Where Did It Go?

Use bounce data to track energy through a system.

PS.1 "Evaluate sources of information concerning the law of conservation of energy to illustrate energy transformations in practical applications and natural systems. a..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each energy transformation in the passage. Circle the measurements the class collected, then number the two reports so you can compare their claims with the evidence.

The Bounce Test

1. At a school gym, a rubber ball is held above the floor. Its position gives the ball-Earth system gravitational potential energy. Falling converts that energy to kinetic energy. At impact, the ball and floor deform, storing elastic potential energy. Contact forces do work while the ball slows and rebounds. As it rises, kinetic energy becomes gravitational potential energy.

2. To compare surfaces, students release the same ball from 100 cm above tile and a foam pad. They measure each rebound's highest point with a meterstick and repeat each drop three times. The ball is released without a push, and the foam pad rests on the tile. The table contains their measurements.

BALL REBOUND MEASUREMENTS

Surface	Drop height (cm)	Trial 1 rebound (cm)	Trial 2 rebound (cm)	Trial 3 rebound (cm)
Tile	100	72	70	74
Foam	100	26	28	24

3. Report A claims, 'Lower rebounds prove that energy is destroyed at impact.' Report B claims, 'Some energy may spread into the ball, floor, and air in forms rebound height cannot measure.' Both cite the same table. No other data were collected. Conservation of energy applies to the full system, including the ball and its surroundings.

2 ANSWER WITH EVIDENCE

Use the passage

1. Calculate the average rebound height for each surface. What do the averages tell you about the ball's gravitational potential energy at the top of each rebound?

2. During impact, how do work and elastic potential energy help explain the ball's change in motion?

3. Which report is consistent with conservation of energy? Use the rebound data to support your choice, and state one thing the data cannot prove.

4. What new measurement could help test whether energy spreads into forms that rebound height cannot show? State what result would support that idea.

3 YOUR TURN

Your own words

A coach wants a surface that returns more mechanical energy to the ball without less consistent rebounds. Use all six measurements to recommend tile or foam: calculate each surface's rebound-height range, explain your choice, and describe one change that would make a follow-up comparison more reliable.

Where Did It Go?

PART 1 · READ AND MARK

Underline each energy transformation in the passage. Circle the measurements the class collected, then number the two reports so you can compare their claims with the evidence. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Calculate the average rebound height for each surface. What do the averages tell you about the ball's gravitational potential energy at the top of each rebound?	**Tile averages 72 cm, and foam averages 26 cm. With the same ball, the higher tile rebound means more gravitational potential energy at its peak.**
2	During impact, how do work and elastic potential energy help explain the ball's change in motion?	**Contact forces do work as the ball slows and deforms. Some kinetic energy becomes elastic potential energy in the ball and surface.**
3	Which report is consistent with conservation of energy? Use the rebound data to support your choice, and state one thing the data cannot prove.	**Report B is consistent with conservation of energy. The lower foam rebounds show less energy returned as gravitational potential energy, but height data alone cannot prove where the rest went.**
4	What new measurement could help test whether energy spreads into forms that rebound height cannot show? State what result would support that idea.	**Measure a surface's temperature before and after many drops. A temperature increase would support a transfer of energy into thermal energy.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I recommend tile because its average rebound is 72 cm, compared with 26 cm on foam. Tile's rebound-height range is 4 cm, and foam's is also 4 cm, so neither surface has a smaller range in these trials. Tile returns the ball to a greater height without a larger range. I would run more drops on each surface to make the comparison more reliable.

Accept measurements of sound or warming after repeated drops for question 4 if the stated result would support energy transfer. A higher rebound indicates more gravitational potential energy at that height for the same ball, but it does not identify every other energy transfer.