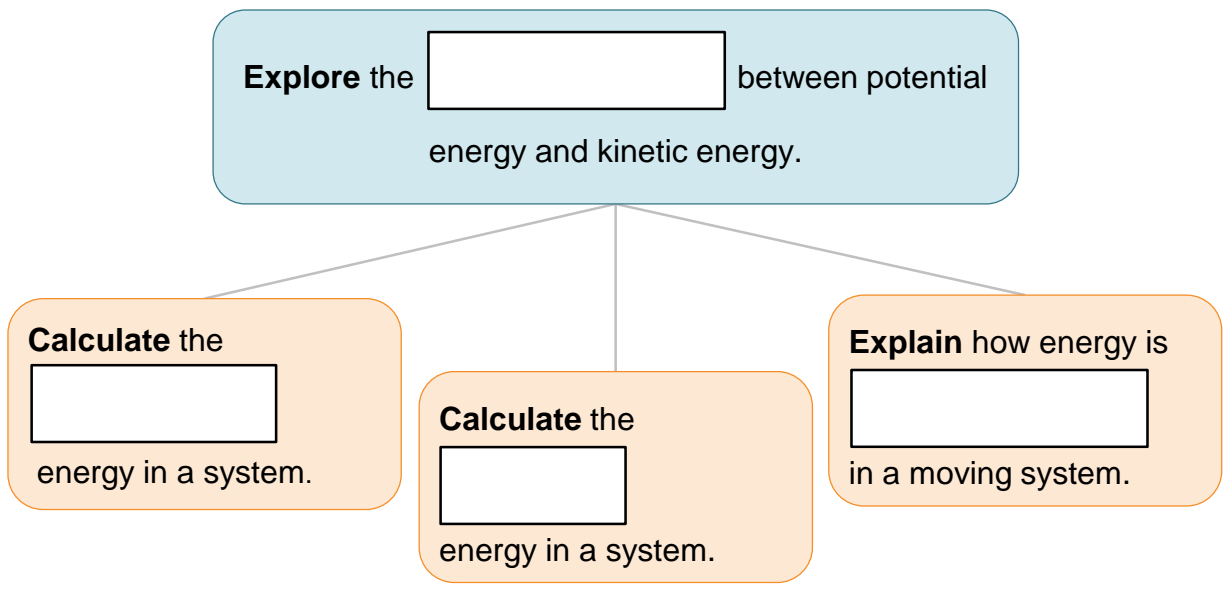




Lesson Question



Lesson Goals



Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

- | | |
|----------------------|--|
| ___ system | A. the energy an object has due to its motion |
| ___ transformation | B. a group of related objects that interact and form a complex whole |
| ___ kinetic energy | C. the stored energy an object has due to its position |
| ___ potential energy | D. a change in form, appearance, nature, or characteristic |

**Energy**

- Energy is the ability to do .
- Work involves the of energy from one object to another.
- Energy exists in several .
 - Chemical
 -
 - Mechanical
 -
 -
 - Kinetic

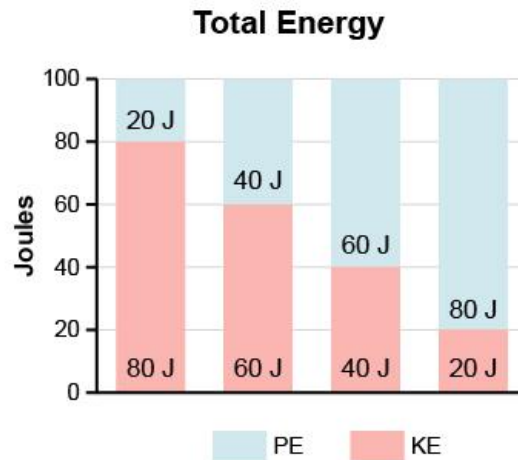
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Potential Energy and Kinetic Energy

- Objects can have more than one form of at the same time.
- is the energy an object has due its position.
- is the energy an object has due to its motion.
- The amount of each form of energy depends on the and position of an object.

Total Energy



A is the group of objects that interact with each other.

- The in a system stays the same.
 - If potential energy increases, then kinetic energy .
 - If potential energy decreases, then kinetic energy .

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Gravitational Potential Energy

- Potential energy is energy.
- Potential energy related to the of an object is known as gravitational potential energy.
 - Gravitational potential energy comes from the presence of .
 - The greater the height of an object, the its gravitational potential energy.

The Potential Energy Equation

- Gravitational potential energy is directly related to:
 - an object's , m .
 - the acceleration due to , g .
 - an object's , h .

$$PE = mgh$$

An Application of the Potential Energy Equation

What is the potential energy of a 150 kg rock resting on top of a hill that is 25 m high?

