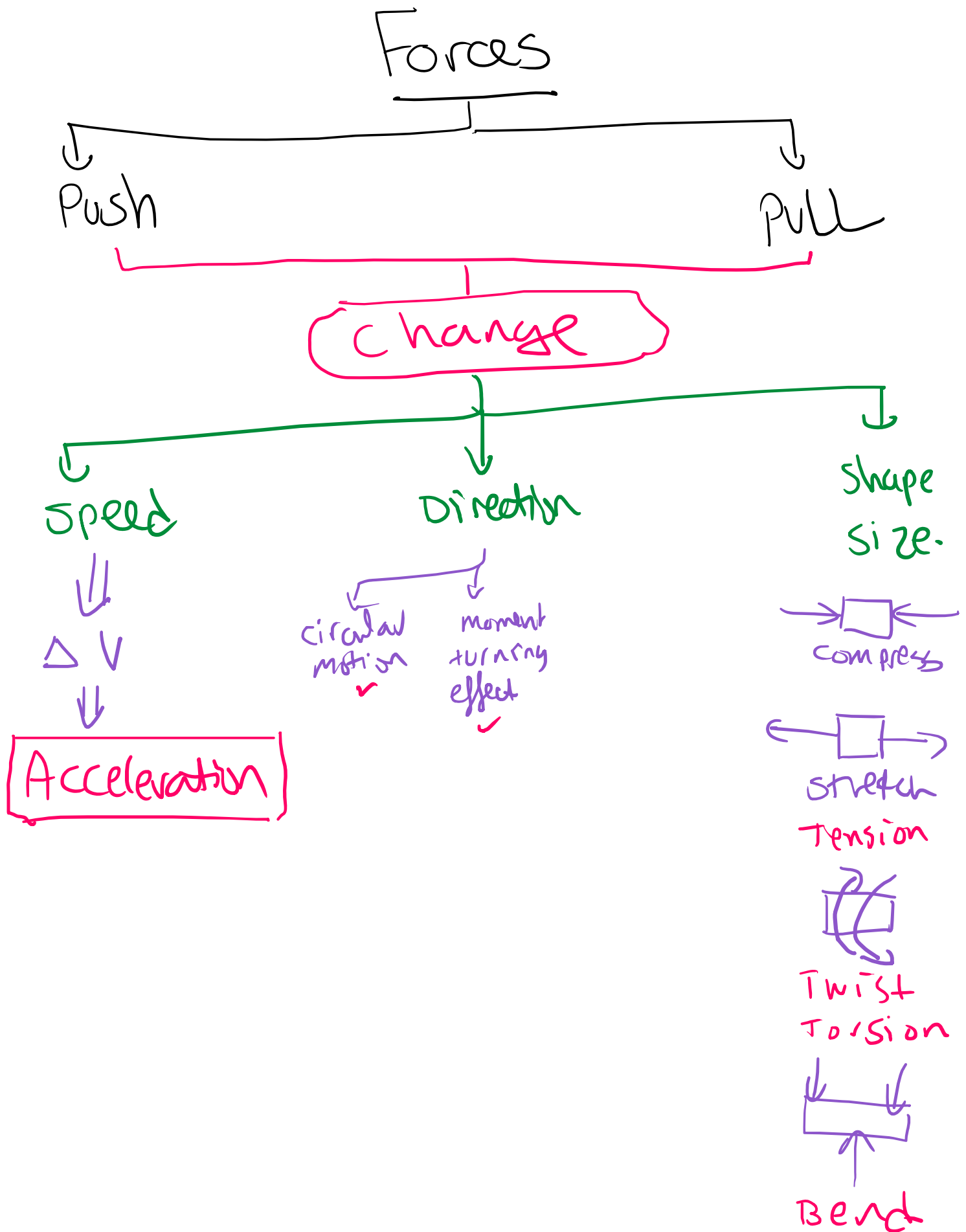




Force (Newton) (N)

Newton's 1st law "Law of inertia"

