Power
Average Power: Work per Time

$$\bar{P} = \frac{W}{\Delta t} = \frac{F d}{\Delta t} = F \bar{v}$$

Instantaneous Power:

$$P = \frac{dW}{dt} = \frac{F dx}{dt} = F \cdot v$$

SI unit of power = J/s = **Watt** [W]

British system uses horsepower. 1 hp = 746 W

Kilowatt hour = unit of energy.

1 KWh = 1000 W (3600 s) = 3.6 x 10^6 J

Formulas on AP Sheet:

$$P = \frac{dW}{dt}$$

$$P = F \cdot v$$

$$W = \int_{t_1}^{t_2} P dt$$
**Ex1:** An elevator has a mass of 1800 kg. It experiences a constant frictional force of 4000 N.

a) What power delivered by the motor is needed to lift the elevator at a constant speed of 3.0 m/s?

b) The elevator now comes to rest in 6 s. What is the average power during this time period?
Ex2: A 5 kg object’s position varies with time according to $x = 4t^2 - 20$

Find: $\text{KE}(t)$
$\text{F}(t)$
$\text{P}(t)$

And the net work done from $t = 1.0$ to $t = 3.0$ s

Formulas on AP Sheet:

\[
P = \frac{dW}{dt}
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\[
P = \text{F} \cdot \text{v}
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