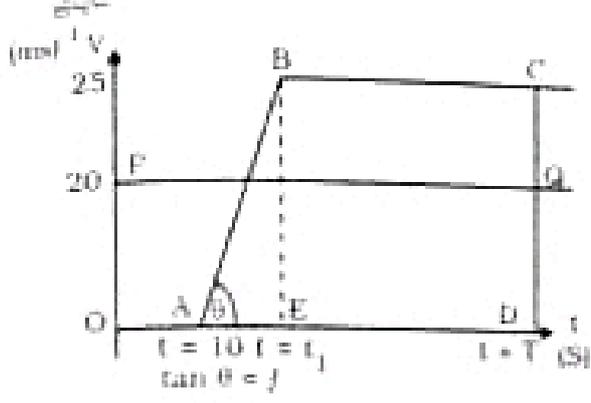


11. (a) පහත වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය



$72 \text{ km h}^{-1} = 20 \text{ ms}^{-1}$
 $90 \text{ km h}^{-1} = 25 \text{ ms}^{-1}$

වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය
 200m දුරකදී

$ABE \Delta = 200 \text{ m}$

$\frac{1}{2} AE \times BE = ABE \Delta$
 $\frac{1}{2} (t_1 - 10) \times 25 = 200$
 $\Rightarrow t_1 = 26 \text{ seconds}$

$\tan \theta = f = \frac{BE}{AE} = \frac{25}{t_1 - 10}$
 $= \frac{25}{16} \text{ ms}^{-2}$

$t = T$ දී වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය

$ABCD \square = OPQD \square = 0$

$\frac{1}{2} (AD + BC) \times BE = OP \times OD$
 (මෙහිදී)

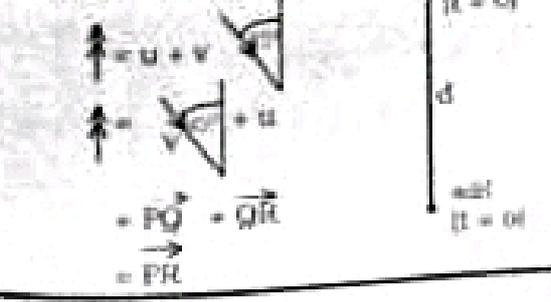
$\frac{1}{2} (T - 10 + T - t_1) \times 25 = 20 \times T$
 $t_1 = 26 \text{ s}$

$T = 30 \text{ seconds}$

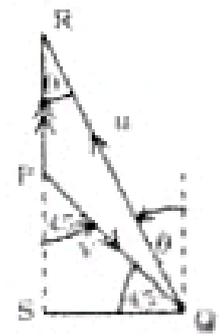
(b) පහත වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය

(i) $E = v$; මෙහි $E = 0$

මෙහිදී $E = v + u$



(ii) වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය



$QS = v \sin 45^\circ = \frac{v}{\sqrt{2}} = 15$

$SR = \sqrt{u^2 - \frac{v^2}{2}}$

$PR = \sqrt{\frac{2u^2 - v^2}{2}} = \frac{v}{\sqrt{2}}$
 $= \frac{\sqrt{2}u^2 - v^2 - v}{\sqrt{2}}$

වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය

$t_1 = \frac{d}{|PR|}$

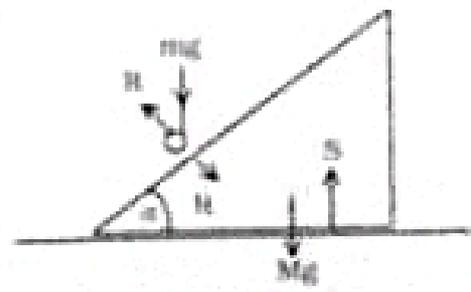
$t_1 = \frac{\sqrt{2}d}{\sqrt{2u^2 - v^2} - v}$ (මෙහිදී d වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය)

