

ทบทวน

week 1

- พื้นฐานฟิสิกส์
- คลื่น / มนุษย์ศาสตร์ฟิสิกส์

① น้ำหนัก
② แรง □ // แรง
③ โลก แรงทางขวา x y

week 2 - คลื่นเสียง ≠ คลื่นแม่เหล็ก → คลื่นเสียงทำให้เกิด： • ร่องรอย

- คลื่นเสียง
- คลื่นเสียง มีแนวโน้ม.

- รูปคลื่น / คลื่นเสียง
- คลื่นเสียง / คลื่นแม่เหล็ก
- คลื่นเสียง / คลื่นแม่เหล็ก

① คลื่นเสียง มีแนวโน้ม
② คลื่นเสียง

- คลื่นเสียง มีแนวโน้ม

$$\begin{aligned} V &= U + a t \\ V^2 &= U^2 + 2 a s \\ S &= U t + \frac{1}{2} a t^2 \end{aligned}$$

→ คลื่นเสียง มีแนวโน้ม
→ คลื่นเสียง มีแนวโน้ม

- คลื่นเสียง มีแนวโน้ม / คลื่นเสียง

$$\hat{E}^x \quad r(t) = 2t^2 \quad \text{--> sumsumsto3m/s}$$

$$\textcircled{1} \quad v_{av} = ? ; t = 2-4s$$

$$v_{av} = \frac{\Delta s}{\Delta t} = \frac{2(4)^2 - 2(2)^2}{4-2} .$$

$$= \frac{32-8}{2} = \frac{24}{2} = 12 \text{ m/s}$$

(Ans. Given)

$$v_{t=5s} = \frac{ds}{dt} = \frac{d}{dt}(2t^2)$$

$$= 2 \cdot 2t = \underline{\underline{4t}},$$

$$= 4(5) = 20 \text{ m/s},$$

$$\checkmark \quad a_{av} \rightarrow t = 0-2s = \frac{\Delta v}{\Delta t} = \frac{4(2) - 4(0)}{2} \\ = 4 \text{ m/s}^2$$

$$v = \frac{a_{t=5s} \cdot \frac{dv}{dt}}{\frac{da}{dt}} = \frac{d(a_t)}{dt}$$

$$= 4 \frac{dt}{\frac{da}{dt}} = 4 \frac{m/s^2}{m/s} \checkmark$$

s $\frac{ds}{dt}$ variable
v = $\frac{s}{t}$; $\frac{\Delta s}{\Delta t}$; $\frac{ds}{dt}$

a = $\frac{v}{t}$; $\frac{\Delta v}{\Delta t}$; $\frac{dv}{dt}$

Ex $\mathbf{r}(t) = 2t^2\mathbf{i} - 3t\mathbf{j} + 4\mathbf{k}$,

$$\tilde{\mathbf{v}}(t) = \frac{d\mathbf{r}(t)}{dt}$$

$$= \frac{d}{dt}(2t^2\mathbf{i} - 3t\mathbf{j} + 4\mathbf{k})$$



$$\tilde{\mathbf{v}}(t) = 4t\mathbf{i} - 3\mathbf{j}$$

$$|\tilde{\mathbf{v}}| \text{ at } t = 5 \text{ s}$$

$$4\tilde{\mathbf{v}} = (4 \times 5)\mathbf{i} - 3\mathbf{j}$$

$$20\mathbf{i} - 3\mathbf{j}$$

$$|\tilde{\mathbf{v}}|_{t=5\text{s}} = \sqrt{20^2 + (-3)^2}$$

$$= \sqrt{409} \text{ m/s.}$$

$$\tilde{r}(t) = \underbrace{(t^2 + t)}_{s_x} \hat{i} + \underbrace{(3t - 2)}_{s_y} \hat{j} + \underbrace{(2t^3 - 4t^2)}_{s_z} \hat{k}$$

$$\tilde{v} = \frac{d\tilde{r}(t)}{dt}$$

$$= (2t+1)\hat{i} + 3\hat{j} + (6t^2 - 8t)\hat{k}$$

$$\tilde{r}(t) = \underbrace{15t}_{s_x} \hat{i} + \underbrace{(25 + 20t - 5t^2)}_{s_y} \hat{j}$$

$$s_x = 15t \quad \rightarrow v_x = \frac{ds_x}{dt} = 15 \quad \rightarrow a_x = \frac{dv_x}{dt}$$

