

Newton's 3 laws of motion

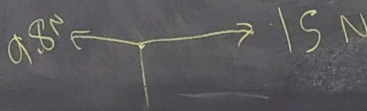
1st law - Law of Inertia

Objects at rest tends to stay at rest.
Objects in motion tend to stay in motion,
Unless acted upon by a net external force

2nd law - $F_{net} = ma$

3rd law - Action - reaction

Every force has an equal & opposite 'reaction' force



Free body diagram

Shows only the forces acting on one object. These forces are the only ones that affect the motion of an object. Adding the forces as vectors gives you the net force.



Weight = Mg

mass \times gravity
 $g = 9.8 \frac{m}{s^2}$

Normal force - Force that acts on a surface that is perpendicular to that surface.



Friction - resistive force between surfaces, Always opposes motion.

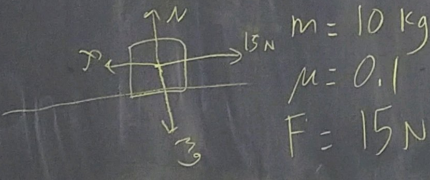
$$f = \mu N$$

Friction = (coefficient of friction) (Normal Force)

Static friction - Surfaces trying to slide

Kinetic friction - Surfaces actively sliding

generally $\mu_s \geq \mu_k$



ex) a) what is weight of box?

- b) what is the Normal force?
- c) what is the force of friction?
- d) what is the net force
- e) what is the acceleration

a) $\text{Weight} = mg = (10 \text{ kg})(9.8 \text{ m/s}^2) = 98 \text{ N}$

b) Normal force = 98 N

c) $f = \mu N = (0.1)(98 \text{ N}) = \underline{9.8 \text{ N}}$

d) $F_{\text{net}} = 15 \text{ N} - 9.8 \text{ N} = \underline{5.2 \text{ N}}$

e) $F_{\text{net}} = ma \quad a = \frac{F_{\text{net}}}{m} = \frac{5.2 \text{ N}}{10 \text{ kg}} = \underline{0.52 \text{ m/s}^2}$