



Science Virtual Learning

4th Grade : Transfer of Energy

April 6, 2020



4th Grade Science

Lesson 11: April 6, 2020

Learning Targets:

Students will understand Potential & Kinetic Energy.

Students can explain how energy is transferred.

BACKGROUND KNOWLEDGE

Look over the following vocabulary words. If you want, make flashcards to help you remember each term!

- Energy : the ability to do work
- Potential Energy : stored energy
- Kinetic Energy : energy in motion

LET'S GET STARTED!

There are two types of energy : Potential & Kinetic.
Watch the videos below to get a better understanding of how they work!



Potential Energy



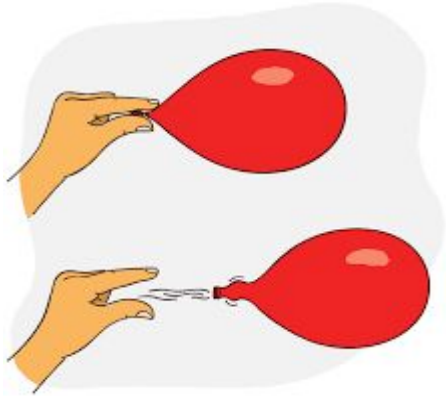
Kinetic Energy

DID YOU KNOW?

There are many different forms of energy: SOUND, LIGHT, HEAT, & ELECTRIC CURRENTS.

The LAW OF CONSERVATION OF ENERGY is a principle that states that energy cannot be created or destroyed. Instead, energy is TRANSFORMED or TRANSFERRED from one type to another!

LOOK AT THE
BALLOONS:



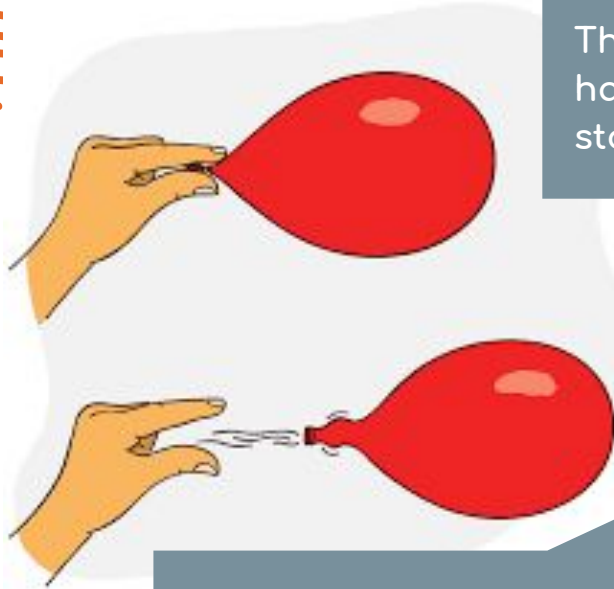
THINK:

Which balloon has
POTENTIAL
ENERGY, or stored
energy?

THINK:

Which balloon has
KINETIC ENERGY, or
energy in motion?

CHECK YOUR THINKING!



The blown up balloon has **POTENTIAL**, or stored energy!

When you let the air out of the balloon, the energy from the air blows out, moving the balloon forward creating **KINETIC** or moving energy!

Here, we see the **LAW OF CONSERVATION OF ENERGY** in action! Energy (in this case the air in the balloon) is not created or destroyed - It is just **TRANSFORMED** or **TRANSFERRED** from one type of energy to another!

The air is stored up in the balloon with the **POTENTIAL** to be used.

When we let the air out of a balloon, we see that moving, **KINETIC** energy **LITERALLY** in **MOTION**!

BRAINPOP : SIMULATION

Click on the skater to play a simulation game to get an idea of POTENTIAL ENERGY & KINETIC ENERGY in real life!



THINK:

Look at the Energy bar in the simulation. How is it changing depending on where you put the skater?

THINK:

In which location on the ramp does the skater have the most POTENTIAL energy? The most KINETIC energy?

MORE TO THINK ABOUT

How does changing the skater's starting position affect the potential energy of the skater?

Describe the change in potential and kinetic energy as the skater goes down the ramp.

How does changing the skater's mass, or size, affect the potential energy of the skater?

REAL LIFE EXAMPLES

Now that you understand POTENTIAL ENERGY & KINETIC ENERGY, take a look at the following examples.

Which examples show a TRANSFER of energy?

THUNDER
CLAPS LOUDLY

A LIGHT BULB
LIGHTS UP

A CAR CRASHES
INTO A WALL

ICE CUBES STAY
FROZEN IN THE
FREEZER

ICE CUBES
MELT IN THE
HOT SUN

AN ELECTRIC
FAN TURNS ON

HOT WATER
COOLS OFF

WOOD BURNS
IN A FIREPLACE

A BOOK SITS
ON A SHELF

A BASEBALL BAT
HITS A BALL

A BOWLING
BALL KNOCKS
OVER PINS

A HAIRBRUSH
SITS ON A
SHELF

CHECK YOUR THINKING!