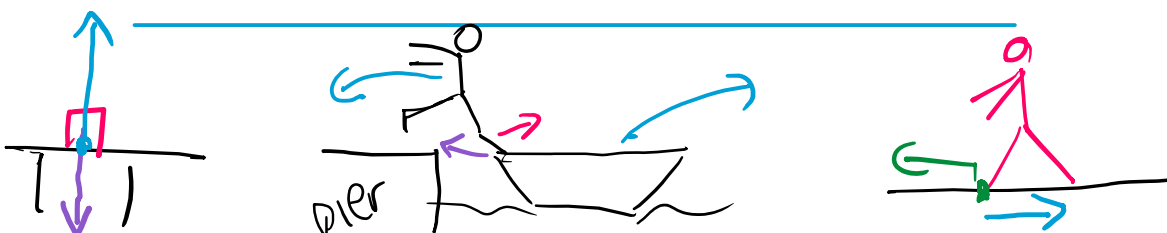
Any object stays at rest, or moving at constant speed in a straight line unless acted on by a force.

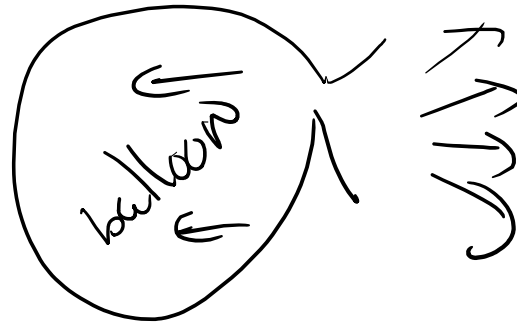
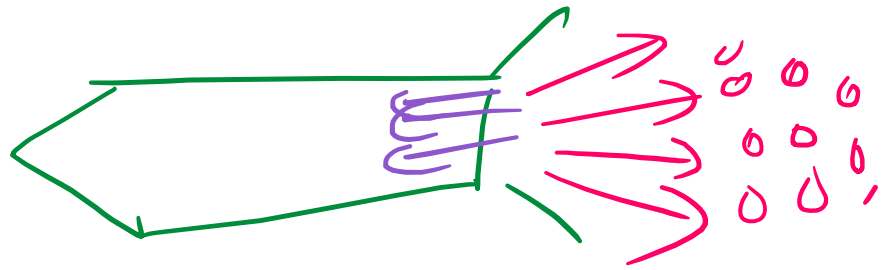
Net force = 0 so no change.

Net Force $\neq 0$ so there is change.

net force = 0 $\Rightarrow$ Equilibrium.

Second law: for every force there is an equal & opposite force





Newton's 3rd law

If a force is applied on an object, it will accelerate

$$F = m a$$

force

mass

acceleration

$$\underline{\underline{F}} = m \uparrow a \downarrow$$

Constant

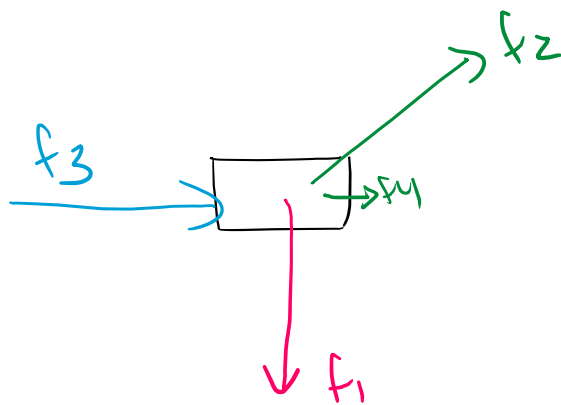
$$f \uparrow = m \downarrow a \uparrow$$

