Work and Power Notes

I. **Energy** is:

* 1. The ability to cause change
  2. The ability to do work.
  3. Measured in Joules (J)

**II. Work** is the transfer of energy that occurs when a force

makes an object move.

A. For work to be done:

1. Object must move

2. Object must move in the direction that the force is

applied in.

B. Work = force x distance

C. Work is measured in **Newton.meters** or **joules (J)** just

like energy.

III. **Power** – the amount of work done in a certain amount of

time.

A. Power = Work or Force x distance

Time time

B. The units for power are N•m/s or J/s or watts (W)

-if energy is transferred without work being done (e.g. in electricity), the formula is:

Power = energy

time

IV. **Machine** – a device that makes work easier on us.

A. A machine cannot change the amount of work required

to move an object, but it can:

1. allow you to input more force, but move a shorter distance (multiplies distance)

2. require you to use less force over a longer distance (multiplies force)

3. change the direction of the force

B. **Effort force (FE)**– the force that you apply to a machine

C. **Effort Distance (DE)** – The distance you move the machine

D. **Work input (Win)** – the work done by you on the

machine.

Win = FE xDE

E. **Resistance force (FR)**– the force applied by the machine on an object.

F. **Resistance Distance (DR)** – The distance the machine moves an object.

G. **Work output (Wout)** – The work done by the machine

on an object.

Wout = FR x DR

H. **Ideal machine** – a machine in which Win = Wout

-in reality, Win is always > Wout because energy is lost

to friction.

V. **Mechanical Advantage (MA)** – how many times a

machine multiplies the effort force required to do a

job

MA = resistance force

effort force

VI. **Efficiency** – a measure of how much of the work put into a

machine is changed into work output by a machine.

Efficiency = Wout x 100

Win

- Efficiency is always less than 100% due to friction.