SCIENCE

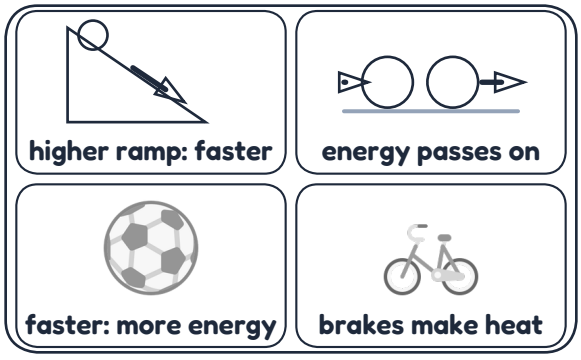
Energy and collisions

Name _____ Date _____

I can explain how speed and collisions change energy.

1 How it works

Everything that moves has energy, and the faster it moves, the more energy it has. When two objects collide, energy moves from one to the other: a rolling ball hits a pin and the pin moves. Some of the energy also changes into sound and heat, which is why a crash makes a noise and brakes get warm.



2 Which has more energy? Circle it.

1.	a ball rolling slowly	a ball rolling fast
2.	a car going 50 miles per hour	a car going 20 miles per hour
3.	a bike parked at school	a bike speeding downhill
4.	a ball from a high ramp	a ball from a low ramp
5.	a gentle breeze	a strong wind

How did I do? ☆ ☆ ☆

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Where does the energy go?

Name _____ Date _____

I can tell where energy goes in a collision.

1 Where does the energy go? Draw a line.

 **a bowling ball hits the pins**	the nail goes into the wood
 **you clap your hands**	the brakes get warm
 **a hammer hits a nail**	you hear a sound
 **bike brakes rub the wheel**	the bumper gets dented
 **a car bumps a wall**	the pins fly apart

2 Fill in the blanks

Use the words in the box.

another **energy** **sound** **faster**

1. Faster objects have more _____.
2. In a crash, energy moves to _____ object.
3. Some energy becomes _____ and heat.
4. A higher ramp makes a ball _____.

How did I do? ☆ ☆ ☆

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Think like a scientist

Name _____ Date _____

I can explain how speed and collisions move energy.

1 Think about it

1. Why do cars have seat belts? _____
2. Why does a crash make noise? _____
3. Why do bike brakes get warm? _____
4. How can you make a marble hit harder? _____

2 True or false? Circle it.

1. A crash makes no sound.	true	false
2. When objects collide, energy can move from one to the other.	true	false
3. A ball from a higher ramp moves faster.	true	false
4. A faster object has more energy.	true	false
5. A parked bike has lots of motion energy.	true	false

3 Draw two balls about to collide. Use arrows to show where the energy goes.

How did I do? ☆ ☆ ☆

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Try it: the marble crash

Name _____ Date _____

I can test how speed changes the energy in a collision.

1 You need

-  a ruler or a cardboard tube
-  a marble
-  a paper cup with a door cut
-  books to stack
-  tape

2 What to do

1. Make a ramp: lean the ruler on 1 book. Put the cup at the bottom, opening facing the ramp.
2. Let the marble roll down. Do not push it. Measure how far the cup moves.
3. Do it again with 2 books, then 3 books.
4. Compare how far the cup moved each time.

3 I predict

Which ramp will push the cup the farthest?

_____

_____

4 What I see

Ramp	How far the cup moved	Fast or slow?
1 book		
2 books		
3 books		

How did I do? ☆ ☆ ☆

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FOR TEACHERS AND PARENTS

Answer key: energy and collisions

1 Page 1

More energy: 1) a ball rolling fast; 2) a car going 50 miles per hour; 3) a bike speeding downhill; 4) a ball from a high ramp; 5) a strong wind.

2 Page 2

Collisions: 1) a bowling ball hits the pins: the pins fly apart; 2) you clap your hands: you hear a sound; 3) a hammer hits a nail: the nail goes into the wood; 4) bike brakes rub the wheel: the brakes get warm; 5) a car bumps a wall: the bumper gets dented.

Blanks: 1) energy; 2) another; 3) sound; 4) faster.

3 Page 3

Think: 1) In a crash, a fast car has lots of energy; 2) Some energy turns into sound; 3) Motion energy turns into heat; 4) Roll it from higher so it goes faster.

True or false: 1) false; 2) true; 3) true; 4) true; 5) false.

Drawing: the moving ball has an arrow toward the other ball, and after the hit the second ball has an arrow moving away.

4 Page 4: Try it!

The cup moves farthest with the highest ramp. A higher ramp lets the marble speed up more, and a faster marble has more energy, so it passes more energy to the cup in the collision. Children may also hear a louder click with the fast marble: some energy turns into sound.

5 Teaching tip

Roll the same ball slowly, then fast, into a stack of paper cups. Children see at once that the faster ball knocks down more, which is the heart of 4-PS3-1.

Safety: keep marbles away from young children, who could swallow them, and pick them up so no one slips.