Constant

force diagrams

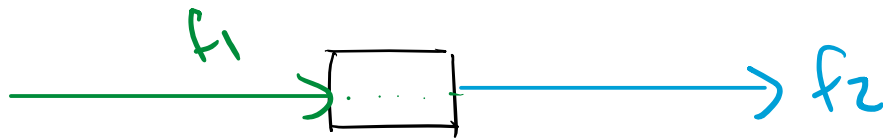


force

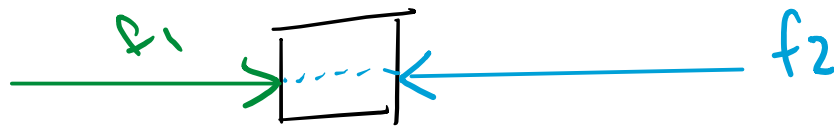


Resultant force

If forces are on the same line



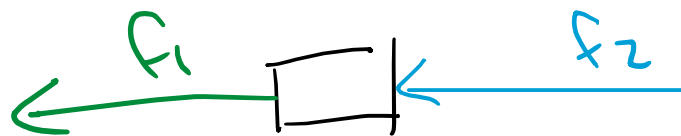
$$\text{Net force} = f_1 + f_2$$



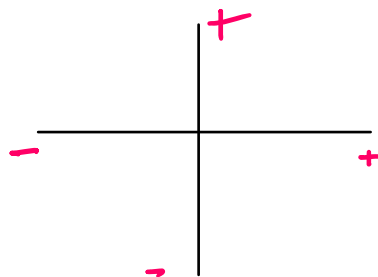
$$\text{net } f = f_1 - f_2$$



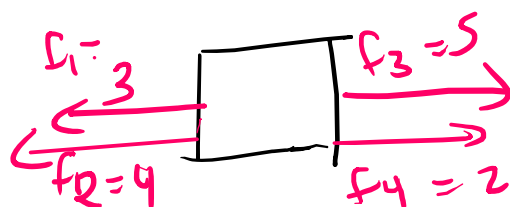
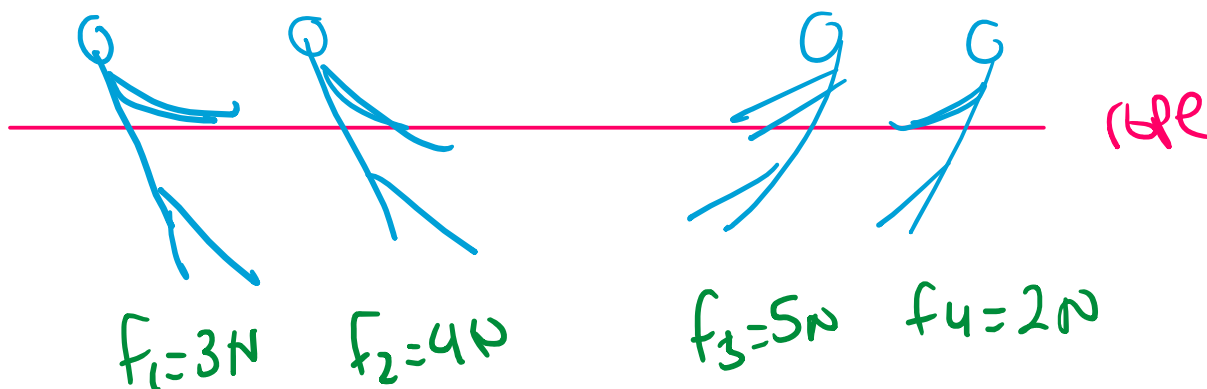
$$\text{net } f = -f_1 + f_2$$