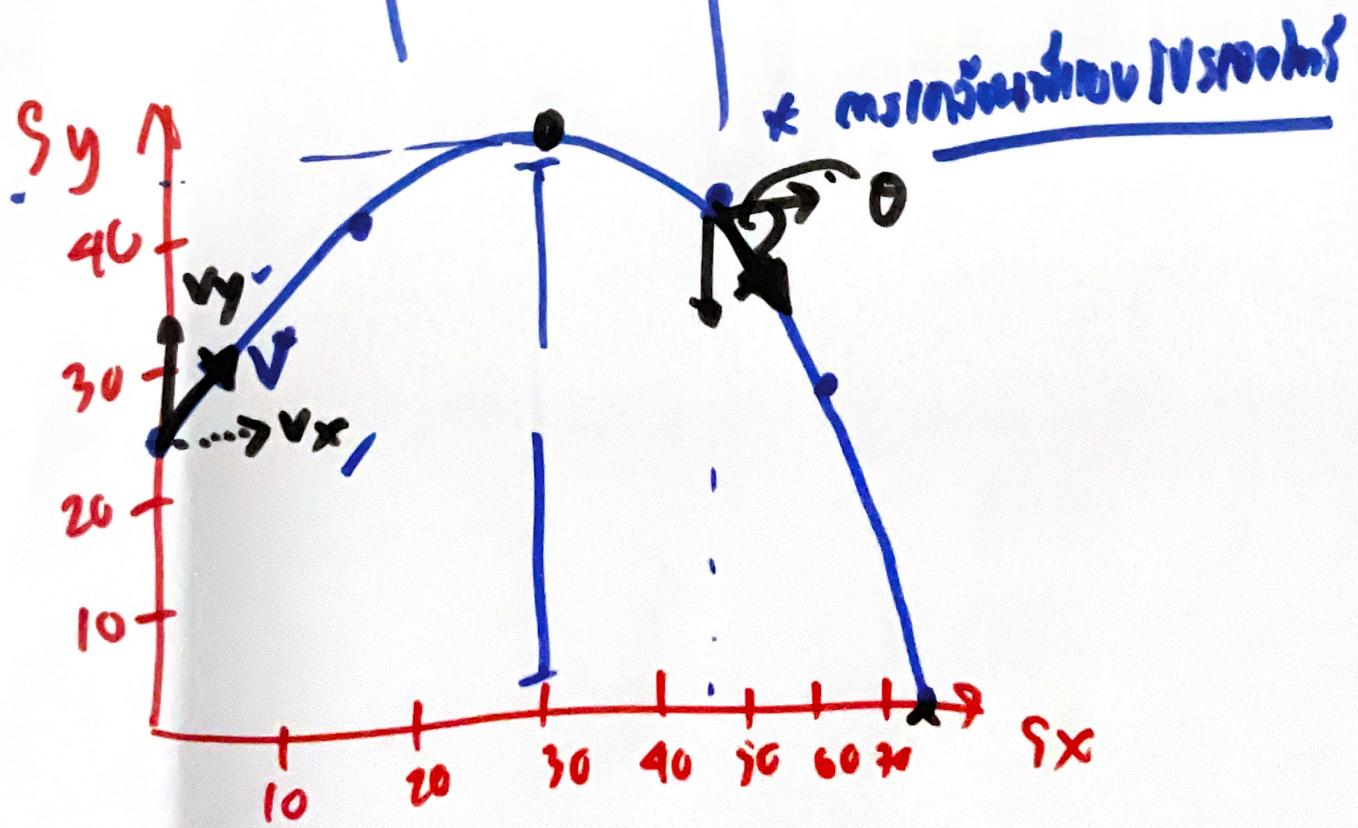
$$s_y = 25 + 20t - 5t^2 \quad \rightarrow v_y = \frac{ds_y}{dt} = \frac{20 - 10t}{m/s^2} \quad \rightarrow a_y = -10$$

