Name: _____ Unit 1: Force & Motion NOTES: 2.02

FOCUS: Energy

ESSENTIAL QUESTION: Can you identify the meaning of the words "work" and "energy"? Can you explain the difference between kinetic, potential, and mechanical energy?

What do we already know?

- A Force is a push or pull applied to an object that is capable of changing its velocity.
- Work is done on an object when the applied force causes displacement, or movement in the same direction as the force.
- Work is calculated by multiplying force times distance.

How is work related to energy?

- Energy is... the ability to do work
- An object that possesses some form of Energy supplies the force needed to do work on an object.
  - The object doing the work loses energy.
  - The object that work is being done to gains energy.

What kind of energy is it?

- The energy acquired by the objects upon which work is done is known as mechanical energy.
- Mechanical energy is ...

the energy that is possessed by an object due to its motion or due to its position.

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- Mechanical energy can be either:
  - Kinetic energy (the energy of motion) OR
  - potential energy (stored energy due to position).
- Objects have mechanical energy if they are:
  - in motion and/or
  - at some position greater than a *zero potential energy position*

Examples:

Stocking Shelves:

(1) Is work done? yes (on shelved food)
no (on boxes being held)

(2) Who/what supplies the force?
the person

(3) Where does the energy come from in the force-supplier?
chemical energy (food)

(4) What type of mechanical energy does it become in the object when the work is done?
Kinetic (while moving)
potential (high on shelf)

Plowing a Field:

(1) Is work done? yes

(2) Who/what supplies the force?
the ox

(3) Where does the energy come from in the force-supplier?
Chemical energy in food

(4) What type of mechanical energy does it become in the object when the work is done?
Kinetic (motion)

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Throwing a Baseball:

(1) Is work done? yes

(2) Who/what supplies the force?

the pitcher

(3) Where does the energy come from in the force-supplier?

food

(4) What type of mechanical energy does it become in the object when the work is done?

Kinetic & potential

Moving a Rollercoaster to the Top of the First Drop:

(1) Is work done? yes

(2) Who/what supplies the force?

motor pulling chain

(3) Where does the energy come from in the force-supplier? gasoline, electricity

(4) What type of mechanical energy does it become in the object when the work is done?

Kinetic energy & potential energy

Drawing a Bow:

(1) Is work done? yes

(2) Who/what supplies the force?

archer

A drawn bow possesses mechanical energy in the form of elastic potential energy.

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(3) Where does the energy come from in the force-supplier?

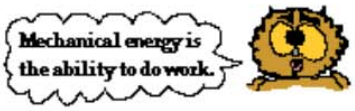
food (chemical energy)

(4) What type of mechanical energy does it become in the object when the work is done?

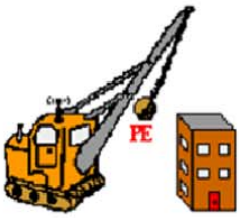
potential energy

How does Mechanical Energy affect an object?

- An object that possesses mechanical energy has the ability to do work.



- Ex: Wrecking Ball



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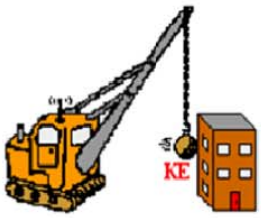

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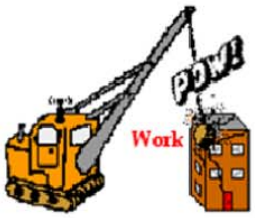

(3)

  - Picture #1: Chemical energy in the fuel supplies the force to the crane to lift the wrecking ball. Lifting the wrecking ball gives the ball mechanical energy in the form of potential energy due to gravity.
  - Picture #2: When the ball is let go, the potential energy due to position transforms into kinetic energy due to motion.
  - Picture #3: The mechanical energy that was stored in the ball due to its position and its motion does work on the building by supplying a force that moves things.