the joined pucks travel northeast with the same velocity. Their combined kinetic energy falls from 8 joules to 3 joules. At station D, two rubber balls glide over a polished floor, one moving west and the other moving south. They bounce apart along different paths. Motion sensors show that their combined kinetic energy falls from 16 joules before contact to 13 joules afterward, even though the balls quickly regain their round shapes.

2 ANSWER WITH EVIDENCE

Use the passage

1. Classify the collision at station A. Which evidence supports your choice?

2. Classify the collision at station B. Which evidence supports your choice?

3. Classify the collision at station C. Which evidence supports your choice?

4. Classify the collision at station D. Why does the bounce not change your classification?

3 YOUR TURN

Your own words

Invent a new collision between two objects approaching from different directions. Describe what happens after contact, give their combined kinetic energy before and after, and classify the collision using that evidence.

After the Collision

PART 1 · READ AND MARK

Underline the before-and-after motion evidence at each station, circle its kinetic energy totals, and write elastic, inelastic, or completely inelastic beside the station. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Classify the collision at station A. Which evidence supports your choice?	**Elastic. The pucks separate, and their combined kinetic energy is 12 joules both before and after contact.**
2	Classify the collision at station B. Which evidence supports your choice?	**Inelastic. The disks separate, but their combined kinetic energy falls from 10 to 7 joules.**
3	Classify the collision at station C. Which evidence supports your choice?	**Completely inelastic. The pucks latch together and move with the same velocity after contact.**
4	Classify the collision at station D. Why does the bounce not change your classification?	**Inelastic. The balls bounce apart, but their combined kinetic energy falls from 16 to 13 joules.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Two toy cars approach on a smooth floor, one moving east and the other moving north. After they collide, they separate on different paths. Their combined kinetic energy drops from 9 joules to 6 joules. This is an inelastic collision because the cars separate but lose kinetic energy.

Accept any supported classification in the original scene. A bounce does not establish an elastic collision unless the total kinetic energy remains the same.