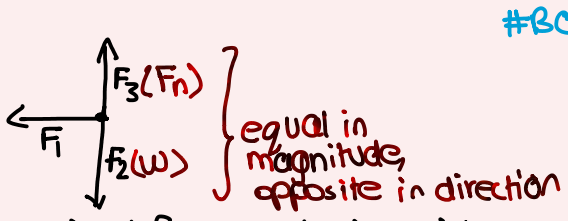
# Free body diagrams

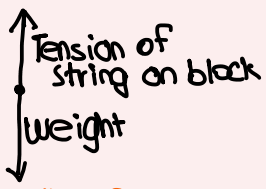
Wednesday, 13 March 2024 12:09 PM

Purpose: shows the forces acting on the object vertically or horizontally to calculate resultant/net force of the object

#Box resting on a surface



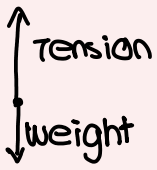

$F_1$: Frictional force and air resistance acting on the box
$F_2$: Gravitational force of box on Earth
$F_3$: Normal force by surface



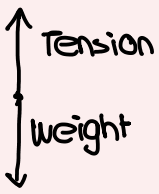

#Block attached to a rope

*Tension is the force that always acts through a rope

Tension > weight




#block is pulled upwards with constant acceleration



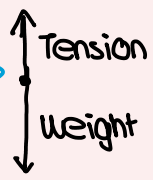

#Block is pulled up with constant velocity, zero acceleration

According to newton's first law of motion, an object will continue to stay at rest or constant motion, unless acted upon by a force

Second law:
$F_{net} = ma$
$a = 0$
$\therefore F_{net} = 0$

Third law:
Both the tension and weight are equal in magnitude, opposite in direction

Weight > tension




#Block is descending lower with a downward acceleration using a rope

#Note: Negative acceleration ≠ deceleration
Deceleration → Object is slowing down in speed
Negative acceleration → Acceleration in the negative direction