$t_1 = \frac{\sqrt{2}d (\sqrt{2u^2 - v^2} + v)}{2(u^2 - v^2)}$ (මෙහිදී)

වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය

එහි $\sin \theta = \frac{v \sin 45^\circ}{u} = \frac{v}{u\sqrt{2}}$ (මෙහිදී)

(c) වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය



(i) $\Sigma F_x = 0$

(ii) $\Sigma F_y = 0$

(iii) $\Sigma F_z = 0$

වස්තුවක චලිතය පෙන්වන චලිතයේ රූපය

$$= \frac{1}{K} + \frac{1}{K} \Rightarrow a_1 = \frac{18}{16} = \frac{9}{8} \text{ ms}^{-2}$$

$$F = ma_1 \text{ වන්නේ නම්} \\ \rightarrow F = Ma_2 + m(a_2 - a_1 \cos \alpha)$$

$$F = 600 + m(a_2 - a_1 \cos \alpha) \\ \Rightarrow 1600 = 600 + m(a_2 - a_1 \cos \alpha)$$

$$1000 = m(a_2 - a_1 \cos \alpha) \\ \Rightarrow 1000 = m(a_2 - \frac{9}{8} \cos \alpha)$$

$$1000 = m(a_2 - \frac{9}{8} \times \frac{4}{5}) \\ \Rightarrow 1000 = m(a_2 - \frac{9}{10})$$

$$1000 = m(a_2 - 0.9) \\ \Rightarrow 1000 = m a_2 - 0.9m$$

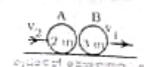
$$144 \text{ km h}^{-1} = 40 \text{ ms}^{-1}$$

$$P = H \cos \alpha$$

$$P = \frac{H}{\cos \alpha}$$

$$R = 400 \text{ N}$$

$$P = 400 \text{ N}$$



$$2m \times 2u + 3m \times 3u = 2mv_2 + 3mv_1 \\ 2m \times 2u + 9m = 2mv_2 + 3mv_1 \\ 4m \times 2u + 9m = 2mv_2 + 3mv_1 \\ 8m \times 2u + 9m = 2mv_2 + 3mv_1 \\ 16mu + 9m = 2mv_2 + 3mv_1$$

$$v_1 = v_2 = v \text{ (7u + 3u)} \\ \Rightarrow 16mu + 9m = 2mv + 3mv \\ \Rightarrow 16mu + 9m = 5mv \\ \Rightarrow 16u + \frac{9}{m} = 5v \\ \Rightarrow 16u + \frac{9}{m} = 5v$$

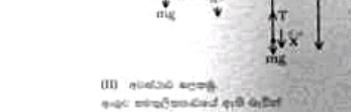
$$v = \frac{16u + \frac{9}{m}}{5}$$

විකල්ප 2: නිසි වේ.
 P හි වේගය ගණනය කිරීමට P හි වේගය අවශ්‍ය වේ.
 Q හි වේගය ගණනය කිරීමට Q හි වේගය අවශ්‍ය වේ.

$$\frac{1}{2} m_1 a_1^2 + \frac{1}{2} m_2 a_2^2 + mg a \sin \theta = 0 \\ - 3mg a \sin \theta = 0$$

$$2m_1 a_1^2 = 2mg a \sin \theta \\ a_1^2 = g \sin \theta$$

$$P = mg \sin \theta = m a_1^2 \\ R = mg \sin \theta = mg \sin \theta = 0$$



$$T_0 = mg \cos \theta$$

$$T = \frac{mg \sin \theta}{\cos \theta} = mg \tan \theta$$

$$mg \tan \theta = m a_1$$

$$a_1 = g \tan \theta$$

$$v = \frac{g}{\cos \theta} (x - 2t) = \frac{g}{\cos \theta} (x - 2t) = 0$$

$$v = \frac{g}{\cos \theta} (x - 2t) = 0$$

$$v = \frac{g}{\cos \theta} (x - 2t) = 0$$

$$v = \frac{g}{\cos \theta} (x - 2t) = 0$$

$$v = \frac{g}{\cos \theta} (x - 2t) = 0$$

եթև անվանա $\vec{K} = 0$ ևս $x = 2t$ ԵՊ.
 ԵՊ. C ԵՊ.