$$\text{net } f = -f_1 - f_2$$



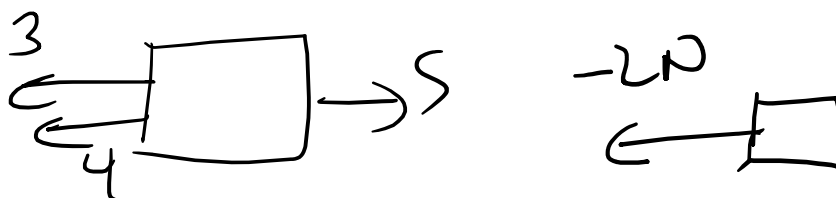
Example



$$\text{net } f = -3 - 4 + 5 + 2 = 0$$

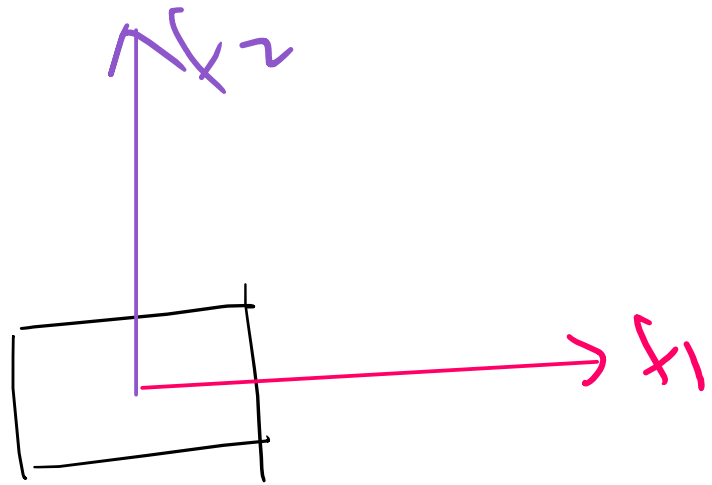
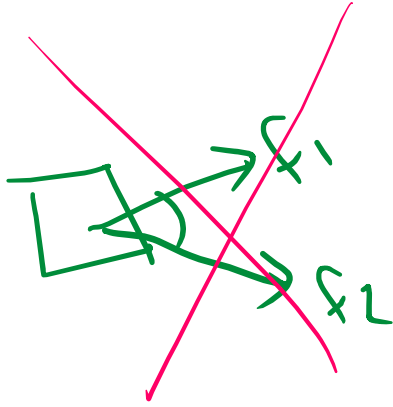


