# Physics Honors: Work and Power

## Work

Work: The force applied through a distance

$$W = F^*d^*\cos(\Theta)$$

- W = Work (J)
- F = Force(N)
- d = distance (m)
- $\Theta$  = angle of the applied force

### **Work Practice Problems**

A hockey player uses a stick to exert a 4.5N force directly to a hockey puck over a displacement of 0.15m forward. How much work does the stick do on the puck?

#### **Work Practice Problems**

 Together, two people exert a 925N force at 25 degrees above horizontal when pushing a car a distance of 35m to the nearest gas station. How much work do the people do?

1. If they got two more friends to help and doubled their force, how much work must they do to push the same car the same distance?

# Questions for Conversation:

• Can you do work if you don't move the object?

• What does a negative mean for work?

• Is work a vector?

#### Power

Power is the time it takes for work to occur

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

P = Power (Watts)

W = Work (Joules)

t = time (seconds)

#### **Power Practice Problems**

An electric motor lifts an elevator 9.0m in 15.0s by exerting an upward force of 1,200 N. What power does the motor produce?

If the elevator moves the same elevator the same distance in half the time, what power would the motor need to produce?

# Work/Energy Theorem

The Work/Energy Theorem states that the work done on a system is equal to the change in the system's energy

W = E

W = Work (Joules)

E = Energy (Joules)