



## Science Virtual Learning

# 4th Grade : Transfer of Energy

April 7, 2020



4th Grade Science  
Lesson 12: April 7, 2020

**Learning Targets:**

Students will understand different types of Potential Energy.

Students can give examples for each type :  
Gravitational, Chemical & Nuclear.

# BACKGROUND KNOWLEDGE

Review what you know about  
**POTENTIAL & KINETIC** energy.

- **Potential Energy** : stored energy
  - a blown up balloon, a book on a shelf, a motionless ball
- **Kinetic Energy** : energy in motion
  - releasing air from balloon, a bat hitting a ball, melting ice

# LET'S GET STARTED!

Think back to what you learned about POTENTIAL & KINETIC energy.

Which are examples of POTENTIAL energy & which are examples of KINETIC energy?

SWINGING ON  
A SWING

DRIBBLING A  
BASKETBALL

A CAR SITTING  
IN A DRIVEWAY

SITTING AT A  
DESK

RIDING A BIKE

HOLDING A  
BALL

THROWING A  
BALL

A CHILD AT THE  
TOP OF A SLIDE

# LET'S CHECK YOUR THINKING!

The examples of POTENTIAL ENERGY are **ORANGE**.

The examples of POTENTIAL ENERGY are **BLUE**.

How did you do?

SWINGING ON  
A SWING

DRIBBLING A  
BASKETBALL

A CAR SITTING  
IN A DRIVEWAY

SITTING AT A  
DESK

RIDING A BIKE

HOLDING A  
BALL

THROWING A  
BALL

A CHILD AT THE  
TOP OF A SLIDE

# COASTER : SIMULATION

Click on the roller coaster & play a simulation game to refresh your understanding of POTENTIAL & KINETIC ENERGY.

## THINK:

Look at the Energy graph in the simulation. How is it changing depending on where the coaster car is?



# MORE TO THINK ABOUT

How does the position of the coaster car on the track affect the potential energy of the car?

Describe the change in potential and kinetic energy as the coaster car goes down a hill.

How would changing the mass, or size, of the coaster & its passengers affect the potential energy of the coaster?



# A CLOSER LOOK AT: POTENTIAL ENERGY

We learned that POTENTIAL ENERGY is stored, or unmoving energy. BUT, did you know there are lots of different forms of POTENTIAL ENERGY?

Take a look at the forms POTENTIAL ENERGY can take on.

GRAVITATIONAL  
ENERGY

CHEMICAL  
ENERGY

NUCLEAR  
ENERGY





# GRAVITATIONAL ENERGY

**GRAVITATIONAL ENERGY** refers to the energy that is stored (POTENTIAL energy!) based on the height (how tall) and the mass (or the weight) of an object. When the force of gravity pulls that object down, it becomes **KINETIC ENERGY**.

## EXAMPLE:

When a rock rolls down a mountain, **GRAVITY** pulls it. Every time the rock bounces down the hill, it releases its stored, **POTENTIAL** energy **INTO** the ground.

## THINK:

What are some other examples of **GRAVITATIONAL ENERGY** you can think of?

# EXAMPLES OF: GRAVITATIONAL ENERGY

GRAVITATIONAL  
POTENTIAL: a  
book sitting on a  
shelf.

GRAVITATIONAL  
KINETIC: the  
book falling off  
the shelf.

GRAVITATIONAL  
POTENTIAL: fruit  
hanging on a  
tree branch.

GRAVITATIONAL  
KINETIC: ripe  
fruit falling to the  
ground.

# EXAMPLE OF: GRAVITATIONAL ENERGY

Click to play  
the BrainPop  
simulation on  
Gravitational  
Energy on  
Planets X and  
Y!



**THINK:**

How is the  
Gravitational Energy  
moving from Potential  
to Kinetic Energy?

# CHEMICAL ENERGY

**CHEMICAL ENERGY** is stored in the bonds that hold molecules together. When those bonds are broken, chemical energy is released. Chemical energy is used by both humans & animals to survive.

## EXAMPLE:

ALL food holds chemical energy waiting to be used! When you eat broccoli (and you should DEFINITELY be eating broccoli!) you break the molecule bond & release its chemical energy.

## THINK:

What are some other examples of CHEMICAL ENERGY you can think of?

# EXAMPLES OF: CHEMICAL ENERGY

CHEMICAL  
POTENTIAL: a  
charged car  
battery.

CHEMICAL  
KINETIC: a car  
using the battery  
to run.

CHEMICAL  
POTENTIAL: a  
gas stove in the  
kitchen.

CHEMICAL  
KINETIC: lighting  
the gas stove to  
cook dinner.

# EXAMPLE OF: CHEMICAL ENERGY

Click to  
watch the  
BrainPop  
video on  
batteries!



