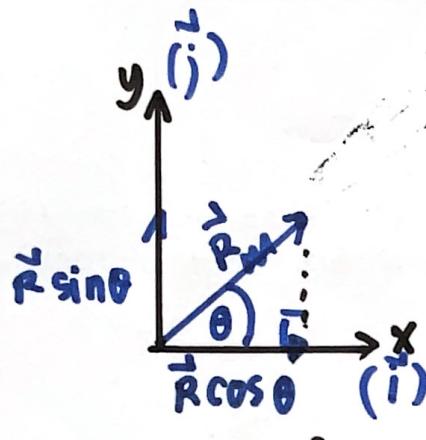


# ทบทวน week k 1

$\vec{R}, \tilde{R}$

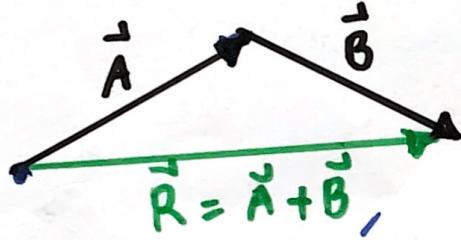


$$|R| = \sqrt{R_x^2 + R_y^2}$$

$$\begin{aligned} \tilde{R}\cos\theta &= R_x \\ \tilde{R}\sin\theta &= R_y \\ \boxed{\tilde{R}_x \hat{i} + \tilde{R}_y \hat{j}} &= \vec{R} \end{aligned}$$

## การรวมเวกเตอร์

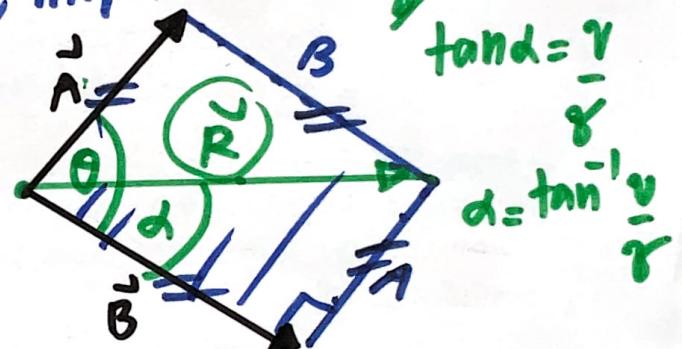
### ① น้ำดื่มชา



$$\vec{R} = \vec{A} + \vec{B}$$

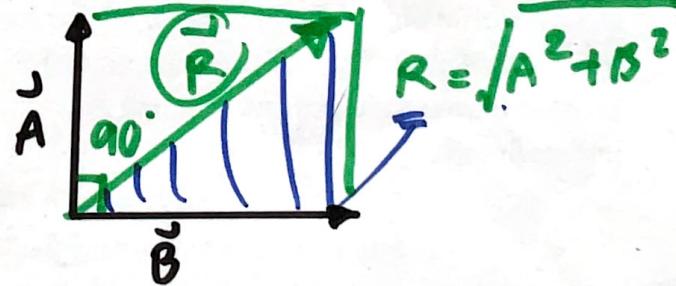
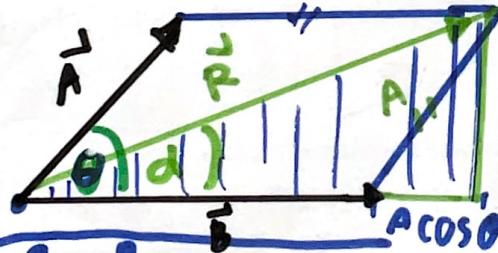
$\vec{R}$  = مجموعลักษณะ

