Jen

Section 4.2: Newton's Second Law

Newton's **first** law told us that if no net force acts on an object, its acceleration is ___zero___.

So, it's fair to assume that if there *is* a net force (a.k.a. unbalanced force, resultant force), then the acceleration will be ___not zero___.

Newton's **second** law tells us how to calculate that acceleration:

Resultant force or net force

sigma (sum of)

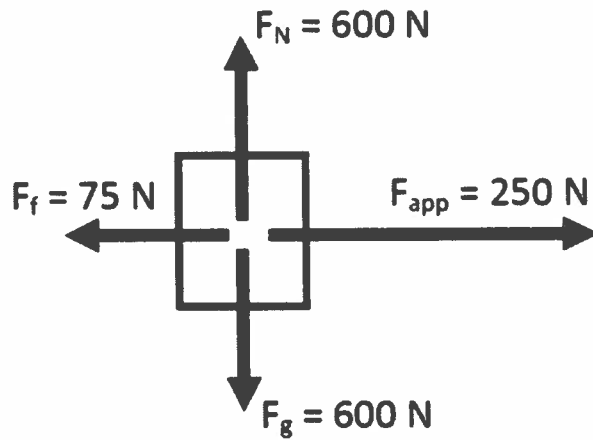$$\sum \vec{F} = m\vec{a}$$

kg   m/s²

Newton's Second Law

Take a look at the units on both sides...

$$N = kg \frac{m}{s^2}$$

Example: A 650 kg car accelerates at 4 m/s² south. What is the net force acting on it?

$$\sum \vec{F} = m\vec{a}$$
$$= 650 (-4)$$
$$= -2600 \, N$$
$$= 2600 \, N \text{ south}$$

Example: Determine the magnitude and direction of the net force on the object below.

$$F_N = 600 \text{ N}$$

$$F_f = 75 \text{ N} \qquad F_{app} = 250 \text{ N}$$

$$F_g = 600 \text{ N}$$

Find $\Sigma \vec{F}$

Answer:
175 N East

= Net force
= Resultant force

175   75
600   600
250

OR
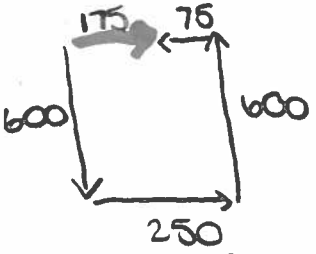
Find $\Sigma \vec{F}$

x	y
$\Sigma \vec{F}$	$\Sigma \vec{F}$
250 - 75	600 - 600
= 175 N	= 0