Newton's Laws

1. Obj at rest remains at rest.....
2. $\vec{F} = \frac{d\vec{p}}{dt} = m\vec{a}$
3. Action – Reaction

$\vec{p} = m\vec{v}$

$\vec{F}_{NET}$

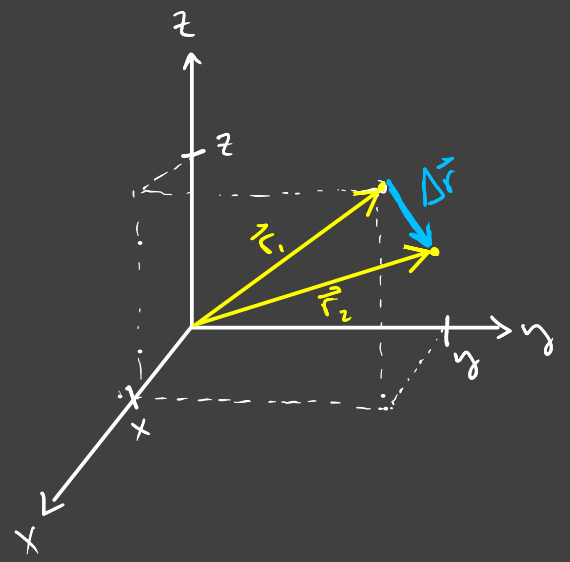
$\vec{a} = \frac{d\vec{v}}{dt} \approx \frac{\Delta\vec{v}}{\Delta t}$

velocity

$\frac{d\vec{x}}{dt} \approx \frac{\Delta\vec{x}}{\Delta t}$

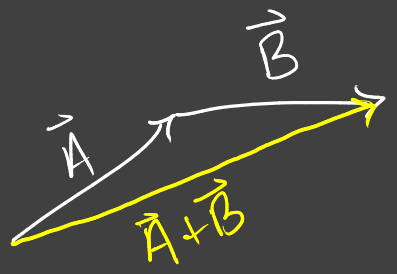
$x \Rightarrow$ position

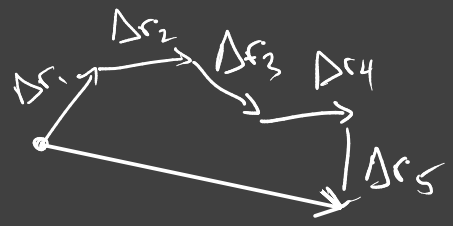
$jerk = \frac{da}{dt}$

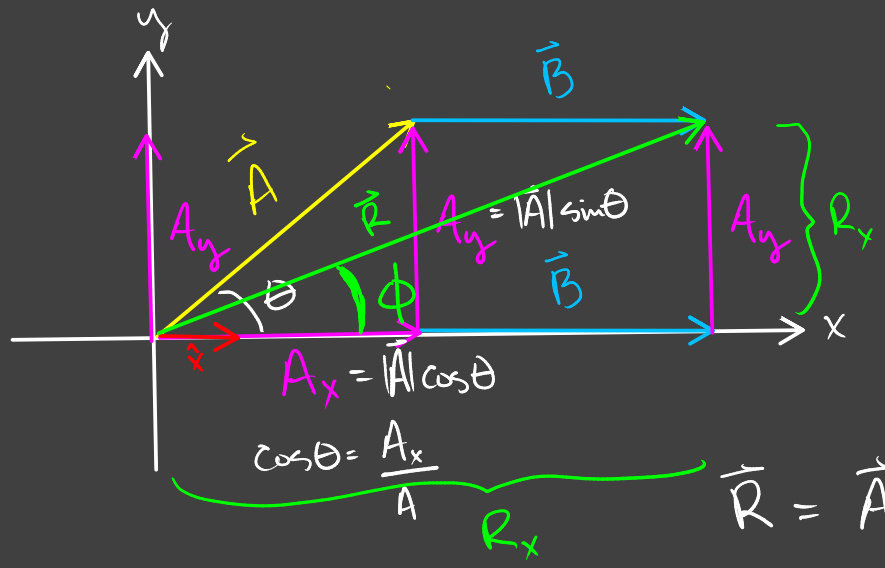


$\vec{r}_1 + \Delta\vec{r} = \vec{r}_2$

$\vec{r}_1$: position; $\Delta\vec{r}$: displacement







$\cos\theta = \frac{A_x}{A}$

$\vec{A} = A_x\hat{x} + A_y\hat{y}$

$\vec{B} = B_x\hat{x} + B_y\hat{y}$

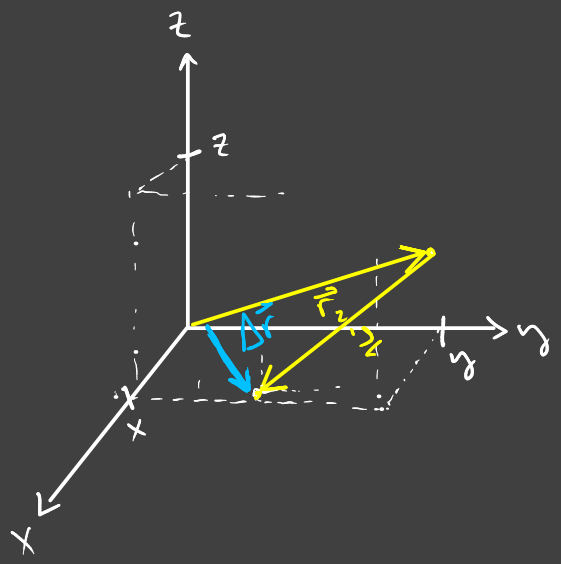
$\vec{R} = \vec{A}+\vec{B} = \overbrace{(A_x + B_x)}^{R_x}\hat{x} + \overbrace{(A_y + B_y)}^{R_x}\hat{y}$

$|\vec{R}| = \sqrt{R_x^2 + R_y^2}$

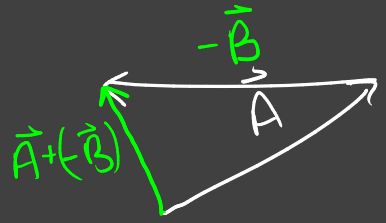
$\tan\phi = \frac{R_y}{R_x} \rightsquigarrow \phi = \tan^{-1}\left(\frac{R_y}{R_x}\right)$

	x	y
A:	A_x	A_y
B:	B_x	B_y
R:	R_x	R_y

$$\Delta\vec{r} = \vec{r}_2 - \vec{r}_1$$



$$\vec{A} - \vec{B}$$



$$\vec{A} - \vec{B} = (A_x - B_x)\hat{x} + (A_y - B_y)\hat{y}$$

- scalar multiplication

$$c\vec{A} = cA_x\hat{x} + cA_y\hat{y} + cA_z\hat{z}$$