

Name: \_\_\_\_\_

### Energy Guided Notes

Energy is the ability to do \_\_\_\_\_. (Work = Force x Distance) Scientifically speaking, the energy of an object is how much work is done on another object. We measure energy in units of Joules (J).

If you push against a heavy couch and it doesn't move, is work being done?

What if you lift a box off of the ground? Is work done in this instance? Why?

The definition of work says nothing about the time it takes to do the work so we introduce the definition of power. Power is how \_\_\_\_\_ work is done and we use the equation:

$$\text{Power} = \frac{\text{work done}}{\text{time interval}}$$

Power is measured in units called watts (W)

What is the work done in lifting a 500 N barbell 2.2 m above the floor?

Calculate the power when the barbell is lifted 2.2 m in 2 s.

Energy cannot be created or \_\_\_\_\_. It can only be converted from one form to another. This is known as the Law of Conservation of \_\_\_\_\_. Energy can be converted from one form to another. Examples: chemical energy to heat energy (food digestion to body heat), potential energy to kinetic energy (pen being knocked off a desk), electrical energy to electromagnetic energy (lamp giving off light). List another example here:

For this unit we will primarily focus on mechanical energy, kinetic energy, and potential energy. Mechanical energy is the energy of an object or system due to its motion or \_\_\_\_\_. It is the sum of kinetic and potential energy.

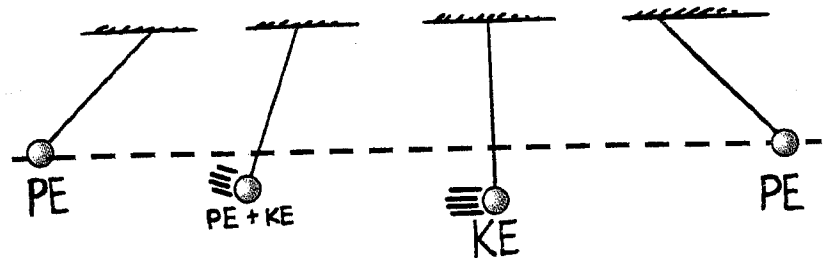
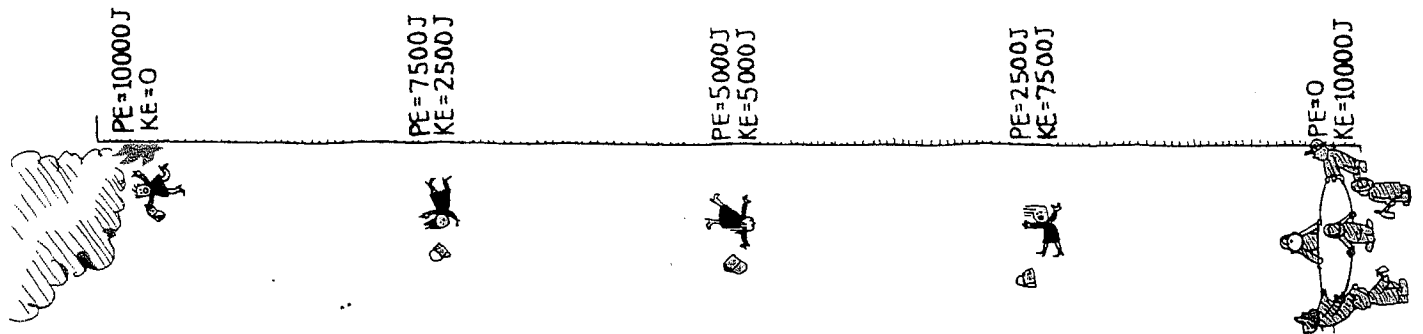
Kinetic Energy is the energy of an object that is in \_\_\_\_\_. We can calculate the kinetic energy of an object using the following equation:  $KE = \frac{1}{2} * m * v^2$ . (Mass should be in kilograms and velocity in meters per second) Kinetic Energy units are kg · m/s or Joules (J)

What is the kinetic energy of a 5 kg bowling ball rolling down a lane with a velocity of 7 m/s?

Potential Energy is the energy an object has due to its \_\_\_\_\_. Stationary objects have potential energy. An object can gain potential energy if it is moved \_\_\_\_\_. We can calculate the potential energy of an object by using this equation:  $PE = mgh$ . (Mass is measured in kilograms, g is the acceleration due to gravity which is \_\_\_\_\_ and h is the height of the object) Units are in Joules (J)

What is the potential energy of a clock that has a mass of 2 kg and sits on a shelf that is 2.5 m high?

Connecting back to the conservation of energy, the kinetic energy that an object has can never be more than the potential energy that the object started with!!! As an object transitions from potential to kinetic energy, the total amount of energy in the system is the same throughout. ( $PE + KE = \text{Constant}$ )



**Figure 8.8 ▲**  
Energy transformations in a pendulum: The PE of the pendulum bob at its highest point is equal to the KE of the bob at its lowest point. Everywhere along its path, the sum of PE and KE is the same. Because of the work done against friction, this energy will eventually be transformed into heat.