Name: **Key**

Science 7

Date: _____

Work and Machines

Aim: I can differentiate between work and power.

Do Now: Solve the following work word problems. Write all **3** steps.

$\frac{W}{F|d}$

1. You carry a 20 N bag of dog food up a 6 m flight of stairs. How much work did you do?

$$W = Fd = 20N(6m) = 120.0 \text{ J}$$
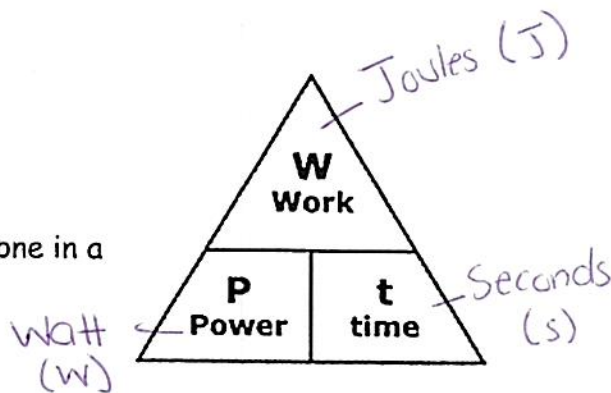
2. How much energy do you give a 200N couch if you push it 35 meters?

$$W = Fd = 200N(35m) = 7,000.0 \text{ J}$$

Notes:

Power

- How _____Quickly_____ work is done.
- The _____amount_____ of _____work_____ done in a certain amount of _____time_____.

$$\frac{W}{P \mid t}$$

Joules (J)

W Work

P Power   t time

Watt (W)   Seconds (s)

Example Questions:

1. A figure skater lifts his partner, who weighs 450N, 1.0 m in 3.0s. How much power is required?

Formula: $P = W/t \rightarrow P = \frac{Fd}{t}$	$W = Fd$
Substitute: $P = \frac{450N(1.0m)}{3.0s} = \frac{450 \text{ J}}{3.0s}$	
Final Answer with Units: $P = 150.0 \text{ W}$	

2. Frank does 2400J of work in climbing a set of stairs. If he does the work in 6 seconds, what is his power output?

Formula: $P = W/t$
Substitute: $P = \frac{2400 \text{ J}}{6s}$
Final Answer with Units: $P = 400.0 W$

3. A small motor does 4000J of work in 20 seconds. What is the power of the motor in watts?

Formula: $P = \dfrac{W}{t}$
Substitute: $P = \dfrac{4000J}{20s}$
Final Answer with Units: $P = 200.0\,W$

4. If 68 W of power is produced in 18 seconds, how much work is done?

Formula: $W = Pt$
Substitute: $W = 68W\,(18s)$
Final Answer with Units: $W = 1,224.0\,J$

5. A person weighing 600 N gets on an elevator. The elevator lifts the person 6 m in 10 seconds. How much power was used?

Formula: $P = W/t$
Substitute: $P = \dfrac{600N\,(6m)}{10s} = \dfrac{3600J}{10s}$
Final Answer with Units: $P = 360.0\,W$

6. You go rock climbing with a pack that weighs 70N and you reach a height of 30 m. If you finished the climb in 600s, what was your power?

Formula: $P = W/t$
Substitute: $P = \dfrac{70N\,(30m)}{600s} = \dfrac{2100J}{600s}$
Final Answer with Units: $P = 3.5\,W$