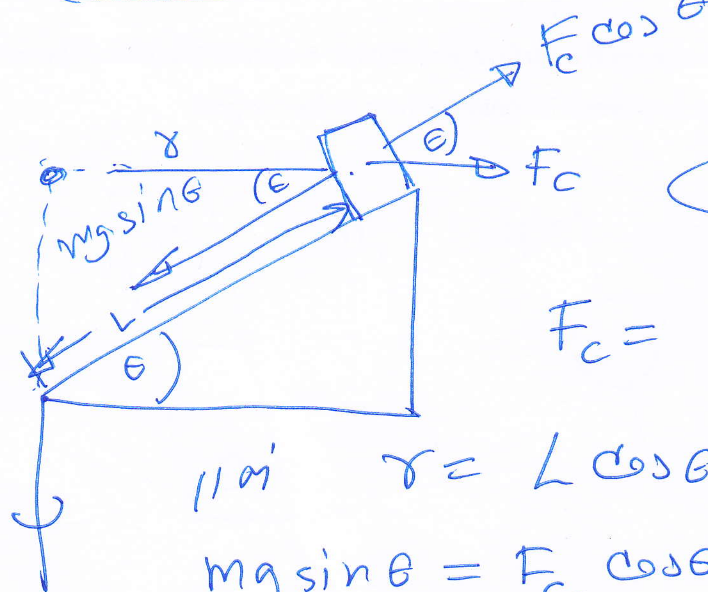
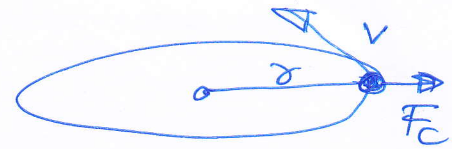
เฉลยกฎการเคลื่อนที่

3.1





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

แต่ $r = L\cos\theta$

$$mg\sin\theta = F_c\cos\theta$$

แทนค่า

$$mg\sin\theta = \frac{mv^2}{r}\cos\theta$$

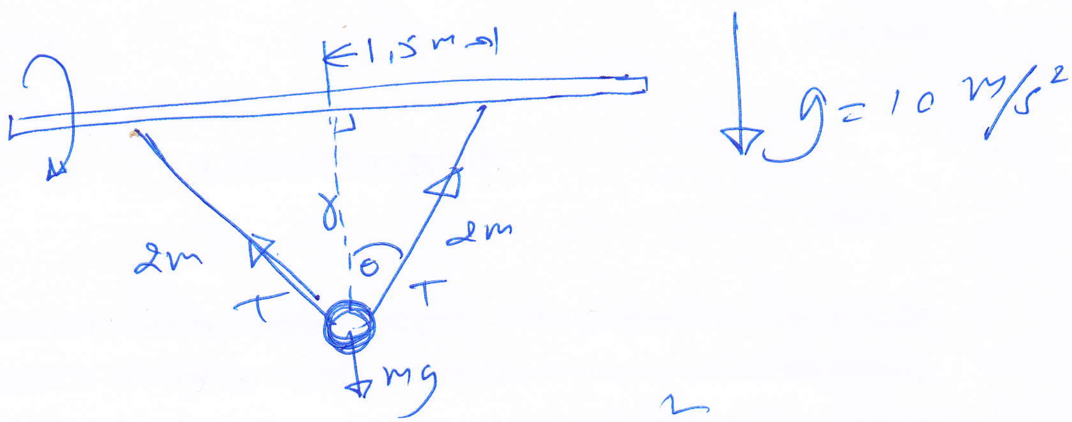
$$mg\sin\theta = \frac{mv^2}{L\cos\theta}\cos\theta$$