Check your thinking with the answers below.
The blue highlighted rectangles show the examples
with a TRANSFER of energy!

CONTINUE THINKING HOW is the energy being
TRANSFERRED or TRANSFORMED?

THUNDER
CLAPS LOUDLY

A LIGHT BULB
LIGHTS UP

A CAR CRASHES
INTO A WALL

ICE CUBES STAY
FROZEN IN THE
FREEZER

ICE CUBES
MELT IN THE
HOT SUN

AN ELECTRIC
FAN TURNS ON

HOT WATER
COOLS OFF

WOOD BURNS
IN A FIREPLACE

A BOOK SITS
ON A SHELF

A BASEBALL BAT
HITS A BALL

A BOWLING
BALL KNOCKS
OVER PINS

A HAIRBRUSH
SITS ON A
SHELF

READING CONNECTION : SPORTS

Read the article & look to the next slide for guiding questions.

Baseball is built around the transfer of kinetic energy. The pitcher generates kinetic energy with his body and transfers it to the ball, and the hitter generates kinetic energy with his body and transfers it to his bat. A major-league fastball reaches speeds of more than 145 kph (90 mph), and it takes a *lot* of energy to throw the ball that hard.

As Tim mentions in the movie, kinetic energy is related to mass and speed. If you watch a major-league pitcher, you can see that he doesn't generate all that energy through just the speed of his arm; instead, he goes through a windup or motion that uses his whole body. When you hear a baseball commentator talk about a pitcher's "mechanics," he's talking about how well the pitcher is able to coordinate all his movements to transfer as much energy to the ball as he possibly can.

Likewise, the energy generated by the hitter's swing depends on both the mass of his bat and how quickly he can swing it through the strike zone. When you hear a baseball announcer say that a player has "great bat speed," this is what he means. The hitter also needs to meet the ball squarely in order to hit it hard; basically, he has to put as much of the bat as possible onto the ball to transfer the maximum amount of kinetic energy. If he only grazes the ball, he won't transfer a lot of energy to it, and it'll wind up as a weak pop fly or soft ground ball.

READING CONNECTION : SPORTS

Read the article & answer the questions that follow.

How many examples of transfer of energy did you find in the article?

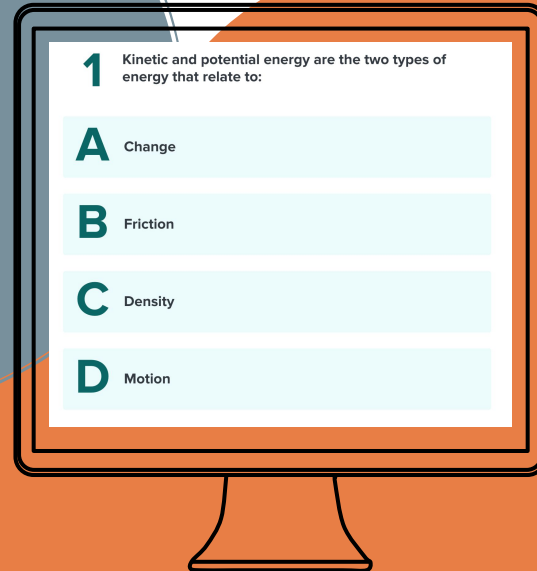
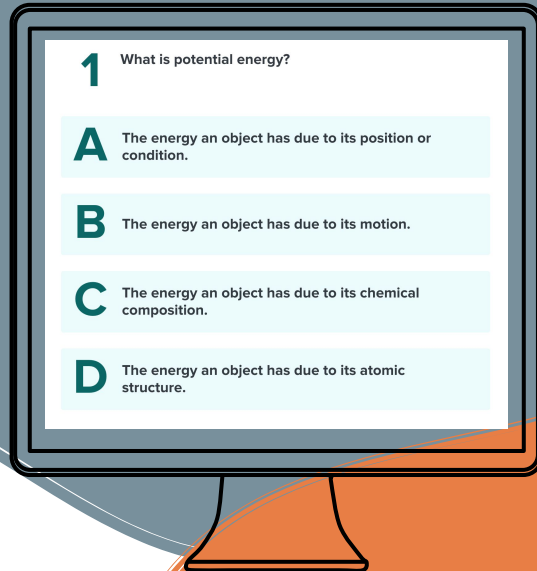
How would baseball be different if energy did NOT transfer?

What other examples of transfer of energy can you find in OTHER sports?

SELF CHECK

Click on the computer screens below to test your knowledge of Potential & Kinetic Energy.

CHALLENGE: Teach a sibling, a parent or a friend about energy transfer!



ENERGY SORT

Find examples of potential & kinetic energy outside or in your home.

BONUS: Can you find an example of an object that shows potential energy and TRANSFERS to kinetic energy?

Can you find examples of objects with kinetic energy that TRANSFERS to potential energy?

POTENTIAL ENERGY

KINETIC ENERGY

TRANSFER OF ENERGY