Energy and Collision

Reflect

Shuffleboard is popular at parks and on cruise ships

What happens to objects when they collide? Objects have both energy and speed, whether they are moving or not. Energy cannot be destroyed, so during a collision, the energy has to go somewhere.

One game that relies on objects colliding is shuffleboard. In shuffleboard, a cue (fang) is used to push heavy metal discs (biscuits) down a court to slide into a space marked with a number. Opposing players try to knock each other's biscuits out of the scoring area. The player with the most biscuits inside the scoring area wins the round.

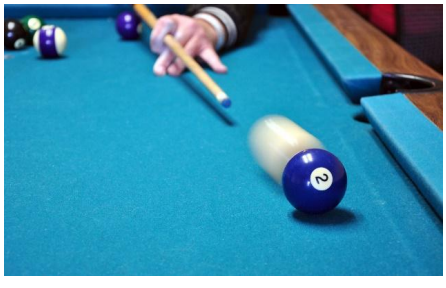
Each player has to figure out how hard to push the fang to get their biscuit into the scoring area. More importantly, pushing the other player's biscuits out of the scoring area without having your own biscuit also slide too far requires skill.

The biscuits colliding with each other changes both biscuits' energy and speed. As the moving biscuit collides with a biscuit at rest, it loses energy and speed, while the other biscuit gains speed and energy.

Don't sink the cue ball!
Billiards, or pool, is another game that involves objects colliding. As shown in the picture to the right, a cue stick is used to hit a white cue ball. The cue ball, in turn, collides with one or more of the numbered balls. The goal is to drop the numbered balls into a pocket without sinking the cue ball.

collision: The meeting of objects in which each exerts a force upon the other.

speed: how fast an object moves



What Do You Think?

What do you think would happen if you replaced the biscuits with wrapped pieces of candy? What about replacing the white cue ball with a balloon?

One important characteristic of baseball pitchers is how fast they can throw the ball. The speed of each pitch is measured and often displayed during the game. Balls moving faster have more energy.

Catcher's mitts are designed to protect the catcher's hand from the energy of the ball. Extra padding covers both the palm and the fingers. Other parts of the design such as the closed webbing make it easier for the catcher to hold onto the ball firmly and not drop it.

Catchers wear a mitt and other equipment to protect themselves from collisions with the ball.

Look Out!

Many people are in car accidents every day. When cars collide with each other, each car changes speed and energy quickly. The hoods and trunks of cars are designed to slow down this change of speed and protect the people inside each car.

Toy cars demonstrating the effects of a collision.

Try Now

What Do You Know?

In the table below, take a moment to think about the energy transfer that is occurring. Then decide which object is gaining energy and which object is losing energy in each situation.

Your World Real-life collisions	Gains Energy Which object is gaining energy?	Loses Energy Which object loses energy?
A cue stick is used to hit the cue ball in billiards.		
An asteroid hits the surface of Jupiter.		
A soccer ball is kicked into the goal.		
A child catches a football.		

Connecting With Your Child

Energy Transfer at Home
This activity will help you and your child explore the transfer of energy between colliding objects.

The materials you will need are a small toy car and a small ball, such as a tennis ball or a golf ball.

Find a spot where you child can roll the ball into the toy car and observe the car's speed. A smooth surface such as a wood floor or a concrete garage works well. Some sidewalks are also smooth enough.

Place the toy car some distance from the ball. Have your child kneel or sit near the toy car. Roll the ball gently so that it collides with the toy car. Have your child observe what happens to the speed of the toy car and the ball after the collision.

Repeat this as you roll the ball faster. Be sure not to roll it so fast that either the ball or the toy car flies off the ground!

Discuss the following questions with your child:

- Was the ball's energy greater when it was rolled fast or slow?
- What happens to the speed of the ball after it collides with the toy car?
- How does changing the speed of the ball change the speed of the toy car?
- What happens to the toy car's energy after the collision?
- When did the toy car gain the most energy: when the ball was rolled faster or slower?