Work and Mechanical Advantage

What is Work?

Work….work….work….

- Brain Pop: https://www.brainpop.com/science/motionsforcesandtime/work/

What is Work?

Work….work….work….

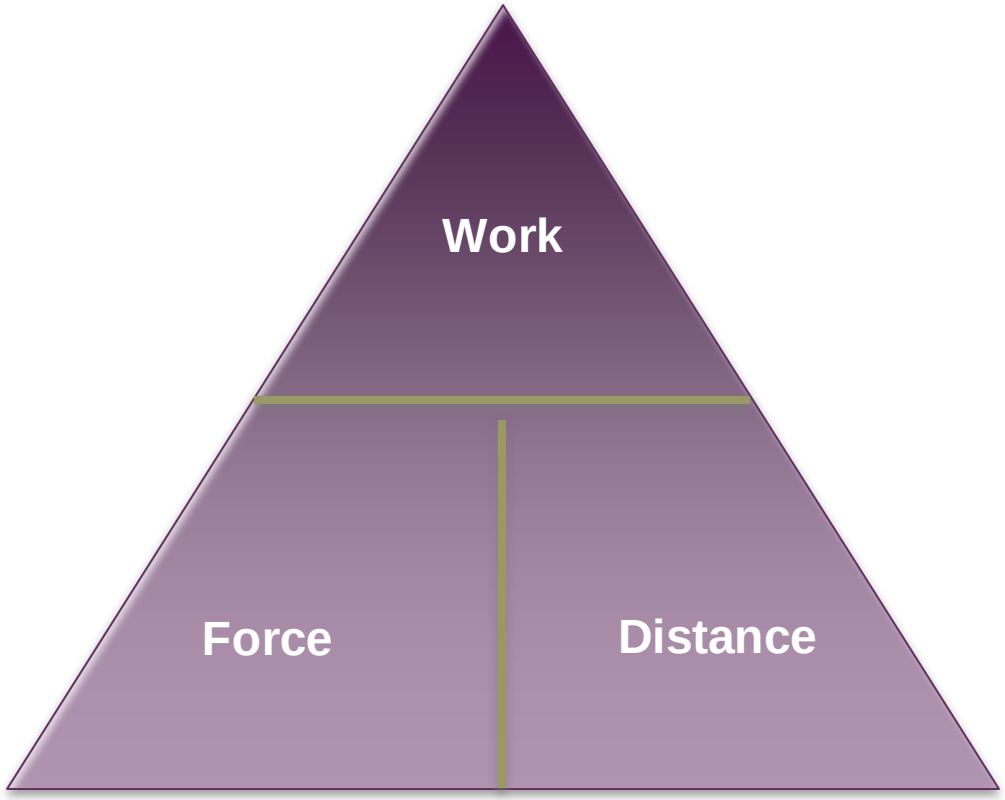
- Work is a force exerted on an object that moves the object some distance.

- **Formula:**
  - **Work= force X distance**
    = F x d

  - Work is measured in Joules (J)
  - Force is measured in Newtons (N)
  - Distance can be in a variety of measurements.

What is Work?

Work….work….work….



Practice Problems:

Example 1: You exert a force of 2N on a lever and it moved 0.6m. Calculate the work.

Work = force x distance

= 2N x 0.6m

= 1.2J

Practice Problems:

Example 2: If the work done on a car is 3J and the distance travelled was 10m, find the force.

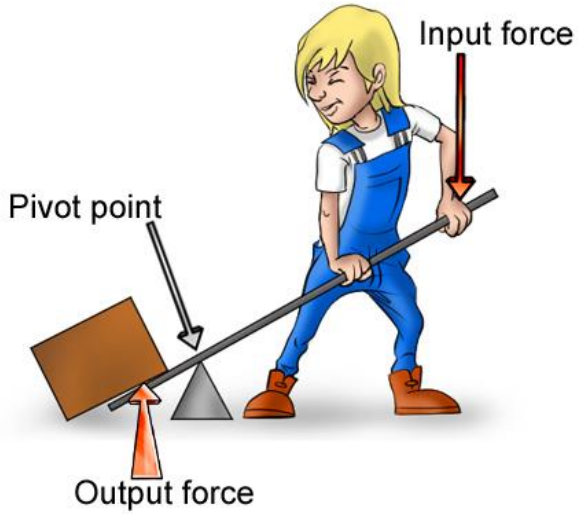
Force = work / distance

= 3J/10m

= 0.3N

Work Input and Work Output

- The work you do on the machine is called the input work.
- The work the machine does on the load is called output work.



Mechanical Advantage

- Input work is the work you do on a machine.
- Output work = work the machine does on the load (object)
- Mechanical Advantage (MA) is the comparison of the force produced by a machine to the force applied to the machine.

Mechanical Advantage

- Formula:

$$\text{Mechanical Advantage} = \frac{\text{Load force } (F_L)}{\text{Effort force } (F_E)}$$

Practice Problems:

Ex 1: If you apply an effort force of 500N to a branch and the back of the truck weighs 2500N, what is the MA?

$MA = F_{(l)} / F_{(e)}$

$= 2500N/500N$

$= 5$

Practice Problems:

Ex 2: If the MA of a wedge is 9.6 and you applied an input force of 50N, what is the output force?

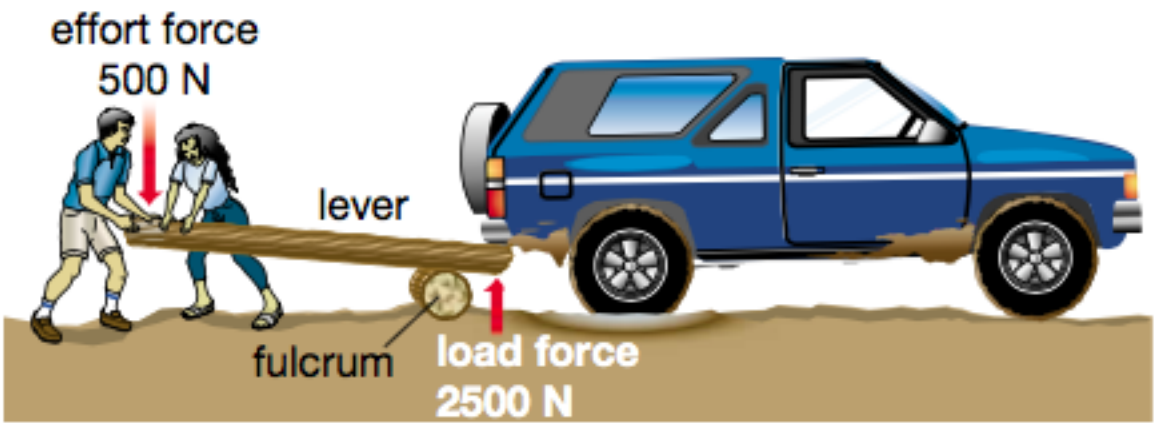
Load Force = MA x effort force

= 9.6 x 50N

= 480 N

Mechanical Advantage

- Any object with a MA greater than one allows the user to move a large load with a smaller effort force.



Review

- Kahoot: Work & Mechanical Advantage Review