$$v^2 = Lg\sin\theta$$

$$v = \sqrt{Lg\sin\theta}$$

#

3.2



(a) $$2T\cos\theta - mg = \frac{mv^2}{r}$$

$r = 2\cos\theta$ ıımc ó,

$$2T\cos\theta - mg = \frac{mv^2}{2\cos\theta}$$

$$2T\cos\theta = mg + \frac{mv^2}{2\cos\theta}$$

$$T = \frac{mg}{2\cos\theta} + \frac{mv^2}{4\cos^2\theta}$$

an $\sin\theta = \frac{1.5}{2}$, $\cos^2\theta = 1 - \sin^2\theta$

$$= 1 - \left(\frac{1.5}{2}\right)^2$$

$$= \frac{4 - 2.25}{4}$$

$$\cos^2\theta = \frac{1.75}{4}$$

$$\cos\theta = \sqrt{\frac{1.75}{4}} = \frac{1.333}{2}$$

$$T = \frac{40}{1.333} + \frac{4\times 16}{4\times \frac{1.75}{4}}$$

$T = 30.00 + 36.57 \ N$

$= 66.57 \ N$

(v) $2T\cos\theta = \dfrac{mv^2}{r}$

$T = \dfrac{mv^2}{2r\cos\theta}$

$= \dfrac{4\times 16}{2\times 1.333\times\cos\theta}$, $r = 1.333$
$= 2\cos\theta$

$= \dfrac{64}{(1.333)^2} = 36.0 \ N.$

(vi)

$2T\cos\theta + mg = \dfrac{mv^2}{r}$

$T = \dfrac{mv^2}{r\,2\cos\theta} - \dfrac{mg}{2\cos\theta}$

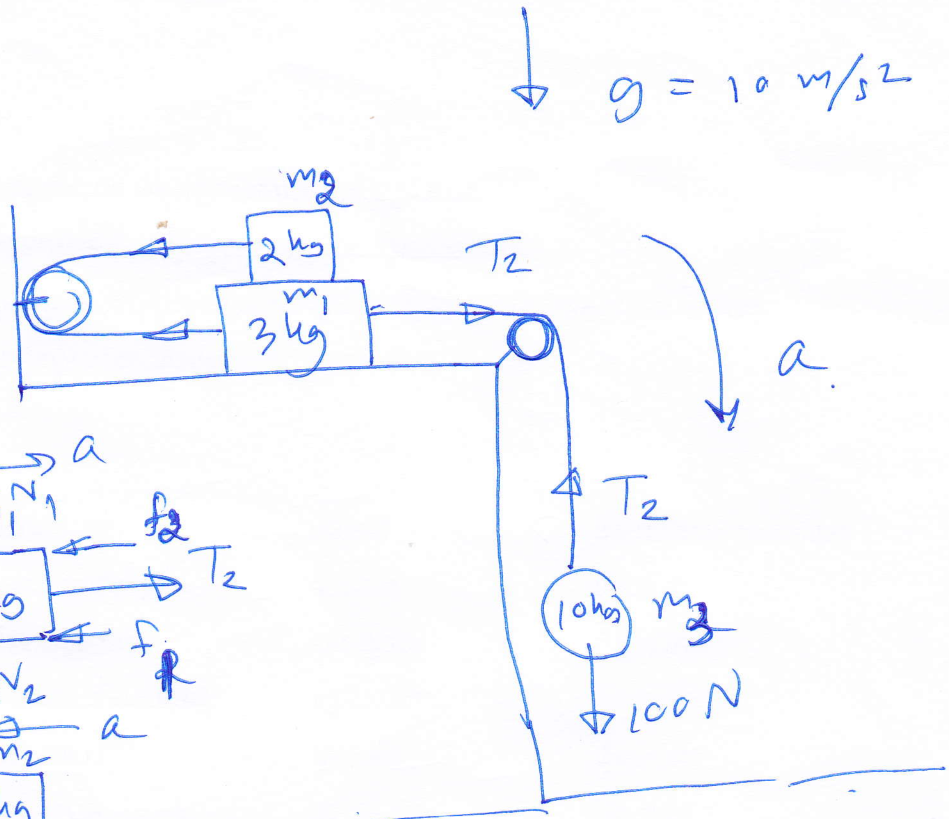
$= \dfrac{mv^2}{4\cos^2\theta} - \dfrac{mg}{2\cos\theta}$