no change

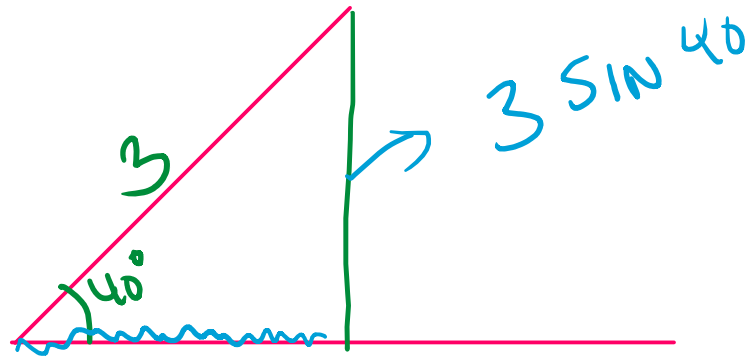


$$\text{net} = -3 - 4 + 5 = -2\text{N}$$

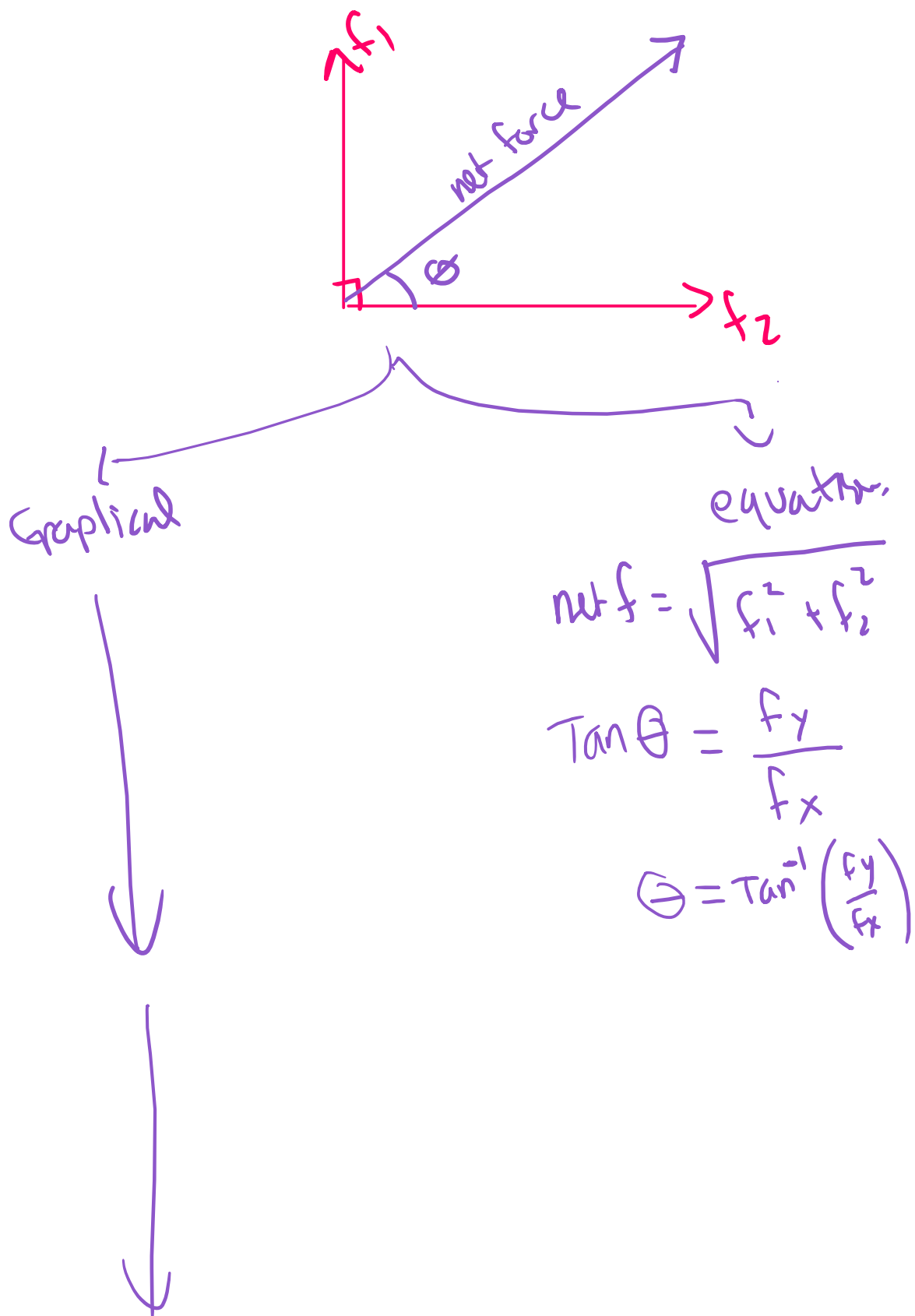
forces perpendicular



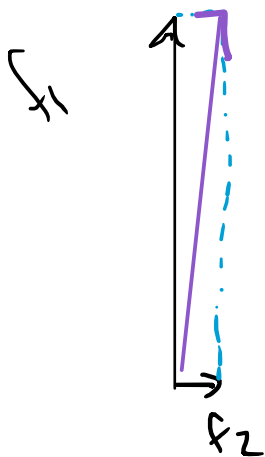
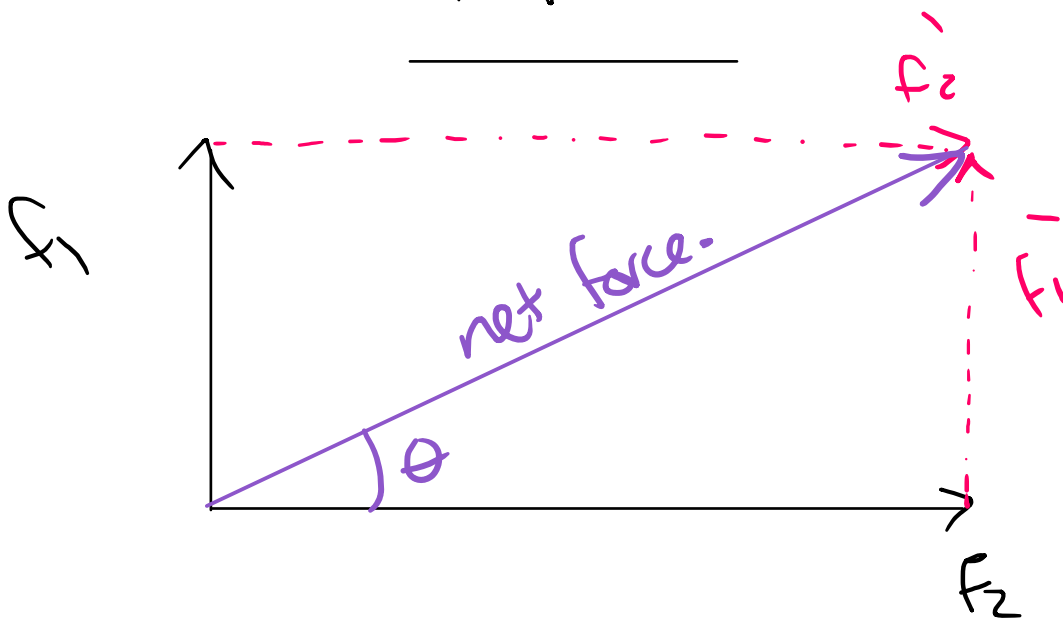
not in
syllabus