$$\tilde{v}(t) = v_x \hat{i} + v_y \hat{j}$$

$$v(t) = \sqrt{15^2 + (20 - 10t)^2}$$

$$t=0; \quad v = \sqrt{15^2 + (20 - 10(0))^2} = 25 \text{ m/s}$$

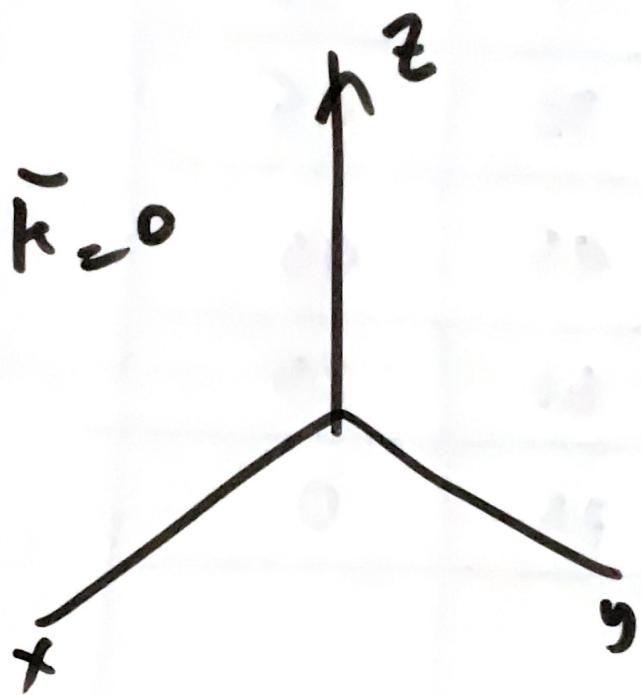
t	s_x'	s_y
0	0	25
1	15	40
2	30	45
3	45	46
4	60	25
5	75	0



120108



$$\vec{i} + \vec{j} + \vec{k} = 0$$



గాను: $s_y = 0$; $v = ?$ (అపక్రమాలు)