Gravity on Earth is a constant of m/s/s.

$$PE = (150 \text{ kg})(9.8 \text{ m/s}^2)(25 \text{ m}) = \text{ }$$

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The Potential Energy Equation

When potential energy is known, or can be found.

$$PE = mgh$$

To find mass, rearrange equation: $m = PE/gh$

To find height, rearrange equation: $h = PE/gm$

Example: Jeremiah, who has a mass of 60 kg, starts skating down a hill with a potential energy of 1,200 J. What is the height of the hill? Round your answer to the nearest whole number.

Step 1: Identify what is known.

- $m =$
- $g = 9.8 \text{ m/s/s}$
- $PE =$

Step 2: Multiply mass x gravity.

$$60 \text{ kg} \times 9.8 \text{ m/s/s} = \text{ } \text{ kg m/s/s}$$

Step 3: Solve the equation.

$$h = (1,200 \text{ J})/588 \text{ kg m/s/s} = \text{ }$$

Step 4: Round the answer to the nearest whole number.

$$h = 2.04 \text{ m} = \text{ } \text{ m}$$

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Kinetic Energy

Kinetic energy:

- is the energy of .
- depends on the mass and velocity of an object.
 - Increases when increases
 - Increases when increases

The Kinetic Energy Equation

- Kinetic energy is directly related to an object's mass, m , times an object's velocity, v , .

$$KE = \frac{1}{2}mv^2$$

Mass (m) is measured in .

Velocity squared (v^2) is measured in .

Multiplied together give us , J.

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An Application of the Kinetic Energy Equation

Example: What is the kinetic energy of a 55 kg girl walking at a velocity of 2 m/s?

Step 1: Identify what is known.

- $m =$
- $v =$ 2 m/s

Step 2: Find half of 55 kg.

$$55 \text{ kg} / 2 = \text{ } \text{ kg}$$

Step 3: Square the velocity

$$\text{ } \text{ m/s} \times \text{ } \text{ m/s} = \text{ } \text{ m}^2/\text{s}^2$$

Step 4: Solve the equation.

$$\text{KE} = 27.5 \text{ kg} \times 4 \text{ m}^2/\text{s}^2 = \text{ }$$

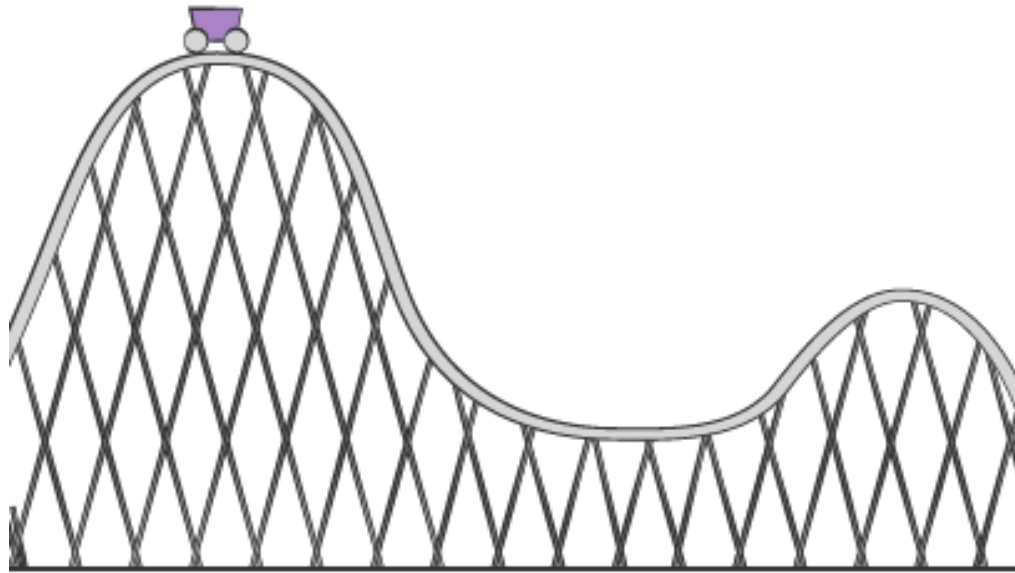
Imagine that the girl's velocity increases to 4 m/s. Her kinetic energy increases to .

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Potential and Kinetic Energy Transformations

- PE and KE goes through , or changes
- Top of the hill = all energy
- Downhill = potential becomes
- On the ground = kinetic energy
- Uphill = kinetic becomes



Summary

Potential and Kinetic Energy



Lesson Question

What is the relationship between potential and kinetic energy?



Answer

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Review: Key Concepts

- Gravitational potential energy as an object gets closer to the ground.
- At the same time, kinetic energy increases because the object is up.

Term	Definition	Affected by	Equation
Kinetic	Energy of <input type="text"/>		$KE =$ <input type="text"/>
Potential	Energy due to <input type="text"/>		$PE =$ <input type="text"/>



Summary

Potential and Kinetic Energy

Use this space to write any questions or thoughts about this lesson.