### ② ท่ามกลาง



$$\tan d = \frac{y}{x}$$

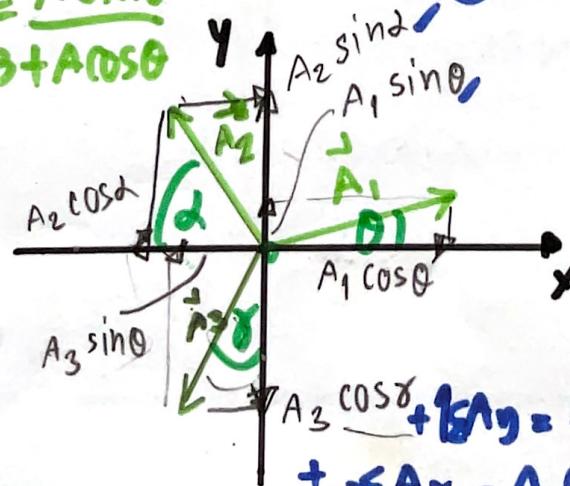
$$d = \tan^{-1} \frac{y}{x}$$



$$R = \sqrt{A^2 + B^2 + 2AB\cos\theta}$$

$$\tan d = \frac{A\sin\theta}{B + A\cos\theta}$$

### ③ มนต์จีบันดู



$$+ A_3 \cos\theta + A_1 \sin\theta = A_2 \sin\theta - A_3 \cos\theta + A_1 \sin\theta$$

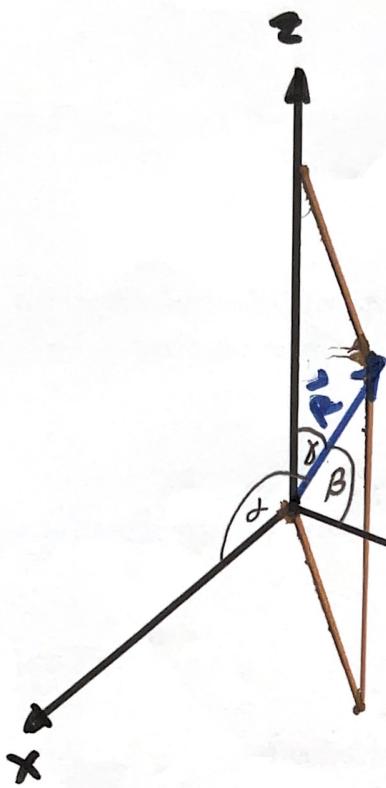
$$+ A_x = A_1 \cos\theta - A_2 \cos\theta$$



$$A = \sqrt{(\sum A_x)^2 + (\sum A_y)^2}$$

$$\tan d = \frac{A_y}{A_x}$$

$$d = \tan^{-1} \frac{A_y}{A_x}$$



$$\underline{R} = R_x \hat{i} + R_y \hat{j} + R_z \hat{k}$$

$$R_x = R \cos \alpha$$

$$R_y = R \cos \beta$$

$$R_z = R \cos \gamma$$

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

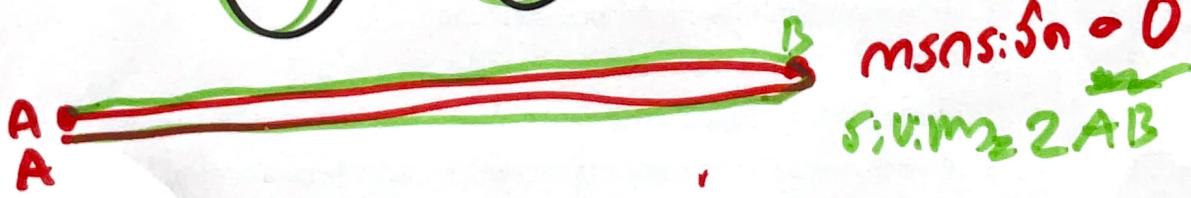
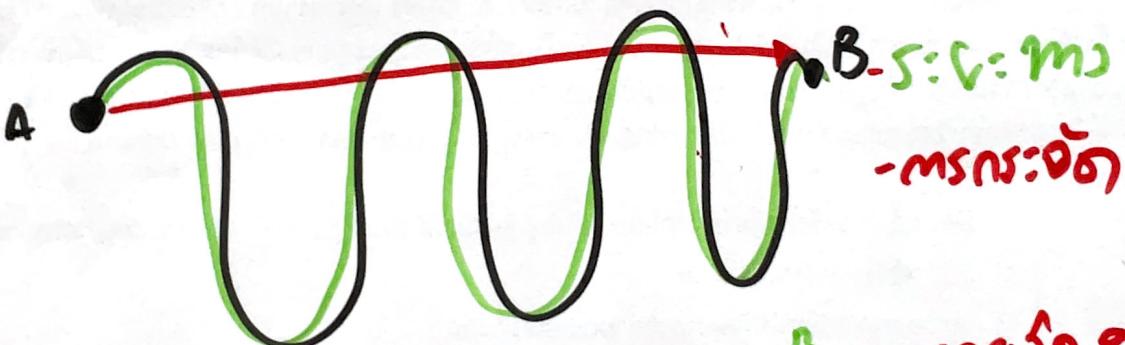
→ مقدار ابرازی ( $\alpha$ )  
 ← مقدار ابرازی ( $x$ )

