Name: _____

Period: _____

# Energy Review

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|---|---|
| 1. Power E | A. Tells you how good an energy transfer is; ratio of $W_{out}$ to $W_{in}$. |
| 2. Kinetic Energy F | B. Due to being above the ground. |
| 3. Work D | C. Units for work or energy. |
| 4. Potential Energy B | D. Energy transferred by a force. |
| 5. Efficiency A | E. How fast energy is transferred or used. |
| 6. Joules C | F. Energy due to motion. |

| | |
|---|---|
| 1. Nuclear B | A. Any Potential or Kinetic energy. |
| 2. Thermal D | B. Due to splitting or combining atoms. |
| 3. Radiant E | C. Held in molecular bonds. |
| 4. Mechanical A | D. Heat energy. |
| 5. Chemical C | E. Electromagnetic radiation (light energy). |
| 6. Electrical F | F. Moving electrons. |

How can you know that an object has energy?
It can move or create forces or move something

*What kind of Energy: $E_p$, $E_k$, Work, or None?*

PE An object sitting on the edge of a table.

Ep+EK A bullet shot up into the air before it gets to the top.

N A ball after it hits the ground and stops.

W Pushing an object up a ramp.

PE After pushing an object up a ramp.

PE What a rock loses as it falls.

W What it takes to stop or start an object.

N How much energy an object loses if there is no friction.

What Kind of Thermal Transfer?
1. Conduction; 2. Convection; 3. Radiation

3 From a light bulb.

1 Holding onto an ice cube.

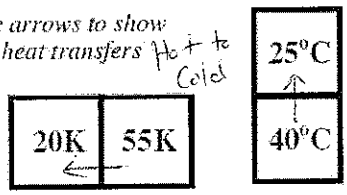
2 Causes ocean currents.

1 Putting your hand on a hot car.

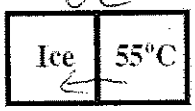
2 A fan cooling you down.

3 If your hand is next to, but not touching a brick

*Use arrows to show the heat transfers* Hot to Cold




Ice is at 0°C



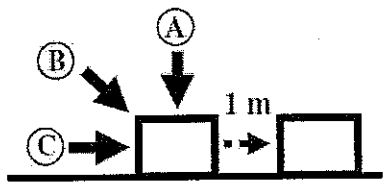

True or False: "An object at rest has potential energy".
It has to be above the ground

A 4 kg rock is held 2 m above the ground for 3 seconds. How much work was done?
None - it didn't move or it's energy didn't change

If molecules have kinetic energy than they must be moving.

Which have more kinetic energy: hot objects or cold objects?

Which feels colder: a cold insulator or a cold conductor?




Which force does the most work?
C

Which force does the least work?
A (none)

A 8 kg cart is rolling 5 m/s. Calculate its kinetic energy.
$KE = \frac{1}{2}mv^2$

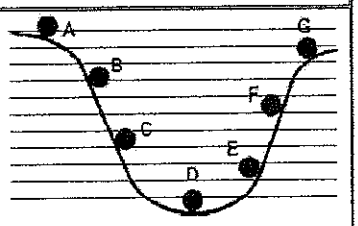
$\frac{1}{2} \cdot 8kg \cdot (5m/s)^2 = 100J$

A rock is pushed 4 meters by a 10 N force.
A) How much work was done? $W = F \cdot d$

$10N \cdot 4m = 40J$

B) If done in 5 seconds, how much power was used?
$P = \frac{W}{t}$ $\frac{40J}{5s} = 8$ Watts or $\frac{J}{s}$

C) If it was pushed on a flat surface, what kind of energy did it gain? KE




At A it has a lot of: PE

At D is has a lot of: KE

As it moves from G to D it is losing: EP

Which has more Ep: C or F?

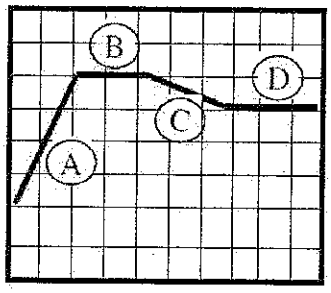
Which has more $E_k$: C or F?