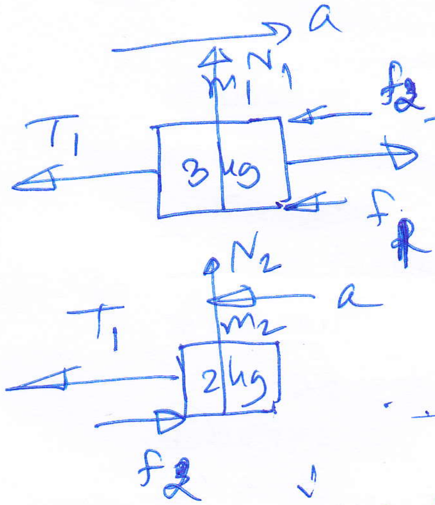
$= 36.57 - 30.00$

$= 6.57$

$= 6.6 \ N$ #

3.3





ก้อน m_1 $\quad T_2 - T_1 - f_1 - f_2 = m_1 a$ ——— ①

ก้อน m_2 $\quad T_1 - f_2 = m_2 a$ ——— ②

ก้อน m_3 $\quad 100 - T_2 = m_3 a$ ——— ③

① + ② + ③

$$100 - f_1 - 2f_2 = (m_1 + m_2 + m_3)a \quad \text{——— ④}$$

$$f_1 = \mu N_1 = \mu(m_1 + m_2)g$$

$$f_2 = \mu N_2 = \mu m_2 g$$

แทนค่าใน ④

$$100 - \mu(m_1 + m_2)g - 2\mu m_2 g = (m_1 + m_2 + m_3)a$$

[illegible]

$$100 - 0.3\times(50) - 2\times 0.3\times 20 = 15a$$

[illegible]