การเคลื่อนที่  $\rightarrow$    
 { ( kinematics )  $\rightarrow$   
 { ( mechanics ) dynamics  $\rightarrow$

$s = v = m$  (distance)  $(s)(x)$

ระยะทาง / ที่เดิน (displacement)  $(\vec{s})(\vec{x})$

L ระยะทาง



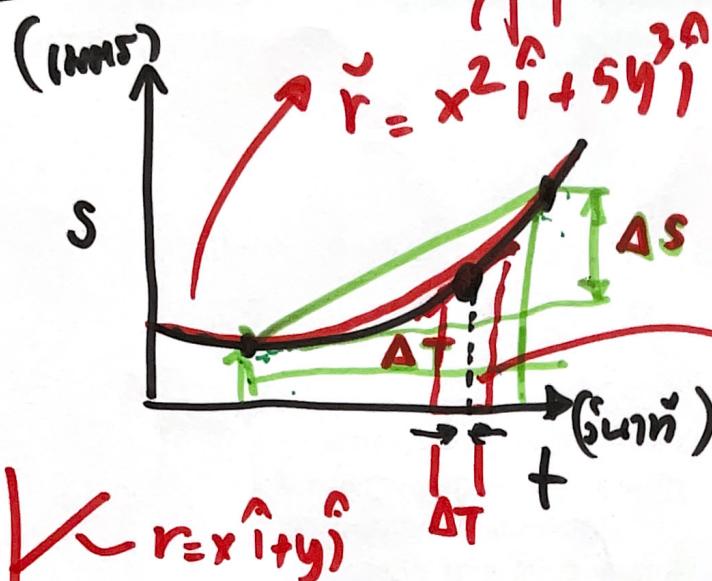
$\rightarrow$  เวลา (time)  $s$

ความเร็ว (speed)  $v$  / ความเร็ว (velocity)  $\vec{v}$

$$\frac{s: v: m}{12x1} \frac{(s)}{(t)} \frac{m}{s.}$$

$$\frac{msns: จ (s)}{12x1} \frac{\vec{s}}{(t)} \frac{m}{s.}$$

အကျဉ်းချုပ်



① အကျဉ်းချုပ်

$$\text{slope} = \frac{\Delta s}{\Delta t} = \overline{v}_{\text{avg}}$$

$$\tilde{v} = \lim_{\Delta t \rightarrow 0} \frac{\Delta s}{\Delta t} = \frac{ds}{dt}$$

