POWER

POWER = The **RATE** at which **Work** is done. So **work** divided by time is **power**.

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

The Unit is Joules/Second

This has been named the watt, (for James Watt) and has the abbreviation W.

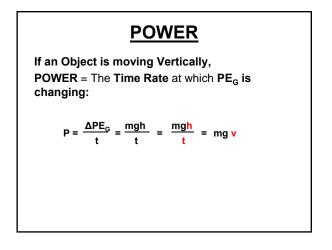
1 kilowatt (kW) = 1000 Watts

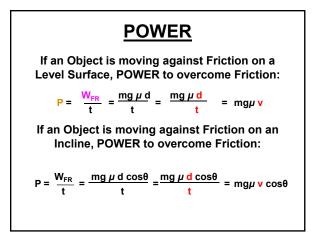
1 horsepower (hp) = 746 Watts

POWER
Remember: W = Fd

$$P = \frac{Fd}{t} = \frac{Fd}{t} = Fv$$
During Acceleration, $\Sigma W = \Delta KE$:

$$P = \frac{\Sigma W}{t} = \frac{\Delta KE}{t} = \frac{\frac{1}{2} m v_{t}^{2} - \frac{1}{2} m v_{t}^{2}}{t}$$





POWER

A 2000 kg car starts from rest and accelerates to a final speed of 25 m/s in 15 seconds. What was the power output of the car?

 $P = W/t = \Delta KE / t$

 $P = (1/2 mv_f^2 - 1/2 mv_i^2) / t$

P = [½ 2000kg(25 m/s)² - ½ 2000kg(0 m/s)²] / 15 sec

P = <u>41,667 watts</u>

POWER

A 30 kg gazelle uses 900 watts to jump up 8 meters. What was its speed?

P = mgv

<u>3.06 m/s</u> = v