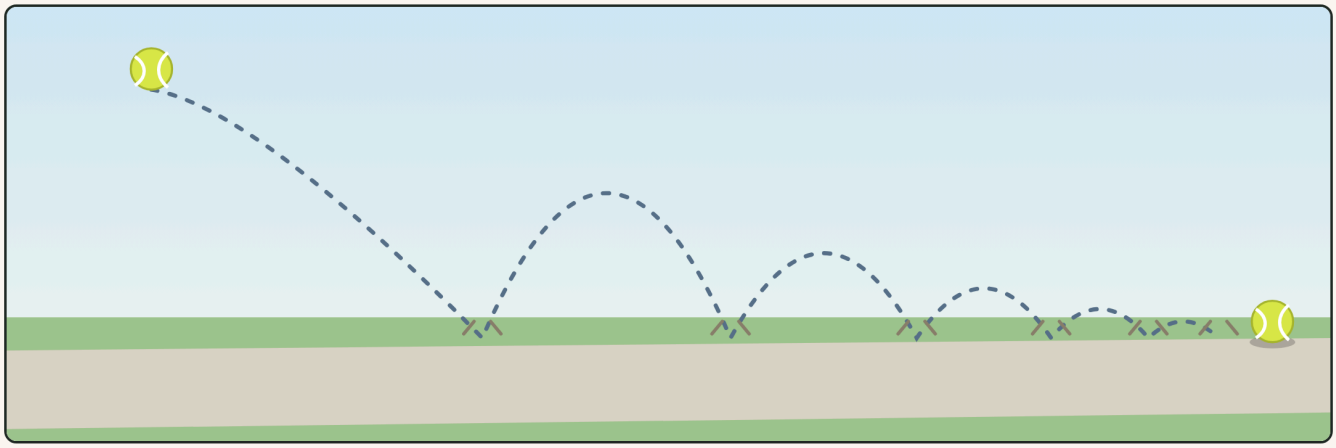
Energy: a concept cartoon, a bounce practical and flow diagrams

Name: Class: Date:

Page 1 is a concept cartoon to discuss in your group. Page 2 is a practical that tests the ideas in it. Page 3 has energy flow diagrams to draw and a frame for a concept cartoon of your own.

DISCUSS Who do you agree with?

Read what each friend says about the bouncing ball. Decide who you agree with, or write your own idea in the empty bubble. Then discuss it in your group, and give a reason for your choice.



Why does each bounce get lower, until the ball stops?

Mia: At each bounce some energy turns into heat and sound. None of it is destroyed.

Jai: The ball uses up its energy, like a battery going flat.

Ellie: Gravity takes a bit of the ball's energy every time it lands.

Sam: The ball gets tired, the way we do after running.

Your own idea

Write a different idea here

?

1. Who do you agree with? Give a reason.

2. What could you measure to test the friends' ideas?

3. After the practical on page 2: who do you agree with now? What changed your mind, or made you surer?

PRACTICAL How much energy does a ball keep when it bounces?

Each group needs: two different balls (such as a tennis ball and a basketball or netball), two metre rulers or a tape measure fixed to a wall with 0 at the floor, and a phone that can film in slow motion if you have one.

> **Safety.** Drop the balls only where the floor is clear and nobody will trip. Drop from no higher than you can reach while standing on the floor: don't stand on chairs or tables.

1. Hold the ball so that its bottom is level with the drop height. Let it go without pushing it.
2. Your partner watches the bottom of the ball at eye level, or films it, and reads the height of the first bounce.
3. Drop each ball three times from each height: 50, 100 and 150 cm, and 200 cm if you can reach it safely.
4. Work out the average bounce height for each drop height, then the share of energy the ball kept.

Which ball do you think will keep the most energy? Why?

RECORD Results

Ball	Drop height (cm)	Try 1 (cm)	Try 2 (cm)	Try 3 (cm)	Average (cm)	Energy kept (%)
	50					
	100					
	150					
	200					
	50					
	100					
	150					
	200					

Gravitational potential energy depends on height, so: energy kept (%) = average bounce height ÷ drop height × 100.

1. Did each ball keep about the same percentage of its energy from every height?

2. Where did the rest of the energy go? Use the words heat and sound.

3. Under the tennis rules, a medium-pace tennis ball dropped from 254 cm onto a hard surface must bounce back to between 135 and 147 cm (ITF). What percentages of its energy are those?

DRAW Draw energy flow diagrams

In these energy flow diagrams the width of each arrow shows the amount of energy. On each grid, let each square stand for 10 J, and make the arrows going out add up to the arrow going in.

A filament globe

100 J of electrical energy goes in. About 10 J becomes light and about 90 J becomes heat (US Department of Energy).

A cyclist

100 J of chemical energy from food goes in. About 20 J does useful work, and the rest becomes mostly heat (OpenStax).

CREATE Make your own concept cartoon

Choose an everyday situation, such as a trampoline, a pull-back toy car or water pumped up to a high reservoir. Write a question, then give three friends different ideas: one that fits the science and two that people often think but that don't. Leave the fourth bubble empty.

The question:

Draw the situation here

Friend 1 | Friend 2 | Friend 3 | Empty bubble

1. Which idea fits the science? Explain why.