ԵՊ. ԵՊ. $T = \frac{2x}{u}$ ԵՊ. ԵՊ.

ԵՊ. $T = 2x \sqrt{\frac{2}{L}}$ ԵՊ.

$K^2 = u^2 a^2 - x^2$ ԵՊ. ԵՊ.

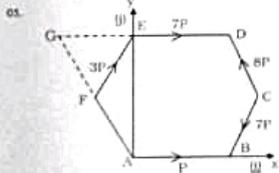
ԵՊ. $g = \frac{K}{L} (a^2 - 0)$ ԵՊ.

ԵՊ. C ԵՊ. ԵՊ. $\sqrt{2L}$ ԵՊ.

ԵՊ. $L = l$ ԵՊ.

ԵՊ. $x = 2t + l = 3t$ ԵՊ.

ԵՊ. $x = 2t + l = l$ ԵՊ.



BC ԵՊ. ԵՊ. ԵՊ.

$= \cos 60^\circ i + \sin 60^\circ j$

$= \frac{1}{2} i + \frac{\sqrt{3}}{2} j$

ԵՊ. BC ԵՊ. ԵՊ. ԵՊ. $= \frac{1}{2} i + \frac{\sqrt{3}}{2} j$ ԵՊ.

ԵՊ. CD ԵՊ. ԵՊ. ԵՊ. $= -\frac{1}{2} i + \frac{\sqrt{3}}{2} j$ ԵՊ.

ԵՊ. FE ԵՊ. ԵՊ. ԵՊ. $= \frac{1}{2} i + \frac{\sqrt{3}}{2} j$ ԵՊ.

ճյուղ	ճյուղ	ճյուղ
\vec{AB}	$7P$	$7P \left(\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right)$
\vec{CB}	$7P$	$7P \left(-\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right)$
\vec{CD}	$8P$	$8P \left(-\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right)$
\vec{ED}	$7P$	$\frac{1}{2} 7P i$
\vec{FE}	$3P$	$3P \left(\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right)$

$\vec{R} = 7P \left(\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right) + 8P \left(-\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right) + 7P i + 3P \left(\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right)$

$= 2P i + \sqrt{3} P j$ ԵՊ. ԵՊ.

$\vec{R} = 4P \left(\frac{1}{2} i + \frac{\sqrt{3}}{2} j \right)$ ԵՊ. ԵՊ.

$\frac{1}{2} i + \frac{\sqrt{3}}{2} j$ ԵՊ. BC ԵՊ. ԵՊ.

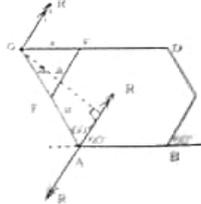
ԵՊ. ԵՊ. BC ԵՊ. ԵՊ.

$|\vec{R}| = \left(4P^2 \left[\left(\frac{1}{2} \right)^2 + \left(\frac{\sqrt{3}}{2} \right)^2 \right] \right)^{1/2} = 4P$ ԵՊ.

ԵՊ. DE ԵՊ. AF ԵՊ. ԵՊ. G ԵՊ. ԵՊ. ԵՊ.

$\vec{M}_G = 7P(2a) \frac{\sqrt{3}}{2} - 7P(3a) \frac{\sqrt{3}}{2} + 8P(2a) \frac{\sqrt{3}}{2} = 3P(4a) \frac{\sqrt{3}}{2} = 0$ ԵՊ.