$$100 - 15 - 12 = 15a$$

$$73 = 15a$$

1 $$a = 4.87 \text{ m/s}^2 \text{ — } 5$$

แทนค่าใน 3 D= 76

$$T_2 = 100 - m_3 a$$

√ $$= 100 - 10\times 4.87$$

$$= 51.3 \text{ N}$$

แทนค่าใน 2

$$T_1 = f_2 + m_2 a$$

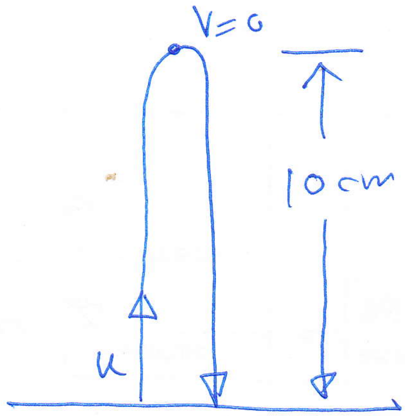
$$= 0.3\times 20 + 2\times 4.87$$

$$= 15.74 \text{ N}$$

#

3.4

1

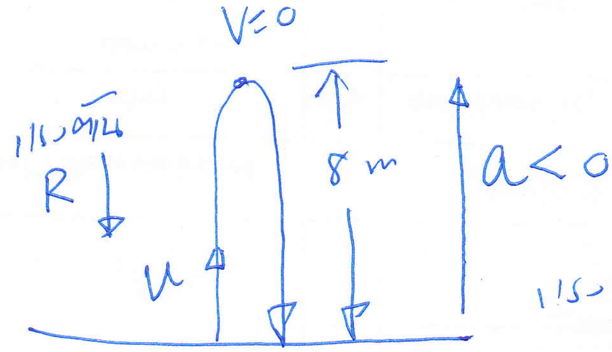


แรงดึง $F=-mg$

$$\downarrow g = 10\ m/s^2$$

$$v^2 = u^2 + 2as$$
$$0 = u^2 - 2gs$$
$$u^2 = 2gs$$
$$= 200$$

2

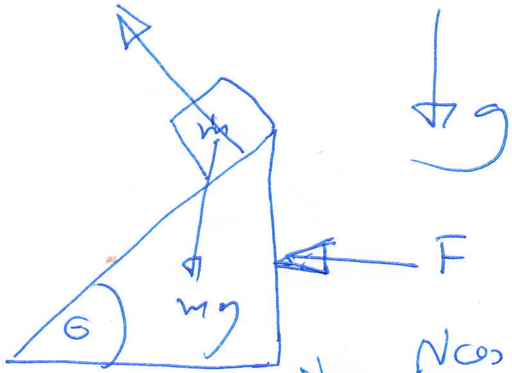


แรงดึง $F=-mg$
เหมือนเดิม

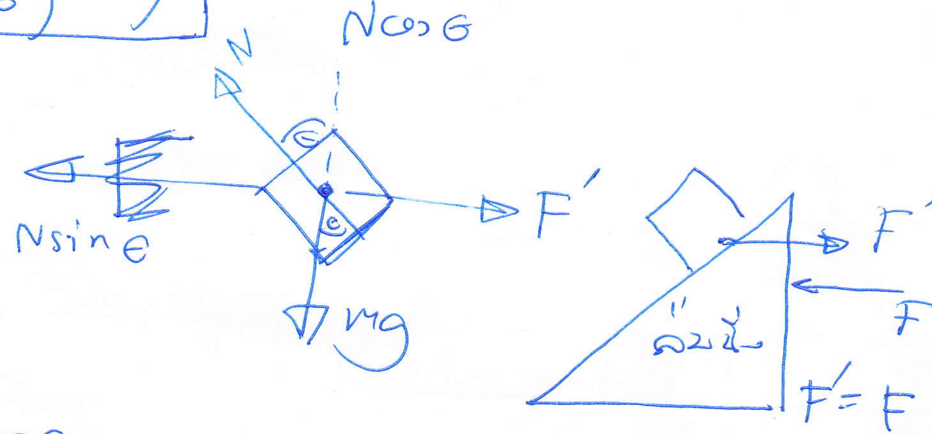
$$v^2 = u^2 + 2as$$
$$a = -\frac{u^2}{2s} = \frac{-200}{16}$$

$$F - R = ma$$
$$-mg - R = ma$$
$$-0.09 \times 10 - R = 0.09 \times \left(-\frac{200}{16}\right)$$
$$R = \frac{18}{16} - 0.9 = \frac{9}{8} - 0.9$$
$$= 1.125 - 0.9 = 0.225\ N \quad \#$$

3.5



1



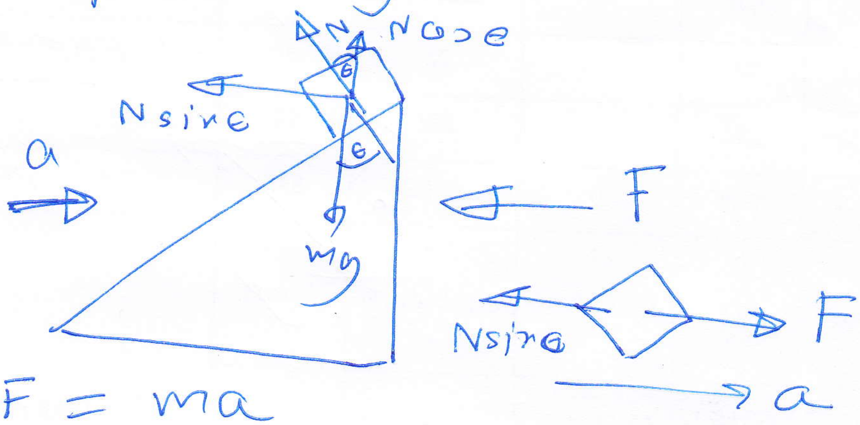
$$N\cos\theta = mg$$

$$N\sin\theta = F' = F$$

$$\frac{F}{mg} = \frac{N\sin\theta}{N\cos\theta} = \tan\theta$$

$$F = mg\tan\theta \longrightarrow \times$$

2



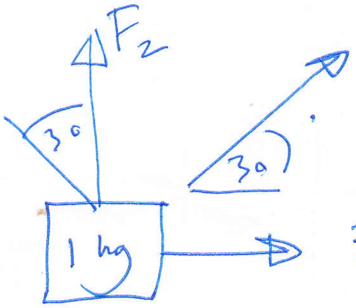
$$\Sigma F = ma$$

$$F - N\sin\theta = ma, \quad N\cos\theta = mg$$

$$F - \left(\frac{mg}{\cos\theta}\right)\sin\theta = ma$$

$$F = ma + mg\tan\theta \longrightarrow \times$$

3.6



$$\Sigma F = ma$$

$$(F_2 \sin 30^\circ + F_1 \cos 30^\circ) = ma$$

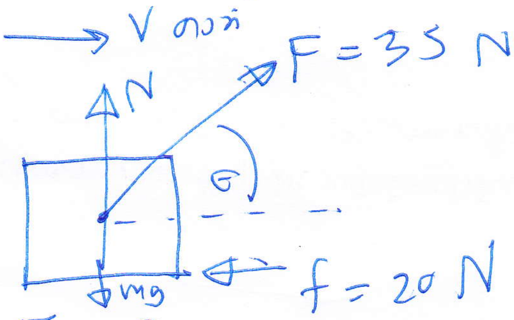
$$5 \times \frac{1}{2} + F\frac{\sqrt{3}}{2} = 10$$

