How Does Motion Energy Change in a Collision?

Unit Storyline

Focus Question 1: How does motion energy move and change?

Lesson 1: Move It
Moving objects have motion energy.

Students make observations of a video to identify similarities between objects that move.

Lesson 2: Give Me Some Energy
Heat, light, and sound are evidence for energy.

Students make observations of systems to collect evidence about how motion energy moves and changes.

Lesson 3: Supermodels
Motion energy can change into heat, light, and sound.

Students use a model to argue that motion energy can move and change in a system.

Lesson 4: Marble Collisions
Motion energy can move to another object in a collision.

Students predict an answer to a question about how changing the motion of marbles affects their motion after a collision.

Focus Question 2: How does speed affect motion energy?

Lesson 5: Sound Barrier
Faster objects produce more sound in a collision.

Students carry out an investigation to collect evidence that shows that faster objects cause louder sounds in a collision.

Lesson 6: Bumper Cars
Faster objects have more motion energy.

Students plan and carry out an investigation into the effect of speed on how far a moving object is displaced and construct an explanation that faster objects have more motion energy.

Lesson 7: Fastest on Earth
Plants and animals have structures that help them move fast.

Students obtain and combine information to construct and explanation that internal and external structures of plants and animals work together to help an animal survive.

Focus Question 3: What causes moving objects to slow down?

Lesson 8: The Rough with the Smooth
Motion energy changes to heat when an object slides on a surface.

Students plan and carry out an investigation to show that a smoother surface causes an object to slide farther than a rough surface.

Lesson 9: Air and Space
Motion energy changes to heat when an object moves through the air.

Students obtain information from a text to provide evidence that when objects move through air, motion energy changes to heat.

Lesson 10: Bouncing Balls
Motion energy changes to heat when a soft object deforms.

Students plan and carry out an investigation to show that fully inflating a ball causes it to bounce higher than a partially inflated ball.

Focus Question 4: How can we protect our brains in a collision?

Lesson 11: Playing Safe
It is important to protect our brains.

Students define the problem of collisions in sport causing damage to the nervous system.

Lesson 12: Egg Drop Challenge Part 1
Several solutions to a problem need to be considered.

Students design a model of a bicycle helmet that changes motion energy to heat.

Lesson 13: Egg Drop Challenge Part 2
A solution to a problem needs to be tested.

Students carry out an investigation to test a model of a bicycle helmet that changes motion energy to heat.

Source: Smithsonian Science Education Center, *How Does Motion Energy Change in a Collision?* in Smithsonian Science for the Classroom. Carolina Biological, Burlington, NC, 2019.

Science Challenge

Focus Question 5: How can we predict how far an object will slide in a collision?

Lesson 14: Slide'n' Collide Part 1

Speed and surface affect how far an object will slide in a collision.

Students plan and carry out an investigation to determine how speed and surface affect how far an object slides in a collision.

Lesson 15: Slide'n' Collide Part 2

Data from an investigation can be used to move an object a set distance.

Students analyze data to find the ramp height and surface that will cause a washer to move a set distance.

Source: Smithsonian Science Education Center, *How Does Motion Energy Change in a Collision?* in Smithsonian Science for the Classroom. Carolina Biological, Burlington, NC, 2019.