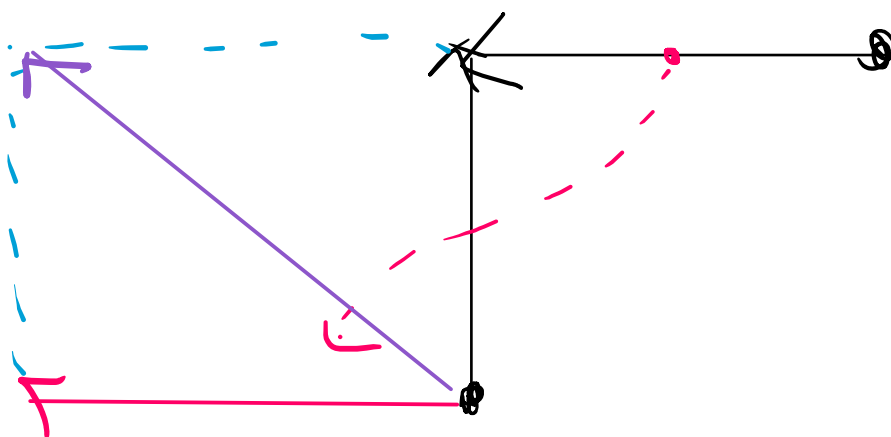
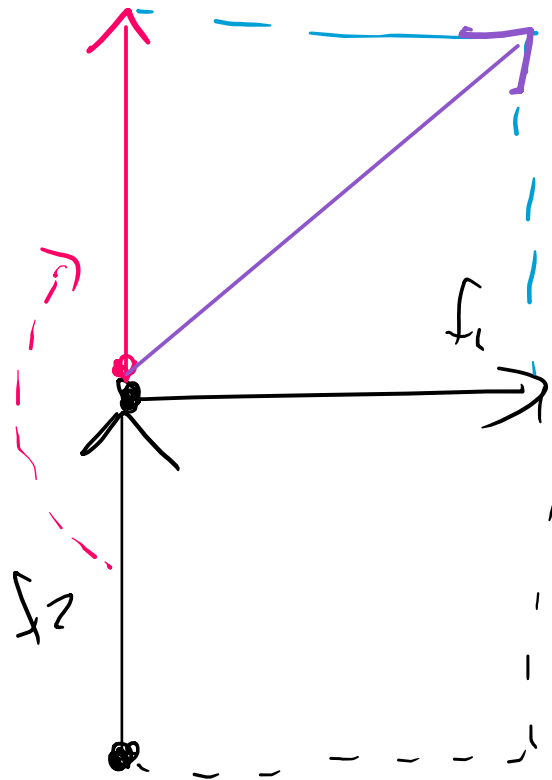
$$3 \cos (40)$$



Graphical



- ① make bases of all forces connected
- ② complete parallelogram
- ③ Resultant force $\Rightarrow$ diagonal starting from bases—