② အကျဉ်းချုပ်: ရောဂါးမှု

$$\tilde{r} = R_x^i + R_y^j + R_z^k$$

$$\frac{d\tilde{r}}{dt} = \frac{d}{dt} (R_x^i + R_y^j + R_z^k)$$

$$\tilde{v} = v_x^i + v_y^j + v_z^k$$

$$|v| = \sqrt{v_x^2 + v_y^2 + v_z^2}$$

$$\tilde{a} = \frac{d\tilde{v}}{dt} = \frac{d}{dt} (v_x^i + v_y^j + v_z^k) = \begin{cases} a_{\text{avg}} \\ a_{\text{variable}} \end{cases}$$

$$|a| = \sqrt{a_x^2 + a_y^2 + a_z^2}$$

$$\frac{dv_x}{dt} \cdot \frac{dv_y}{dt} - \frac{dv_z}{dt}$$

$$R(t) = \underbrace{2t^2}_i \hat{i}$$

①  $v_{av}, t=4s \rightarrow t=5s$

$$\frac{\Delta R}{\Delta t} = \frac{2(5)^2 - 2(4)^2}{5-4} = \underbrace{18 \hat{i}}_{m/s}$$

②  $v_{at=5s} = \frac{dR}{dt} = \frac{d2t^2}{dt} = (2 \times 2)t = 4t \hat{i}$

$$= 4(5) = \underbrace{20 \hat{i}}_{m/s}$$

যখন  
অবস্থান হ'ল

③  $a_{ave}, t=2s \rightarrow t=4s ; v = 4t \hat{i}$

$$\frac{\Delta v}{\Delta t} = \frac{4(4) - 4(2)}{4-2} = \underbrace{4 \hat{i}}_{\frac{m}{s^2}}$$

④  $a_{at=3s} = \frac{dv}{dt} = \underbrace{4 \hat{i}}_J$

$$= \frac{d4t}{dt} = \underbrace{4 \frac{dt}{dt}}_{\hat{i}}$$

অবস্থান হ'ল

$$\underline{\underline{Ex}} \quad \vec{r}(t) = 5\hat{i} + 2t^2\hat{j} - 3t\hat{k} \quad \begin{matrix} t-m. \\ \not\rightarrow s. \end{matrix}$$

$$|\vec{v}| = ? \quad \vec{v} = \frac{d\vec{r}}{dt} = \frac{d}{dt} (5\hat{i} + 2t^2\hat{j} - 3t\hat{k})$$

$$\vec{v} = 4\hat{j} - 3\hat{k}$$

$$|\vec{v}| = \sqrt{(4(1))^2 + (-3)^2} - \cancel{t@x} =$$

$$= 5 \text{ m/s}$$

$$\vec{a} = \frac{d\vec{v}}{dt} = d 4\hat{j} - 3\hat{k}$$

$$= 4\hat{j} \rightarrow 4 \frac{\text{m}}{\text{s}^2}$$

## การเคลื่อนที่ด้วยความเร่งคงที่

$$a = \frac{dv}{dt}$$

$$adt = dv$$

$$\int \frac{dv}{a} = \int dt$$

$$u \quad \begin{matrix} v \\ \int u \end{matrix} = at \quad \begin{matrix} + \\ 0 \end{matrix}$$

$$v - u = a(t - 0)$$

$$v = u + at$$

$$\frac{ds}{dt} = v + at$$

$$s \int \frac{ds}{dt} = \int (v + at) dt$$

$$s = \int_0^s u dt + \int_0^t at dt$$

$$s = ut + \frac{at^2}{2} = ut + \frac{1}{2}at^2$$

$$\begin{aligned} \int x dx &= \frac{x^{l+1}}{l+1} \\ &= \frac{x^2}{2} \end{aligned}$$

