Weight & mass

mass - the amount of matter in an object (kg)

weight - the force of gravity acting on an object (N)

$$\vec{F_g} = m\vec{g}$$

where F_g is the weight (force of gravity) (N)

m is the mass (kg)

g is $9.81\ m/s^2$ near the earth's surface (m/s^2)

P137

4. $m = 1.00\ kg$

$\vec{F_g} = 3.25 \times 10^{-2}\ N\ [down]$

$\vec{g} = ??$

$$\vec{F_g} = m\vec{g}$$

$$\vec{g} = \frac{\vec{F_g}}{m}$$

$$\vec{g} = \frac{3.25 \times 10^{-2}\ N\ [down]}{1.00\ kg}$$

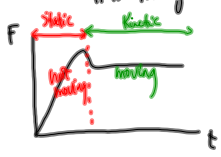
$$\vec{g} = 3.25 \times 10^{-2}\ m/s^2\ [down]$$

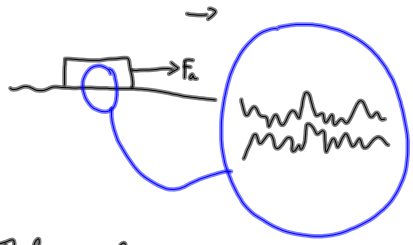
Friction

friction is a force that opposes motion

Static friction - the force you need to overcome in order to just start an object moving

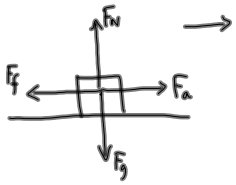
Kinetic friction - the force that an object experiences while it is moving





The frictional force depends on:
- nature of the surfaces in contact
- the weight of the object (really the normal force)

FREE BODY DIAGRAM (FBD)



F_a is the applied force
F_f is the frictional force (static or kinetic)
F_g is the force of gravity or weight
F_N is the normal force (always perpendicular to the surface)

Vertically:

$F_N = F_g$ (as long as F_a is horizontal and the surface is horizontal)

Horizontally:

Static: $F_a = F_f$ at the instant the object starts to move

Kinetic: $F_a = F_f$ the object moves at constant velocity

The frictional force can be calculated using:

$$F_f \propto F_N$$

$$\boxed{F_f = \mu F_N}$$

Where F_f is the frictional force (N) (static/kin
F_N is the normal force (N) ($F_N = F_g$)
μ is the coefficient of friction (depends on the surfaces)

TO DO

① p137 - 141

② TRY THIS on p140