$$F = \frac{2}{\sqrt{3}}[10 - 2.5] = \frac{2 \times 7.5}{\sqrt{3}}$$

$$= \frac{2 \times 7.5 \times \sqrt{3}}{3} = 2 \times 2.5 \times \sqrt{3}$$

$$= 5\sqrt{3} \text{ N}$$

3.7



$g = 10\,m/s^2$

$$\Sigma F = 0$$

(ก) $f = F\cos\theta$

$$20 = 35\cos\theta \Rightarrow \cos\theta = \frac{20}{35} = \frac{4}{7}$$

$$\theta = \cos^{-1}\frac{4}{7} = 55.2 \text{ องศา}$$

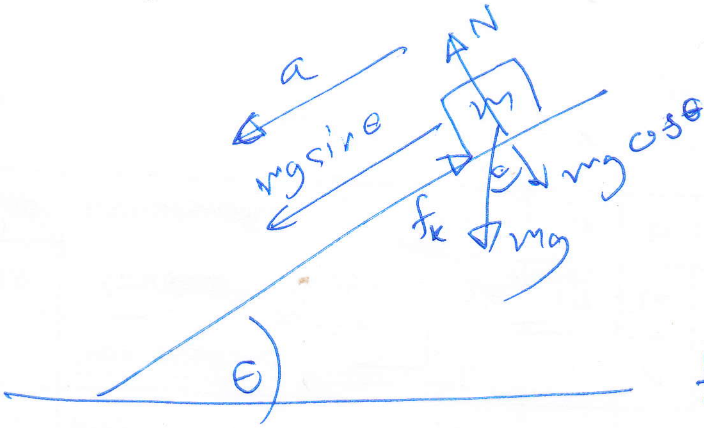
(ข) $N + F\sin\theta = mg = 200$

$$N = 200 - F\sin\theta = 200 - 35\sin 55.2^\circ$$

$$= 171.3 \text{ N}$$

3.8

(1)



$\downarrow g$ + $\uparrow$ −

$N = mg\cos\theta$

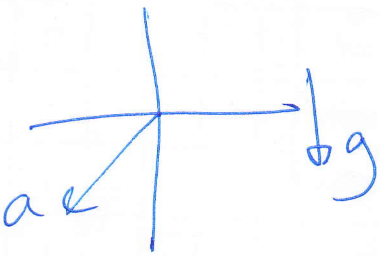
$f_k = \mu_k N$

$= \mu_k mg\cos\theta$

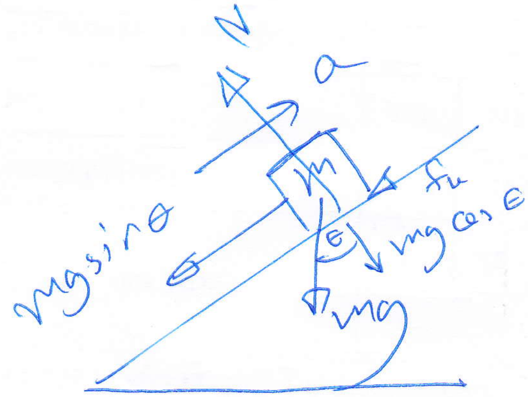
$\Sigma F = ma$

$mg\sin\theta - \mu_k mg\cos\theta = ma$

$a = g[\sin\theta - \mu_k\cos\theta]$



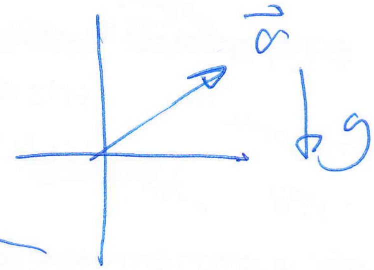
(2)



$N = mg\cos\theta$

$f_k = \mu_k N = \mu_k mg\cos\theta$

$\Sigma F = ma$



$-mg\sin\theta - f_k = ma$

$-mg\sin\theta - \mu_k mg\cos\theta = ma$

$-g[\sin\theta + \mu_k\cos\theta] = a$

$a = -g[\sin\theta + \mu_k\cos\theta]$

$-a = g[\sin\theta + \mu_k\cos\theta] = a' = a_{ขึ้น}$

$a_{ขึ้น} - a$ [illegible]

$a = -a' = a$ #