$t = 5 \text{ s}$ అందులు

$$s_y = 25 + 20t - 5t^2$$

$$0 = 25 + 20t - 5t^2$$

$$0 = 5 + 4t - t^2$$

$$0 = (5-t)(1+t)$$

$$t = 5, -1$$

$$v = \sqrt{15^2 + (20 - 10(5))^2}$$

$$\approx 33.5 \text{ m/s}$$

$$\text{గా } s_y = 0 \quad t = ?$$

$$v_y = 20 - 5t = 0$$

$$t = 2 \text{ s}$$

$$\text{గా } t = 3 \text{ s}; v = ? = 15\hat{i} + (20 - 10(3))\hat{j}$$

$$= 15\hat{i} - 10\hat{j}$$

$$|v| = \sqrt{15^2 + (-10)^2} = 5\sqrt{13}$$

$$\theta = \checkmark$$

$$\theta = \cos^{-1} \frac{15}{5\sqrt{13}}$$

$$\cos \theta = \frac{15}{5\sqrt{13}}$$



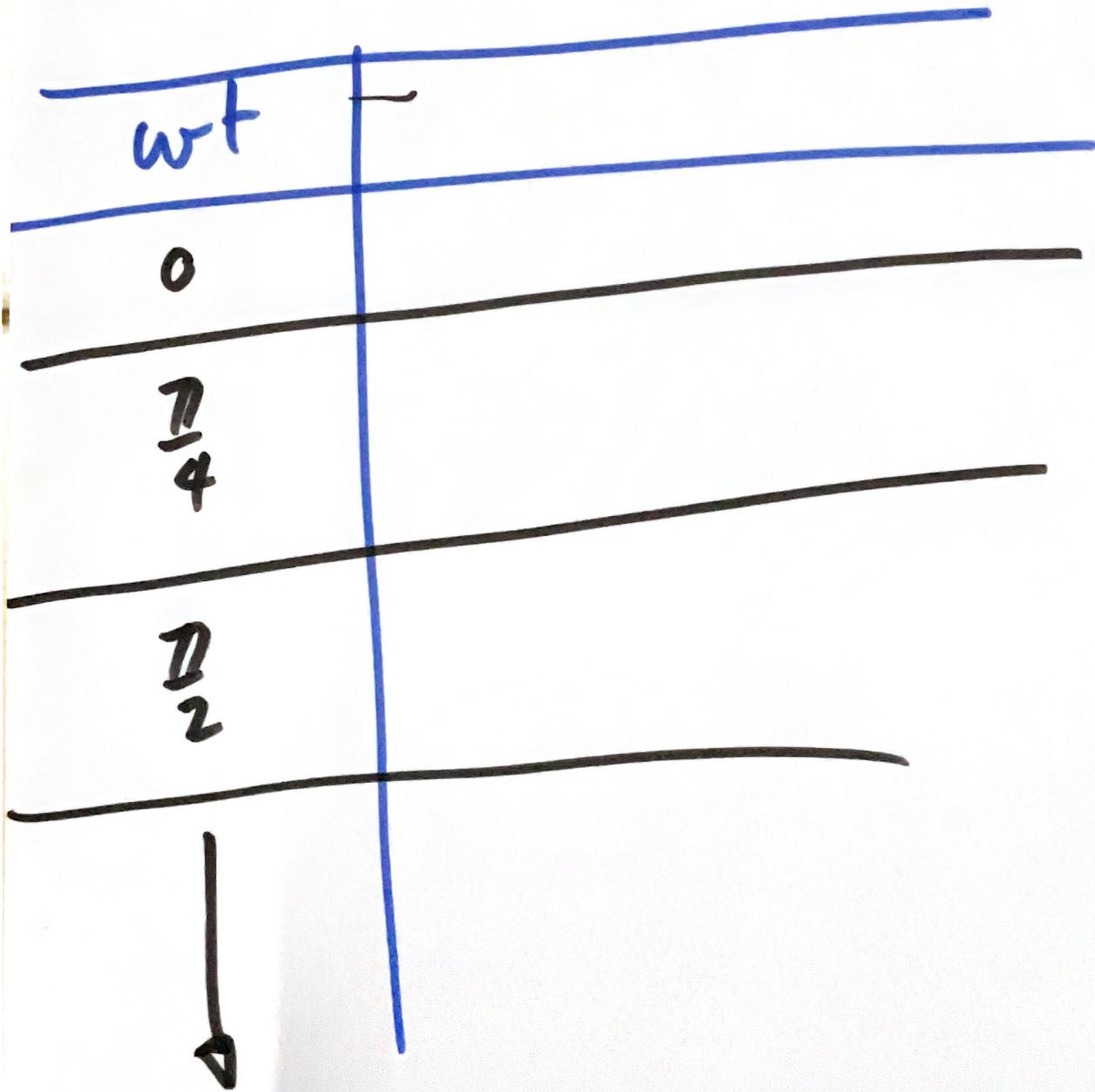
$$v_x = 15$$

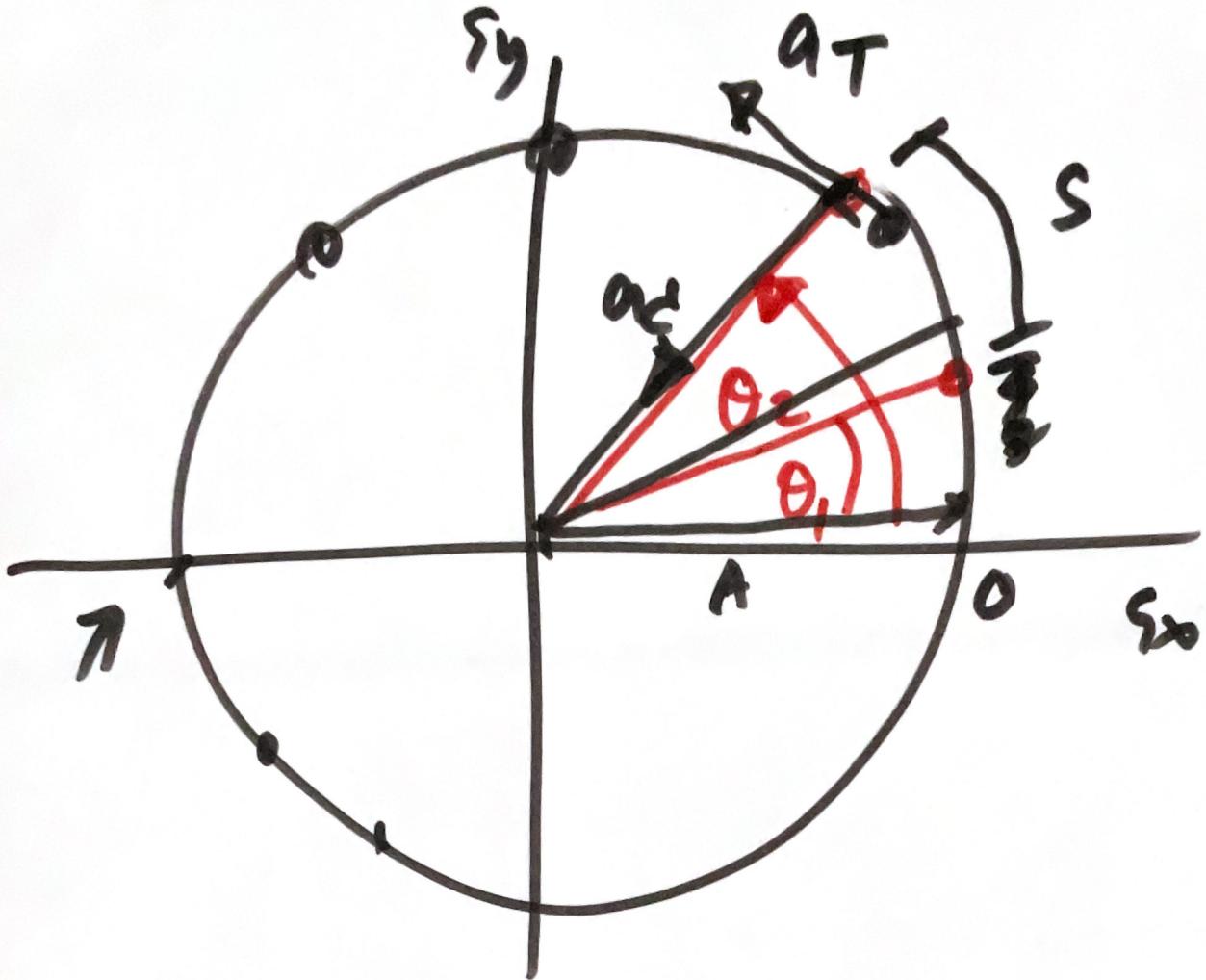
$$v = 5\sqrt{13}$$

$$|r| = A = \sqrt{(A\cos \omega t)^2 + (A\sin \omega t)^2}$$

$$\underline{r(t)} = \underbrace{A\cos(\omega t)}_{sx} \underline{i} + \underbrace{A\sin(\omega t)}_{sy} \underline{j}$$

$\frac{\pi}{4} \text{ rad}$





$$\Delta\theta = \frac{\theta_2 - \theta_1}{R} = \frac{\Delta s}{R}$$

$$\Delta s = \Delta\theta R$$

$$v = w R$$

$$a_c = w^2 R = \frac{v^2}{R} \quad \left. \begin{array}{l} a = \sqrt{a_T^2 + a_c^2} \\ a_T = a R \end{array} \right\}$$

$$\rightarrow \underline{w} = w_0 + \underline{d} t$$

$$\xrightarrow{\text{Div}} w^2 = w_0^2 + 2 \underline{d} \theta$$

$$\rightarrow \theta = w_0 t + \frac{1}{2} \underline{d} t^2$$

Ex nro. 12



$$R = 5.29 \times 10^{11}$$

$$V = 2.18 \times 10^6 \text{ m/s}$$

Res

$$a = \frac{V^2}{R} = \frac{(2.18 \times 10^6)^2}{5.29 \times 10^{11}}$$

Ans

អនកសាស្ត្រទិន្នន័យ (dynamics)