forces

Thrust

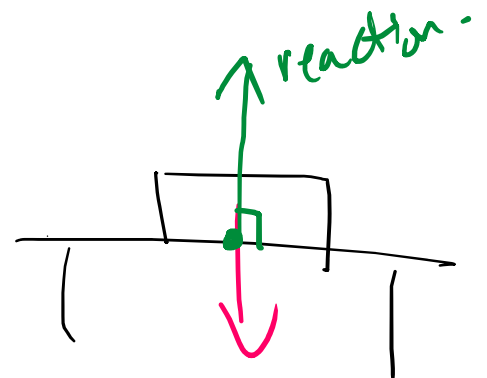
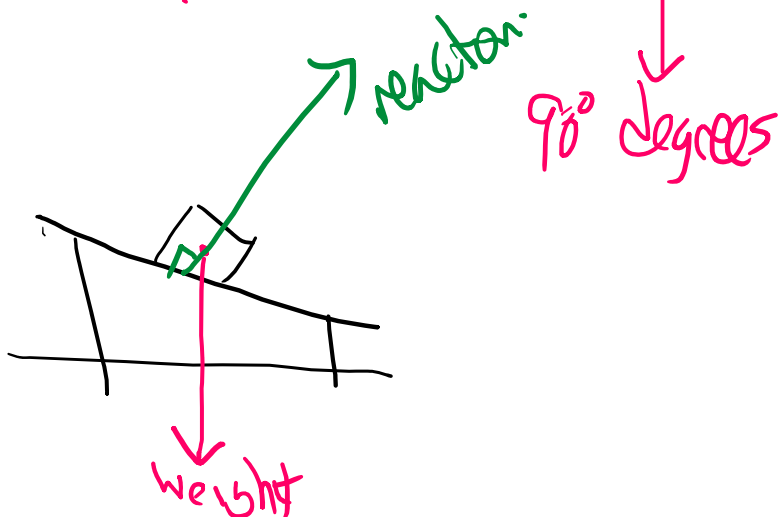
"push" usually $\rightarrow$ vehicles
people pushing something

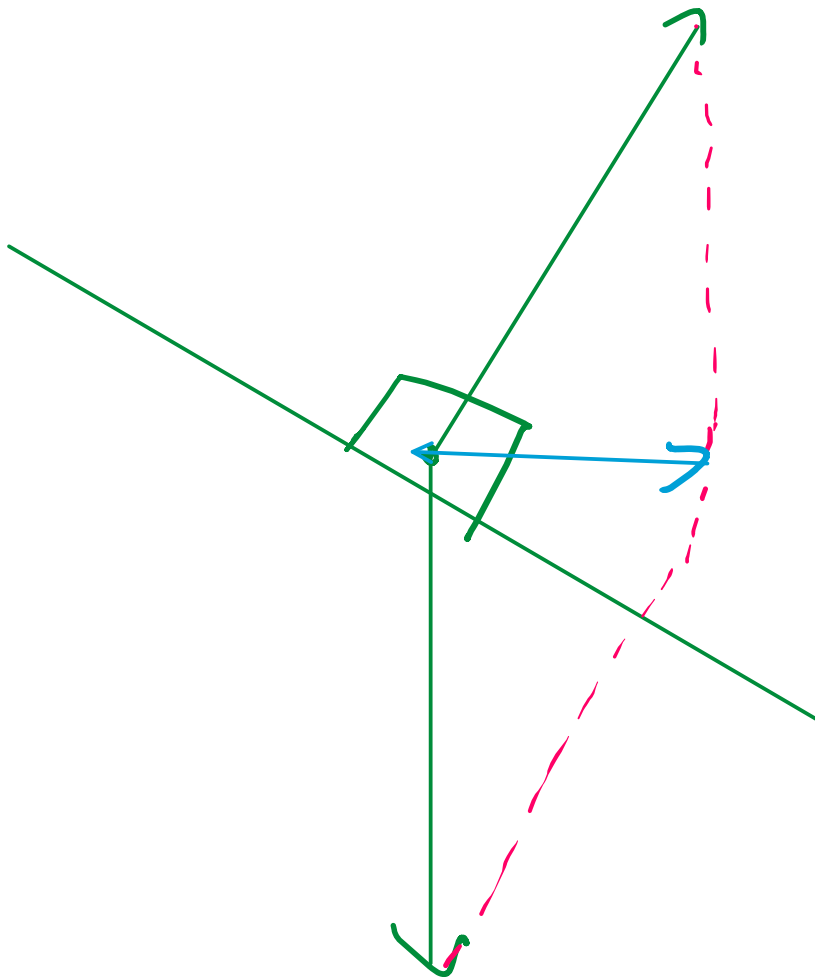
upthrust



usually water lifting another object.

Reaction force = Normal force = Surface force





Weight = force

Always down

$$W = m g$$

force

3 non contact forces

All forces must touch object in order to move it

- ① Gravity
- ② magnet
- ③ charge (+) (-)

friction