Name: _____ Date: 12/3/18 Period: _____

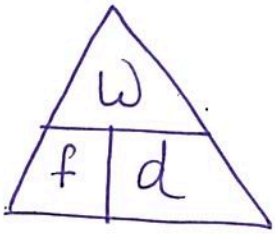
Calculating Work

Work has a special meaning in science. It is the product of the force applied to an object and the distance the object moves. Solve the following problems.

W = Force x Distance	
W = F x d	Force = newtons
	Distance = meters

1. A book weighing 1.0 N is lifted 2 meters. How much work was done?

Formula	$W = f \times d$
Substitution	$W = 1.0\ N \times 2\ m$
Final Answer with Units	$W = 2\ J$



2. A force of 15 N is used to push a box along the floor a distance of 3 meters. How much work was done?

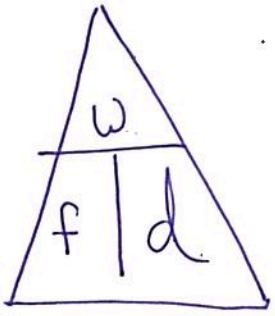
Formula	$W = f \times d$
Substitution	$W = 15\ N \times 3\ m$
Final Answer with Units	$W = 45\ J$

3. It took 50 Joules to push a chair 5 meters across the floor. With what force was the chair pushed?

Formula	$f = \frac{W}{d}$
Substitution	$f = \frac{50\ J}{5\ m}$
Final Answer with Units	$f = 10\ N$

4. A force of 100 N was necessary to lift a rock. A total of 150 J of work was done. How far was the rock lifted?

Formula	$d = \frac{W}{f}$
Substitution	$d = \frac{150\,J}{100\,N}$
Final Answer with Units	$d = 1.5\,m$



5. It took 500 N of force to push a car 4 meters. How much work was done?

Formula	$W = f \times d$
Substitution	$W = 500\,N \times 4\,m$
Final Answer with Units	$W = 2000\,J$

6. A young man exerted 9,000N of force on a stalled car and was unable to move it. How much work was done on the car?

Formula	$W = f \times d$
Substitution	$W = 9000\,N \times 0\,m$
Final Answer with Units	$W = 0\,J$

Name: _____ Date: 12/3/18

Science 7

Work and Machines NOTES

Aim: I can explain how machines make work easier.

Do Now: Worksheet

Notes:

Machines

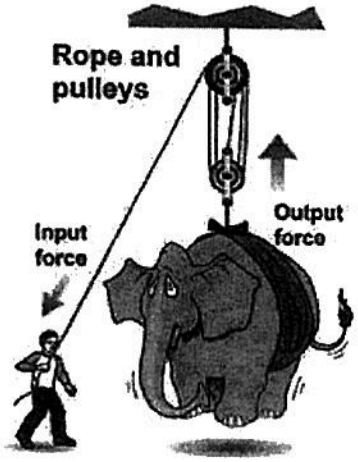
- A device that makes Work easier
- A machine makes work easier by changing at least one of three factors:
  - The amount of force you exert
  - The distance over which you exert the force
  - The direction in which you exert the force

Input Force (Effort Force)

- The force you exert on the machine.

Output Force (Resistance Force)

- The force exerted on an object by a machine.



Mechanical Advantage

- The number of times a machine multiplies the effort force.

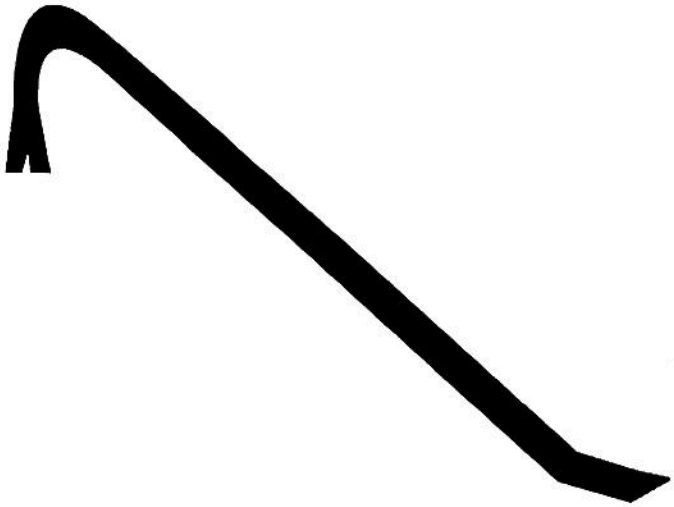
$$\textit{Mechanical Advantage} = \frac{\textit{Output Force}}{\textit{Input Force}}$$

$$MA = \frac{F_{OUT}}{F_{IN}}$$

Example Questions:

1. A worker applies an input force of 20N to pry open a window that has an output force of 500 N. What is the mechanical advantage of the crowbar?

Formula: $ma = \frac{out}{in}$
Substitute: $ma = \frac{500\,N}{20\,N}$
Final Answer with Units: $ma = 25$



2. You exert an input force of 10N on a can opener, and the opener exerts an output force of 30 N. Calculate the mechanical advantage.

Formula: $ma = \frac{out}{in}$
Substitute: $ma = \frac{30N}{10N}$
Final Answer with Units: $ma = 3$