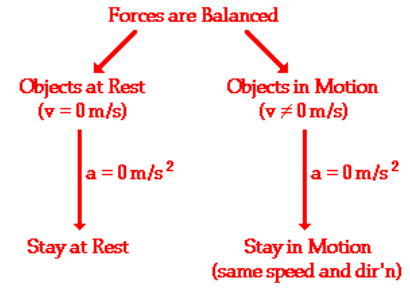
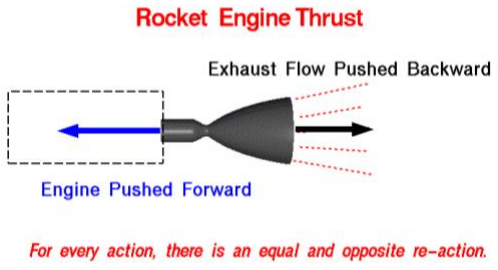
2.1, 2.2 *Newton's First and Third Laws of Motion*

First Law

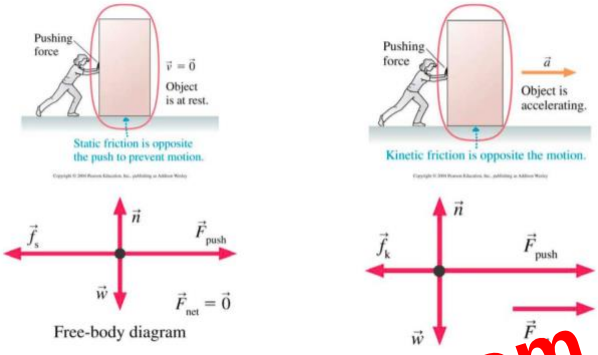


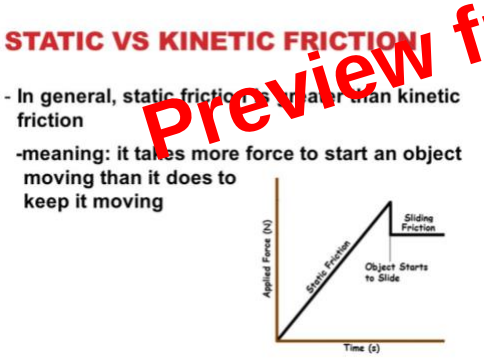
Third Law



2.3 *Friction (according to Coulomb)*

Coulomb's Theory of Friction





1. Friction oppose *relative motion*
2. (i). $f_s \leq f_{s-max} = \mu_s N$

Between 2 obj. not moving relative to e/o

(ii). $f_s = f_{s-max}$

When sliding about to happen

3. $f_k = \mu_k N$

Between 2 obj. moving relative to e/o

N.B.

- Friction may happen in direction of motion of obj. in question is moving slower relative to whatever it is on
- μ_s & μ_k reflects properties of surface in contact, irrelevant to area
- μ_k irrelevant to speed
- $\mu_s \gg \mu_k \gg \mu_r$ (where μ_r = rolling friction)

Just the Tip™: isolate systems, then treat as whole.
Just the Tip™: if it is unknown which way friction acts, use a dotted line pointing both direction. Then evaluate which direction is the net movement (without friction), s.t. the friction acts at the opposite direction.

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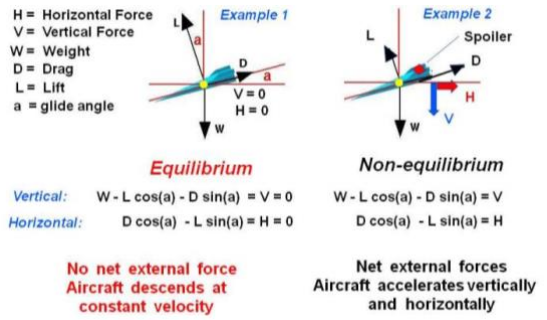
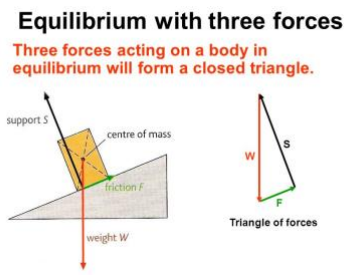
2.4 *Forces in Equ$^{\underline{m}}$*



$$\sum vectors = 0$$

Just the Tip™: This bit is just all about resolving components.



Just the Tip™: triangle rules (cosine/sine) can be used to resolve components.