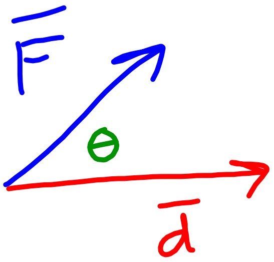
# ESTM Equations:

$$W = F\, d \cos(\theta)$$




- $W \rightarrow$ Work, J
- $F \rightarrow$ force, N
- $d \rightarrow$ displacement, m
- $\theta \rightarrow$ angle, degrees

$$E_{El} = \frac{1}{2} k (\Delta x)^2$$

- $E_{El} \rightarrow$ Elastic Energy (spring), J
- $k \rightarrow$ spring constant, $\frac{F}{m}$
- $\Delta x \rightarrow$ displacement, m

$F = k(\Delta x)$

$$E_K = \frac{1}{2}mv^2$$

$E_K$ → Kinetic Energy, J

$m$ → mass, kg

$v$ → velocity, m/s

$$E_g = ma_gh$$

$E_g$ → Gravitational Potential Energy, J

$m$ → mass, kg

$h$ → height, m

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

P → Power, W

W → Work, J

t → time, s

E → Energy, J

$E_{Th}$ → this comes from non-conservative forces

- Force of friction
- Air resistance

- What happens to the energy when the force occurred?
  - Non-conservative → Energy is lost to $E_{Th}$ and sound (usually)
  - Conservative → Energy is transferred completely between forms

# ESTM Worksheet 5

2)



$$P = \frac{E_g}{t} = \frac{m a_g h}{t}$$

$$= \frac{(12\ kg)(9.8\ m/s^2)(10\ m)}{5\ s}$$

$$= 235.2\ W$$