**Batteries**

## THINK:

Explain how batteries are a form of Chemical Energy: both in terms of POTENTIAL & KINETIC energy.

# NUCLEAR ENERGY

**NUCLEAR ENERGY** is stored protons & neutrons inside a nucleus. Nuclear Energy is the release of those stored protons & neutrons. There are two ways the potential (stored) energy can be released: 1] When one nucleus joins with another nucleus, or 2] When two or more nuclei (that's the plural for nucleus!) combine to create FUSION.

## EXAMPLE:

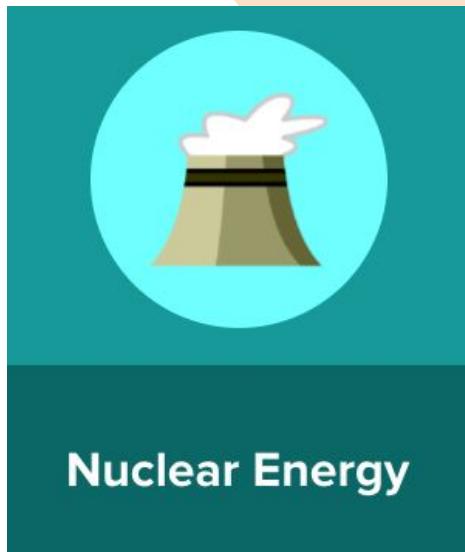
The sun is an example of nuclear fusion energy. Atoms are constantly combining & creating heat & light for the Earth!

## THINK:

What are some other examples of NUCLEAR ENERGY you can think of?

# EXAMPLES OF: NUCLEAR ENERGY

Click to  
watch the  
BrainPop  
video on  
Nuclear  
Energy!



**THINK:**

Would you agree or disagree to build more nuclear power plants in the United States?



# READING CONNECTION : CHERNOBYL

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

The worst nuclear disaster in history occurred outside the city of Chernobyl, in northern Ukraine, in 1986.

On April 26, a steam explosion ripped apart one of the nuclear reactors at the Chernobyl power plant. It was 400 times as powerful as the atomic bomb dropped on Hiroshima, Japan during World War II.

Many plant workers & firefighters died as a result, & thousands are thought to have developed cancer.

115,000 square kilometers in Russia, Belarus, and Ukraine were contaminated, & the radioactive particles floated as far away as the USA. More than 200,000 people had to be relocated, turning two cities into abandoned ghost towns almost overnight.

First, the Soviet government tried to hide the disaster. It wasn't until nuclear technicians in Sweden found radioactive particles on their clothes that people realized something had gone terribly wrong.

The meltdown (a term that means "severe nuclear accident") is thought to have been caused by: poor management, proper safety protocols not being followed & poor reactor design.

Today, most of the radioactive particles released during the Chernobyl disaster are STILL radioactive, and the full consequences of the event & how long the particles will remain is unknown.

# READING CONNECTION : CHERNOBYL

Read the article & answer the questions that follow.

In your opinion, should Nuclear Energy be created and used?

What major health effects did the disaster cause?

Could the Chernobyl disaster have been avoided?  
How?

# SELF CHECK

## POTENTIAL ENERGY SORT

Sort the following examples by determining which type of potential energy it represents.

THE SUN GIVING  
OFF HEAT

FRUIT FALLING  
FROM A TREE

A COW  
CHEWING  
GRASS

BATTERIES IN A  
FLASHLIGHT

A PENNY  
DROPPED FROM  
A TOWER

GAS IN A CAR

A GIRL FALLS  
OFF HER BIKE

COAL FOR THE  
GRILL

A FISSION BOMB  
REACTION

A STAR GIVING  
OFF LIGHT

A LEAF FALLS  
FROM A TREE

A MONKEY  
EATING A  
BANANA

# SELF CHECK

Check your answers!  
BLUE : GRAVITATIONAL  
ORANGE : CHEMICAL  
YELLOW : NUCLEAR

THE SUN GIVING  
OFF HEAT

FRUIT FALLING  
FROM A TREE

A COW  
CHEWING  
GRASS

BATTERIES IN A  
FLASHLIGHT

A PENNY  
DROPPED FROM  
A TOWER

GAS IN A CAR

A GIRL FALLS  
OFF HER BIKE

COAL FOR THE  
GRILL

A FISSION BOMB  
REACTION

A STAR GIVING  
OFF LIGHT

A LEAF FALLS  
FROM A TREE

A MONKEY  
EATING A  
BANANA

# GRAVITATIONAL ENERGY REFLECTION

Think of one object in your home or outside that could be affected by  
GRAVITATIONAL ENERGY.

FIRST: Explain the object when it has POTENTIAL (stored, unmoving) energy

THEN: explain how gravity forces that object to transfer into KINETIC (moving) energy.