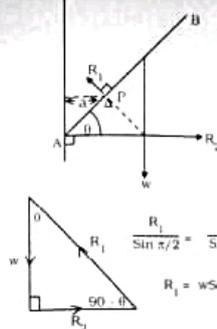
ԵՊ. ԵՊ. BC ԵՊ. ԵՊ. G ԵՊ. ԵՊ.



ԵՊ. A ԵՊ. ԵՊ. R ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ.

$\cos 4P = 2a \times \frac{\sqrt{3}}{2} = 4 \sqrt{3} P a \text{ Nm}$ ԵՊ.

ԵՊ. (Գ) ԵՊ. ԵՊ.



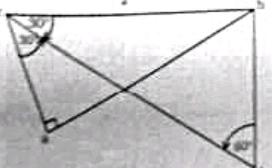
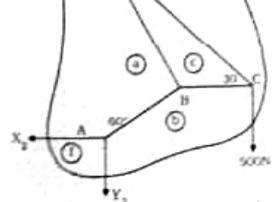
$R_1 = \frac{W}{\sin \pi/2} = \frac{W}{\sin (90^\circ - \theta)}$

$R_1 = W \sec \theta$ ԵՊ.

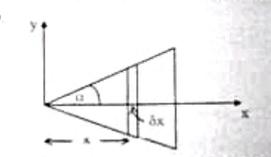
ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ.

$w \times 3a \cos \theta = w \sec \theta \times a \sec \theta$

$= 3 \cos^3 \theta = 1$ ԵՊ. ԵՊ.



ԵՊ.	ԵՊ.	ԵՊ.
CD	1000N	
BC	500√3 N	
BD	250√3 N	
AB	750N	



ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ.

ԵՊ. ԵՊ. $x \tan \theta = 0$ ԵՊ.

ԵՊ. ԵՊ. ԵՊ. $\tan \theta = \frac{R_1}{W}$ ԵՊ.

$\int_0^h \rho x^2 \tan^2 \theta dx = \int_0^h \rho x^2 dx$

$\frac{\rho \tan^2 \theta}{3} x^3 = \frac{\rho}{3} x^3$ ԵՊ.

$\frac{\rho \tan^2 \theta}{3} \left(\frac{3b^3}{4} \right) = \frac{\rho}{3} \left(\frac{3b^3}{4} \right)$ ԵՊ.



ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ.

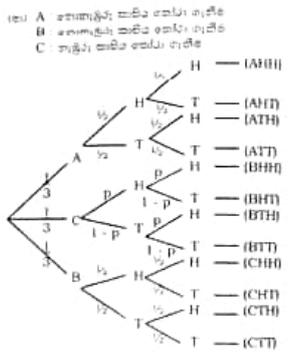
$\sum T \sin 45^\circ + F = W$ ԵՊ.

$\sum T \sin 45^\circ + R = W$ ԵՊ.

ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ. ԵՊ.

BD = h tan 15
 BG = $\frac{3}{4}h$ tan AB = h Sec 15
 AE = AB = h Sin 15
 E සිට ස්ථම්භය වැටීමේදී
 $W \left(h \text{ Sec } 15 + \frac{3h}{4} \text{ Sin } 15 \right)$
 = R x h Sec 15 — 0
 $W \left(\frac{h}{\text{Cos } 15} + \frac{3h}{4} \text{ Sin } 15 \right) = \frac{Rh}{\text{Cos } 15}$
 $Wx = \frac{3}{4} Wx \text{ Sin } 15 \text{ Cos } 15 = R \times R$
 $W = \frac{3}{8} W \text{ Sin } 30 = R$
 $W = \frac{3}{8} W \times \frac{1}{2} = R$
 $R = \frac{19w}{16}, F = \frac{19w}{16} \mu$
 0 = T = $\frac{1}{\sqrt{2}} + \frac{19w}{16} = w \Rightarrow$
 $\frac{T}{\sqrt{2}} = \frac{3w}{16} \Rightarrow T = \frac{3\sqrt{2}w}{16}$
 0 = F = $\frac{3\sqrt{2}w}{16} = \frac{1}{\sqrt{2}} = \frac{3w}{16}$
 0 = $\frac{3w}{16} = \frac{19w}{16} = \mu = \frac{3}{19}$