$$s = ut + \frac{1}{2}at^2$$

$$s = \left[ \frac{2u + at}{2} \right] t$$

$$s = \frac{1}{2}(u + u + at)$$

$$\boxed{s = \frac{(u+v)t}{2}} \rightarrow \frac{2s}{t} = u + v$$

$$v - u = at$$

$$v^2 - u^2 = \frac{2s}{t} \cdot at = 2as$$

$$\boxed{v^2 = u^2 + 2as}$$

Q9

msian's notes

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

$$v = u + gt$$

$$s = ut + \frac{1}{2}gt^2$$

$$v^2 = u^2 + 2gs$$

\* AAS9

msian's notes

②

$$s = ?$$

$$a_{n, \text{fl}} = 3 \frac{\text{m}}{\text{s}^2}$$

$$t = 5 \text{ s}$$

$$u = 50 \text{ m/s}$$

$$s = ut + \frac{1}{2}at^2$$

$$= (50)(5) + \frac{1}{2}(3)(5)^2$$

$$= 287.5 \text{ m.}$$

③

$$s = 10 \text{ m}$$

$$g = 10 \frac{\text{m}}{\text{s}^2}$$

$$u = 0$$

$$s = ut + \frac{1}{2}gt^2$$

$$10 = 0 + \frac{1}{2}(10)(t^2)$$

$$t = 1 \text{ s}$$

17/15m

$$a_{0 \text{ to } 7s} = \frac{45 - 20}{9 - 5} = 6.25 \text{ m/s}^2$$

$$a_{0 \text{ to } 11s} = \frac{0 - 45}{13 - 9} = -11.25 \frac{\text{m}}{\text{s}^2}$$

↗ Ans 2 min w/s

sum  $t=0 \rightarrow t=9s$

$\Delta s$



slope

$$\frac{\Delta v}{\Delta t} = a$$

$$\square \text{ 位移} = vt$$

$$-0-5 \rightarrow \square \text{ 位移} = 5 \times 20 \frac{\text{m}}{\text{s}}$$

$$-5-9 \rightarrow \cancel{\frac{1}{2} \times 5 \times 2} = \frac{1}{2} (20+45) \times 4$$

$$\square \text{ 位移} =$$

$$\frac{1}{2} \times 20 \times 4 + 45 \times 4$$

$$\frac{s}{t} = v$$

$$s = vt$$

$$\frac{1}{2} \times (20+45) \times 4 = 130$$

$$= 130 \text{ m.}$$

$$0-13 \quad s, \bar{s} \quad \frac{1}{2} \times \frac{1}{2} \times 2 = \frac{1}{2} \times 4 \times 45 = 90 \quad \boxed{320 \frac{\text{m}}{\text{s}}}$$

$$\textcircled{5} \quad \underline{x = 50t + 10t^2} \quad \begin{matrix} x \rightarrow m. \\ t = s \end{matrix}$$