អារ៉ា, លីតិ, រាជវិទ្យាគារណ៍នៃបច្ចេកទេស

សារពាក្យ
ការពិនិត្យ

ម៉ាស (mass) $\rightarrow m, \text{ kg}$ \rightarrow នៅលើ $F = mg$
 \hookrightarrow សារពាក្យនៃការងារនៅលើបច្ចេកទេស

$$kg \frac{m}{s^2}$$

$$F = N$$

① inertia mass

② gravitational mass

ក្រ (force) សិក្សាអនុវត្តន៍ - F (N)

\hookrightarrow ក្រលូខាងក្រោម,

ក្រលូខាងលើខាងក្រោម

① internal force ក្រលូខាងក្រោម \rightarrow (solid)

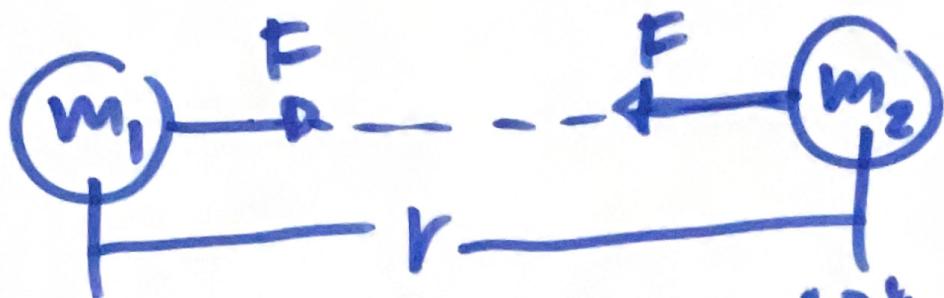
② external force ក្រលូខាងក្រោម \rightarrow (physics) **

- អំពីក្រលូខាងក្រោម \rightarrow (g) ក្រលូខាងក្រោមនៃការងារ T អូសូរក្រោម

- ក្រលូខាងក្រោម $\times (T)$ ✓ ក្រលូខាងក្រោមនៃការងារ T អូសូរក្រោម

- ក្រលូខាងក្រោម $\times (f)$

សំគាល់ក្នុងនាមអំពី



រាយការណ៍បូជ្រើស

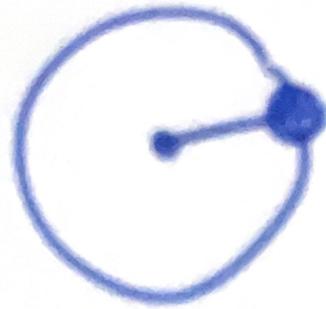
$$F = \frac{m_1 m_2 G}{r^2} \quad \frac{0.6673 \times 10^{-10} N \cdot m^2}{kg^2}$$

$$\left. \begin{array}{l} m_1 = m_2 = 1 \text{ kg} \\ r = 1 \text{ m.} \end{array} \right\} F = 0.6673 \times 10^{-3} N$$



$$W = mg - F = \frac{M}{M_1 m_2 G} \cdot r = 6.4 \times 10^6 \text{ m}$$

n



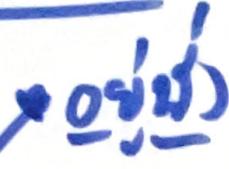
$$F_c = \frac{GMm}{r^2}$$

\downarrow
 $w = mg$

$$mg = \frac{MmG}{r^2}$$

$$M = \frac{gr^2}{G}$$

Newton's laws of motion 3 NC

① $\Sigma F = 0$ 
↓ 

$$\Sigma F = ma^0$$
$$\frac{dv}{dt} = 0$$

② $\Sigma F = ma$

③ action = reaction.

