**BELLMORE-MERRICK CENTRAL HIGH SCHOOL DISTRICT**

*S. H. Calhoun High School & W. C. Mepham High School*

*Ms. Nigro*

*Regents Physics*

*Energy Unit*

**ENERGY**

Energy is the ability to do work. It is a scalar. In this class we will discuss the following types of energy:

Work

Potential Gravitational

Kinetic

Elastic Potential

Thermal

Electric

Electromagnetic

Nuclear

**WORK**

Work in Physics is different from the idea people have of work. In Physics, work is the result of applying a force to cause an object to move. If there is no motion, no work is done. The energy of a system is conserved, unless work is done. Work adds energy to the system. The unit for work is the same as for energy which is *Joules*, J.

*W = F d = ∆E W = Work (J) ∆E = Change in energy (J)*

 *F = Force (N) = Efinal - Einitial*

 *d = displacement (m)*

**Example 1:**

A 90 kg football player pushes a training crate with a force of 100 N causing it to move 5 m in 8 s. How much work is done by the football player?

Sometimes, a force is applied at an angle and it causes a horizontal displacement. Only the component of the force in the direction of the displacement does work.

**Example 2:**

A student pulls on a dynamic cart with a force of 100 N at 60o from the horizontal and the cart rolls forward 2m. How much work did the student do?

Some problems are tricky. Make sure to draw a diagram to indicate the direction of the force and the displacement.

**Example 3:**

A waiter holds a tray of food that weighs 30 N and walks 7 m to deliver it to the table. How much work is done by the waiter?

**Example 4:**

The ramp of a delivery truck is 5 m long and makes a 45o angle with the floor. How much work needs to be done to unload a couch pushed with a constant force of 70 N?

**Example 5:**

A student does 60 J of work pushing a 3 kg block up a 5 m ramp. What is the magnitude of the force applied to the block?

**Example 6:**

Which action(s) would require no work?

1. Lifting an object from the floor to the ceiling
2. Pushing an object on a table at constant speed against friction.
3. Pushing with both hands against a wall.
4. Decreasing the speed of a shopping cart until it comes to rest.
5. Holding a very heavy object above the ground while remaining stationary.