$$\textcircled{1} \quad \cancel{t=3s} = \cancel{t=3s} = v_{av}$$

$$\textcircled{2} \quad \cancel{v_0 + ss = ?}$$

$$\frac{v = \Delta x}{\Delta t}$$

$$\textcircled{1} \quad v_{av} \text{ at } t=0 \rightarrow t=3s$$

$$\frac{\Delta x}{\Delta t} = \frac{[50(3) + 10(3^2)] - [0]}{3 - 0}$$

$$= 80 \text{ m/s}$$

$$\textcircled{2} \quad v_{0+3s} = \frac{dx}{dt} = 50 + 80t = 50 + 20(3)$$

$$= 110 \text{ m/s}$$

$$\textcircled{3} \quad a_{0+3s} = \frac{dv}{dt} = 20 \frac{m}{s^2}$$

Quiz ① Find v & a at t=5s

②  $\vec{r}(t) = 2t^2 \hat{i} - 3t \hat{j} + 4 \hat{k}$

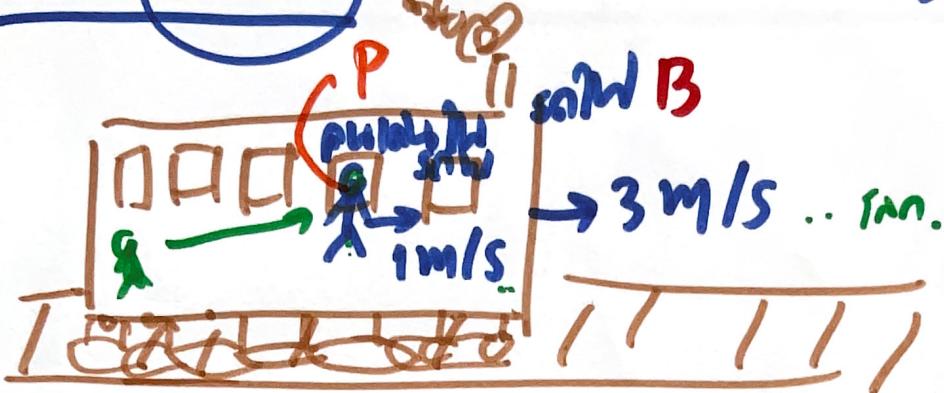
$$\tilde{v} = ?$$

$$\tilde{v}_{@t=5s} = ?$$

$$|v| = ?$$

$$\tilde{a}_{@t=5s} = ?$$

## नियन्त्रित वेग (relative velocity)

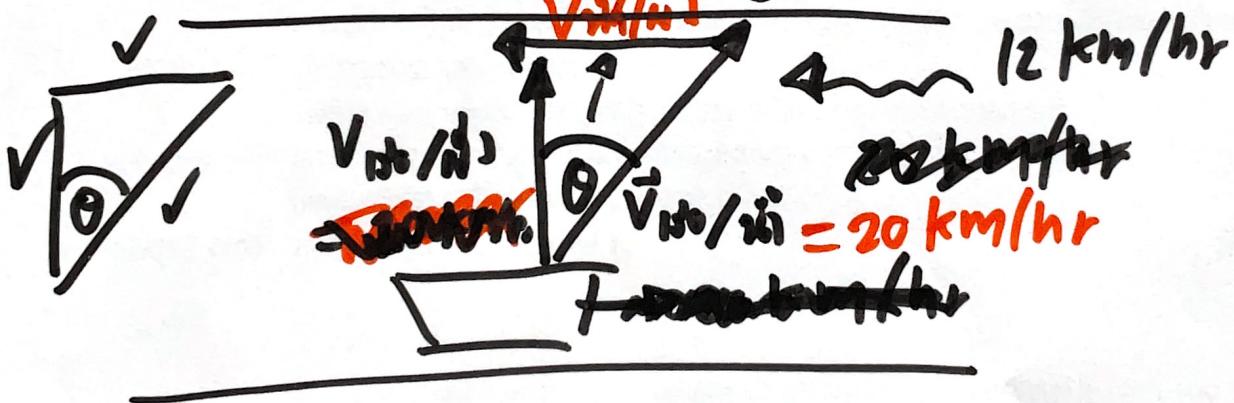


Person A  $\vec{V}_{P/A} = \vec{V}_{P/B} + \vec{V}_{B/A}$

$$4 \text{ m/s} = (1 \text{ m/s}) + (3 \text{ m/s})$$

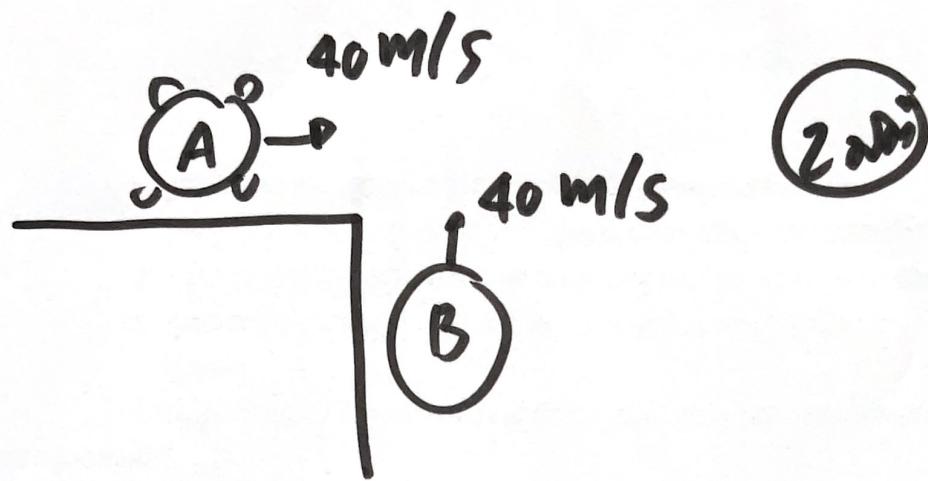
$$V_{W/R} = 12 \text{ km/hr}$$

$$V_{W/R} = 5 \text{ m/s}$$



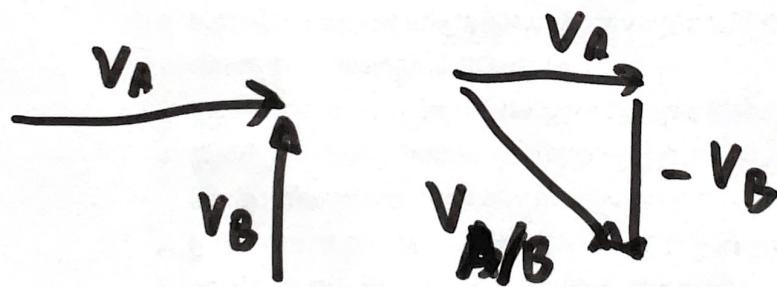