16) friction (friction forces)

117 dimensions

$$f = \mu N$$

maximum static
friction force

μ_s

kinetic friction
coefficient

μ_k

$$N = \underline{\underline{\text{normal force}}}$$

សម្រាប់លក្ខណៈ

① តិចនៅក្នុងបាន

- តិចនៅក្នុងបាន តាមពេលវេលា

② ឱ្យកិច្ចការធ្វើឡើង

* អំពីការក្លាយរាយ និងការក្លាយរាយ

③ សម្រាប់លក្ខណៈ (ស្ថាបន្ទូល)

$$F_{\text{ជាន}} = F_{\text{លរ}}$$

$$F_{\text{លរ}} = F_{\text{ជាន}}$$

ស្ថាបន្ទូល

$$F = m a$$

=

Path
G → F
 $u = 0$
 $v = 5.8 \times 10^6 \text{ m/s}$
 $s = 1.5 \text{ cm.}$

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

$$a = \frac{v^2 - u^2}{2s}$$

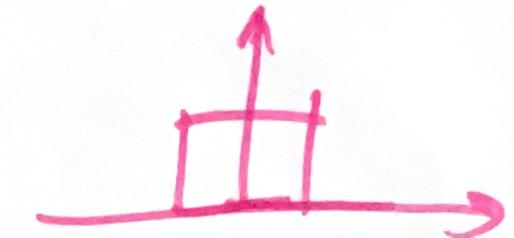
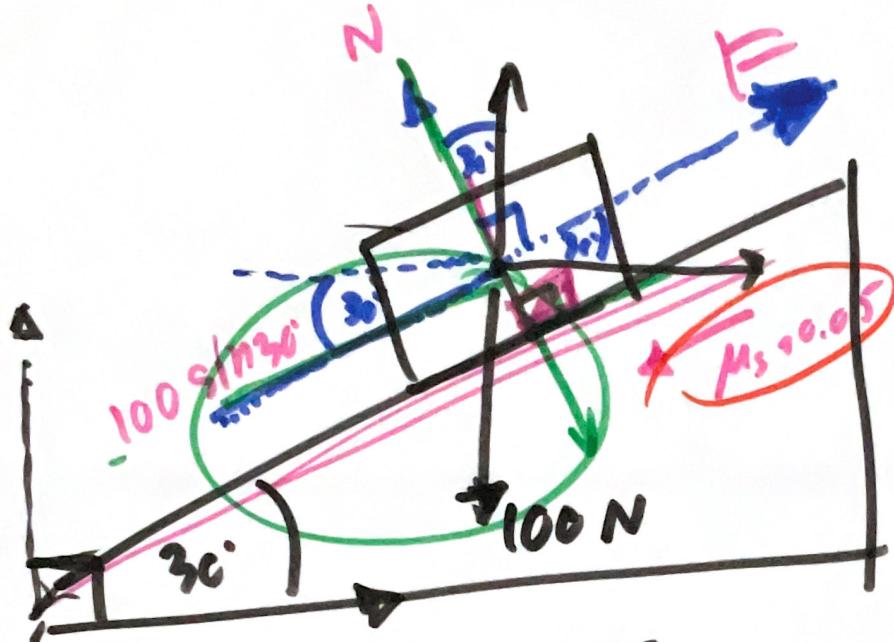
$$= \frac{(5.8 \times 10^6)^2 - 0}{2(1.5 \times 10^{-2})}$$