$P(A \cap B) = 0.6 \cdot 0.02 = 0.58$
 $P(A \cap B) + P(A \cap B) = 0.18 + 0.58 = 0.76$
 (iii) $P(A \cap B)$ සමඟ සූත්‍ර
 $P(A \cap B) = P(A \cap B) = 1 - P(A \cup B)$
 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.6 + 0.2 - 0.02 = 0.78$
 $P(A \cap B) = 1 - 0.78 = 0.22$



සමස්ත ප්‍රවේශ ලක්ෂණයන්
 A, B, C, H සිදුවන සෑම විටම
 $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$
 $= \left(\frac{1}{3} + \frac{1}{2} + \frac{1}{3} \right) + \left(\frac{1}{3} \times \frac{1}{2} \times \frac{1}{3} \right) + \left(\frac{1}{3} \times \frac{1}{2} \times \frac{1}{3} \right)$
 $= \frac{1}{12} + \frac{1}{12} + \frac{1}{3} = \frac{17}{54}$
 සමස්ත ප්‍රවේශ ලක්ෂණයන්
 $\frac{1}{12} + \frac{1}{12} + \frac{1}{3} = \frac{17}{54} \Rightarrow P = \frac{2}{3}$ යනු වැරදි

සිය අදාළවලට අදාළව සමස්ත ප්‍රවේශ ලක්ෂණයන්
 $P(C|HH) = \frac{P(C \cap HH)}{P(HH)} = \frac{\frac{1}{3} \times P \times P}{\frac{17}{54}}$
 $= \frac{1}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{54}{17} = \frac{8}{17}$
 $\sum_{i=1}^n f_i x_i$
 මධ්‍යස්ථය $\bar{x} = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i}$; f_i සංඛ්‍යාව

සමස්ත මධ්‍යස්ථය \bar{x} හි අගය සඳහා සමස්ත මධ්‍යස්ථය
 $y = \frac{x-d}{c} \Rightarrow VC = x - 2 \text{ km}$; $x = a + cy$ යනු වැරදි
 $\bar{x} = \frac{\sum_{i=1}^n f_i (a + cy)}{\sum_{i=1}^n f_i}$
 $\bar{x} = \frac{a \sum_{i=1}^n f_i + c \sum_{i=1}^n f_i y_i}{\sum_{i=1}^n f_i} = \frac{a \sum_{i=1}^n f_i}{\sum_{i=1}^n f_i} + \frac{c \sum_{i=1}^n f_i y_i}{\sum_{i=1}^n f_i}$
 $= a + c \bar{y}$ යනු වැරදි සමස්ත ප්‍රවේශ ලක්ෂණයන්
 $\sigma^2 = \frac{\sum_{i=1}^n f_i (x_i - \bar{x})^2}{\sum_{i=1}^n f_i}$
 $= \frac{\sum_{i=1}^n f_i (x_i^2 - 2x_i \bar{x} + \bar{x}^2)}{\sum_{i=1}^n f_i}$
 $= \frac{\sum_{i=1}^n f_i x_i^2}{\sum_{i=1}^n f_i} - 2\bar{x} \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i} + \bar{x}^2 \frac{\sum_{i=1}^n f_i}{\sum_{i=1}^n f_i}$