$$\sin \theta = \frac{12}{20} = 0.6$$

$$\theta = \sin^{-1} 0.6 = 36.87^\circ$$

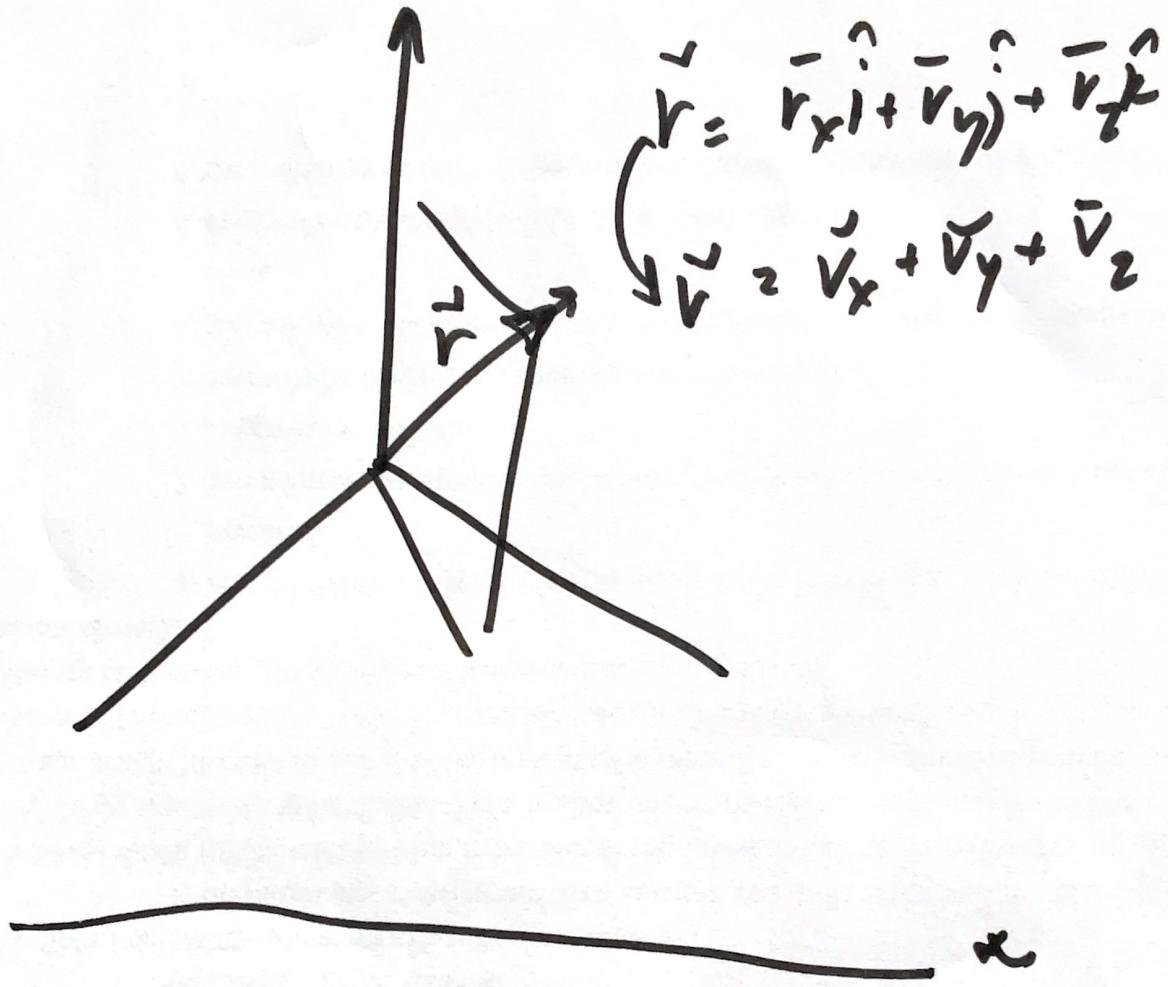


$$V_{A/B} =$$

$$\widehat{V_{A/B}} = V_A + V_B$$

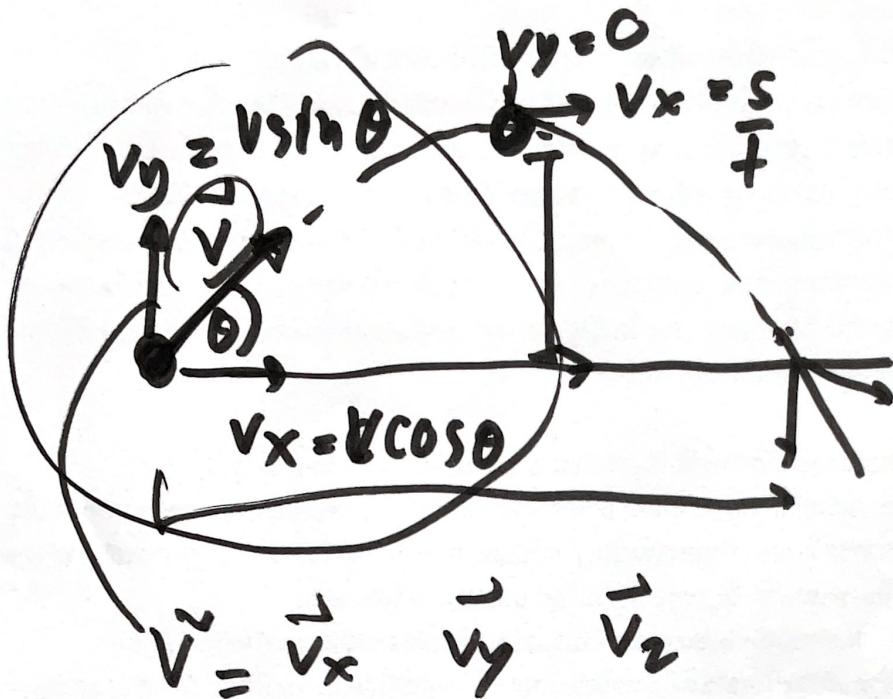


$$\begin{aligned} |V_{A/B}| &= \sqrt{40^2 + 40^2} \\ &= 56.5 \text{ m/s} \end{aligned}$$



missile motion

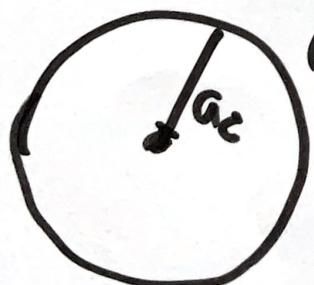
2 दिन



$$s_y = ?$$

$$t = ?$$

$$s_x = ?$$



Angular motion  $\rightarrow 2\pi \text{ rad} / 90^\circ \text{ rev} / 1 \text{ turn}$