How does the $E_p$ of A compare with the $E_k$ of D? Same

A 2 kg rock on a 6 meter ledge has how much potential energy?
$PE = mgh$

$2kg \cdot 10m/s^2 \cdot 6m = 120J$

Position vs. Time




*Which segments show:*

At rest: B + D

Moving: A + C

A lot of kinetic energy: A

No kinetic energy: B + D

Very little kinetic energy: C

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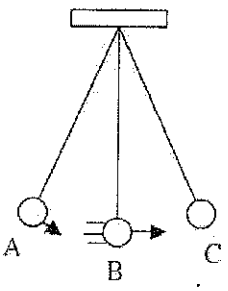
What kind of energy does it have at A? PE

What kind of energy does it have at B? KE

If there is no friction, how do these amounts compare? PE = KE

Write a Conservation of Energy equation from A to B.

$E_p$ at A = $E_k$ at B

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Light bulb A uses 120 J of energy in 2 seconds. How powerful is the light bulb?

$P = W/t$ $\quad \frac{120\text{J}}{2\text{s}} = 60\text{ J/s}$ or Watts

Light bulb B uses 120 J of energy in 12 seconds. How powerful is the light bulb?

$P = W/t$ $\quad \frac{120\text{J}}{12\text{s}} = 10\text{ J/s}$ or Watts

Which light bulb used more energy? Same

Which light bulb is more powerful? A

True or ~~false~~? Something more powerful can do more work or use more energy. It just does the same amount faster.

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How much potential energy does the ball have at the top?

$P = mgh$

$3\text{kg} \cdot 10\text{m/s}^2 \cdot 20\text{m} = 600\text{J}$

How much Ep does it have half-way down? 300J

How much $E_k$ does it have at the bottom just before it hits? 600J

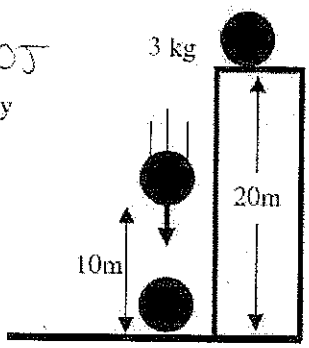
Find the velocity of the ball at the bottom.

$E_p = E_k$

$600\text{J} = \frac{1}{2} 3\text{kg} \cdot v^2$

$600 = 1.5 \cdot v^2$

$\sqrt{400} = \sqrt{v^2}$ $\quad v = 20\text{ m/s}$

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What kind of energy is being put into lifting the object? Work

Calculate it. $W = Fd$

$10\text{N} \cdot 6\text{m} = 60\text{J}$

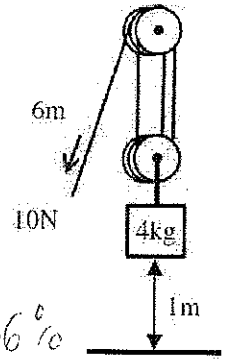
What kind of energy is the pulley getting out by lifting the object? PE

Calculate it. $mgh$

$4\text{kg} \cdot 10\text{m/s}^2 \cdot 1\text{m} = 40\text{J}$

Calculate the efficiency of the pulley.

$\text{Eff} = \frac{W_{out}}{W_{in}} \times 100 = \frac{40\text{J}}{60\text{J}} \times 100 = 66\%$




Where did the extra energy go? Friction

Did you use less or more energy using the simple machine?

More (60J)

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A person pushes a 2 kg cart until it is moving 3 m/s.

A) Find how much energy was given to the cart.

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

$= \frac{1}{2} 2\text{kg} (3\text{m/s})^2 = 9\text{J}$

B) If it took 2 seconds to give this energy to the cart, calculate the power used to move the cart.

$P = W/t$ $\quad \frac{9\text{J}}{2\text{s}} = 4.5\text{ J/s}$ or Watts

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Given the following Conservation of Energy equations, describe what happened to the object.

A) $0 + W = Ek$ An object at rest, moves.

B) $Ek = Ep$ An object in the air is thrown up

C) $Ek - W = Ek$ an object is slowed down

D) $Ep - W = Ek$ An object is lowered

E) $Ek - W = 0$ a moving object stopped

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A 4kg object at rest on the ground is pushed by a force for 8 m. The object ends up going 4 m/s.

Write the Law of Conservation of Energy. → $E_p + W = E_A$

Put in what kind of energy it has before and after. → $0 = Ek$

If $E_b \neq E_A$, add or subtract Work. → $0 + W = Ek$

Put in the equations for each kind of energy. → $0 + F \cdot d = \frac{1}{2} mv^2$

Find the size of the force.

$0 + F \cdot 8\text{m} = \frac{1}{2} 4\text{kg} (4\text{m/s})^2$

$F \cdot 8 = 2 \cdot 16$

$F \cdot 8 = 32$ $\quad F = 4\text{N}$

$\frac{F \cdot 8}{8} = \frac{32}{8}$