$$F = ma$$

$$= (9.11 \times 10^{-3})(\dots)$$

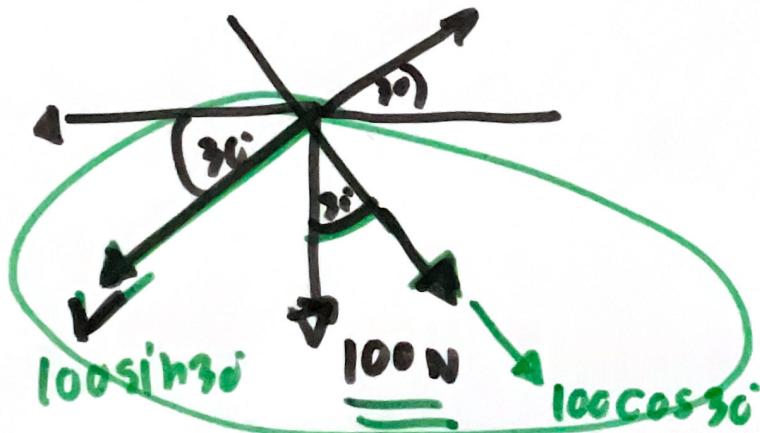
z

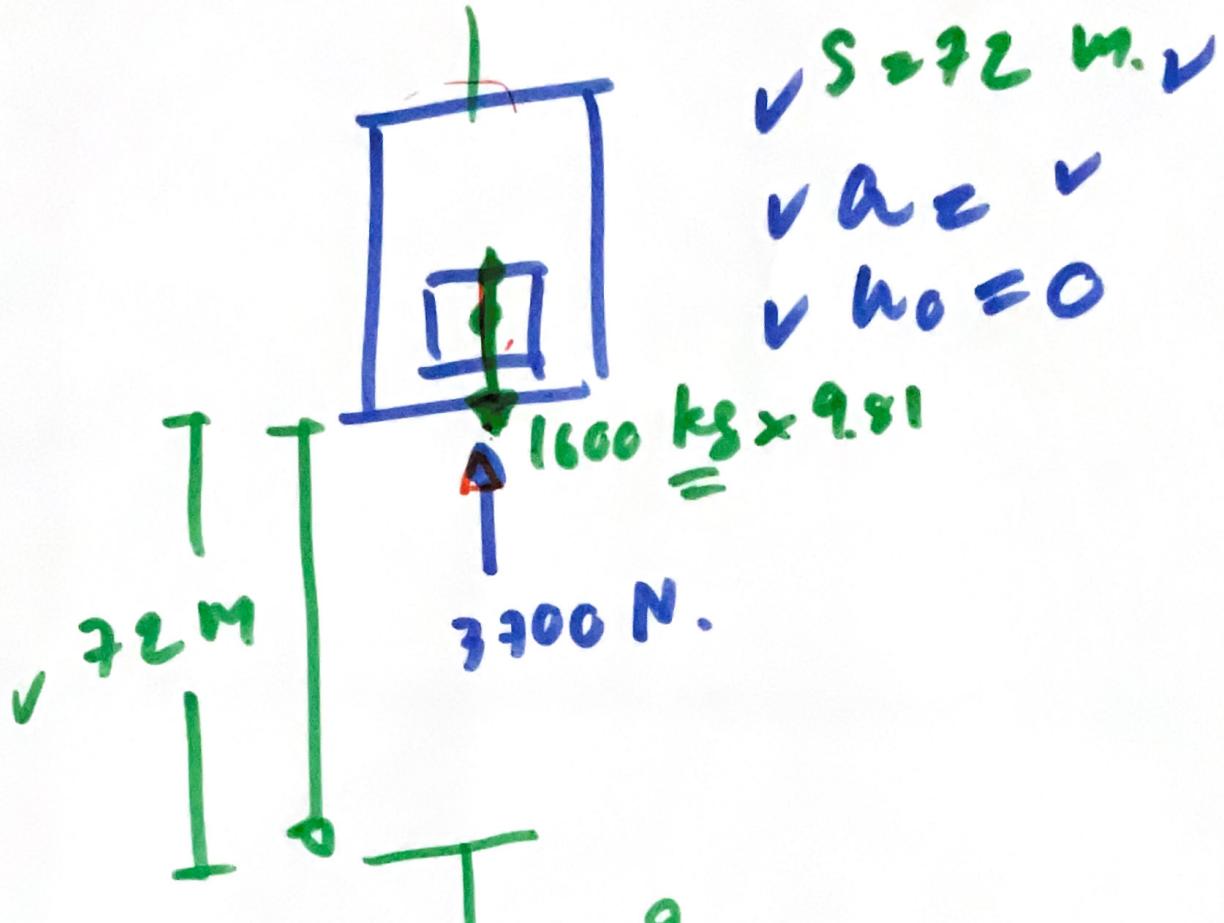
N



$$F = 100 \sin 30^\circ \\ \approx 50 \text{ N}$$

$$N = 100 \cos 30^\circ$$





$\Sigma F = ma$
 1600
 $mg - 3700 = ma$

$$a = \frac{1600 \times 9.81 - 3700}{1600}$$

$\checkmark v^2 = v_0^2 + 2as$
 $v =$ m/s

