**Lesson Question**



**?**

**W**

**2K**

energy in a system.

in a moving system.

energy in a system.

**Calculate** the

**Explain** how energy is

**Calculate** the

**Explore** the between potential

energy and kinetic energy.

**Lesson Goals**

1. the stored energy an object has due to its position
2. a change in form, appearance, nature, or

characteristic

kinetic energy

potential energy

B. a group of related objects that interact and form a

complex whole

transformation

A. the energy an object has due to its motion

system

**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.*



# Energy

* Energy is the ability to do .
* Work involves the of energy from one object to another.
* Energy exists in several .
  + Chemical

•

* + Mechanical

•

•

* + Kinetic

**Slide**

and position

* The amount of each form of energy depends on the

of an object.

is the energy an object has due to its motion.

•

is the energy an object has due its position.

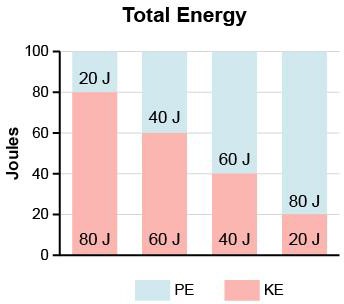
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at the same time.

* Objects can have more than one form of

**Potential Energy and Kinetic Energy**

**2**



* The in a system stays the same.
  + If potential energy increases, then kinetic energy

.

* + If potential energy decreases, then kinetic energy

.

is the group of objects that interact with each other.

A

**Total Energy**

**5**

, *h*.

* an object’s

, *g*.

* the acceleration due to

𝑃𝐸 = 𝑚𝑔ℎ

, *m*.

* an object’s

**The Potential Energy Equation**

* Gravitational potential energy is directly related to:

PE = (150 kg)(9.8 m/s2)(25 m) =

m/s/s.

Gravity on Earth is a constant of

**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?

**Slide**

potential energy.

its gravitational

* The greater the height of an object, the

.

potential energy.

* Gravitational potential energy comes from the presence of

of an object is known as gravitational

* Potential energy related to the

energy.

* Potential energy is

**Gravitational Potential Energy**

**Slide**

# The Potential Energy Equation

When potential energy is known, or can be found.

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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 m/s/s
  + 𝑃𝐸 =

Step 2: Multiply mass x gravity.

60 kg × 9.8 m/s/s = kg m/s/s

Step 3: Solve the equation.

ℎ = (1,200 J)/588 kg m/s/𝑠 =

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

ℎ = 2.04 m = m

**Slide**

increases

* Increases when

increases

* Increases when
* depends on the mass and velocity of an object.

.

**Kinetic Energy**

Kinetic energy:

* is the energy of

**10**

, J.

Multiplied together give us

.

Velocity squared (*v 2*) is measured in

.

Mass (*m*) is measured in

2

𝐾𝐸 = 1𝑚𝑣2

.

an object’s velocity, *v*,

an object’s mass, *m*, times

* Kinetic energy is directly related to

**The Kinetic Energy Equation**

**Slide**

# 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 = w m/s

Step 2: Find half of 55 kg.

55 kg/2 = kg

Step 3: Square the velocity

m/s × m/s = m2/s2

2

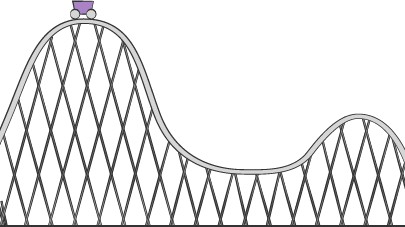
**10**

Step 4: Solve the equation.

KE = 27.5 kg × 4 m2/s2 =

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

**Slide**



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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

What is the relationship between potential and kinetic energy?

**Lesson Question**

**Slide**

**?**

**Review: Key Concepts**

* Gravitational potential energy the ground.

as an object gets closer to

* At the same time, kinetic energy increases because the object is

up.

**Answer**

**2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Term** | **Definition** | **Affected by** | **Equation** |
| Kinetic | Energy of |  | 𝐾𝐸 = |
| Potential | Energy due to |  | 𝑃𝐸 = |

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