$= \frac{\sum_{i=1}^n f_i x_i^2}{\sum_{i=1}^n f_i} - 2\bar{x} \bar{x} + \bar{x}^2$ යනු වැරදි
 $= \frac{\sum_{i=1}^n f_i x_i^2}{\sum_{i=1}^n f_i} - \bar{x}^2$
 $x = a + cy \Rightarrow \bar{x} = a + c \bar{y}$ යනු වැරදි
 $\sigma^2 = \frac{\sum_{i=1}^n f_i (a + cy)^2}{\sum_{i=1}^n f_i} - (a + c \bar{y})^2$
 $= \frac{\sum_{i=1}^n f_i (a^2 + 2acy + c^2 y^2)}{\sum_{i=1}^n f_i} - a^2 - 2a c \bar{y} - c^2 \bar{y}^2$
 $= \frac{\sum_{i=1}^n f_i a^2}{\sum_{i=1}^n f_i} + 2ac \frac{\sum_{i=1}^n f_i y_i}{\sum_{i=1}^n f_i} + c^2 \frac{\sum_{i=1}^n f_i y_i^2}{\sum_{i=1}^n f_i} - a^2 - 2ac \bar{y} - c^2 \bar{y}^2$
 $= \frac{\sum_{i=1}^n f_i a^2}{\sum_{i=1}^n f_i} + 2ac \bar{y} + c^2 \bar{y}^2 - a^2 - 2ac \bar{y} - c^2 \bar{y}^2$
 $\sigma^2 = c^2 \left[\frac{\sum_{i=1}^n f_i y_i^2}{\sum_{i=1}^n f_i} - \bar{y}^2 \right]$
 සමස්ත ප්‍රවේශ ලක්ෂණයන් $\sigma = c \sqrt{\frac{\sum_{i=1}^n f_i y_i^2}{\sum_{i=1}^n f_i} - \bar{y}^2}$
 $\sum_{i=1}^n f_i y_i = 23.5 \text{ m}$; $\sum_{i=1}^n f_i y_i^2 = 155.9$
 සමස්ත ප්‍රවේශ ලක්ෂණයන් $x = 10y + 45 \text{ m}$; $\bar{x} = 10\bar{y} + 45$ යනු වැරදි
 $\therefore a = 45 \text{ m}$; $c = 10$ යනු වැරදි
 සමස්ත ප්‍රවේශ ලක්ෂණයන් $\sigma = a + c \bar{y}$
 $= 45 + 10 \left(\frac{23.5}{25} \right)$
 $= 45 + 9.4 = 54.6 \text{ m}$ යනු වැරදි
 සමස්ත ප්‍රවේශ ලක්ෂණයන් $\sigma^2 = c^2 \left[\frac{\sum_{i=1}^n f_i y_i^2}{\sum_{i=1}^n f_i} - \bar{y}^2 \right]$
 $\therefore \bar{y} = \frac{\sum_{i=1}^n f_i y_i}{\sum_{i=1}^n f_i} = \frac{23.5}{25} = 0.94$
 $\sigma^2 = 100 \left[\frac{155.9}{25} - (0.94)^2 \right]$
 $= 535.24 - 88.36$
 $= 446.88$ යනු වැරදි
 සමස්ත ප්‍රවේශ ලක්ෂණයන් $\sigma = \sqrt{446.88} = 21.14$ යනු වැරදි

වර්ග ප්‍රවේශ (i)	ප්‍රවේශ සංඛ්‍යාව (f _i)	සමස්තය (f _i x _i)	f _i x _i ² (f _i x _i - 5)	y = $\frac{x-45}{10}$	(y)	(y) ²
0 < x < 10	5	42	40	-4	-16.8	67.2
10 < x < 20	15	39	-30	-3	-11.7	35.1
20 < x < 30	25	34	-20	-2	-6.8	13.6
30 < x < 40	35	32	-10	-1	-3.2	3.2
40 < x < 50	45	2.8	0	0	0	0
50 < x < 60	55	2.8	10	1	2.8	2.8
60 < x < 70	65	2.5	20	2	5.0	10.0
70 < x < 80	75	1.6	30	3	4.8	14.4
80 < x < 90	85	0.6	40	4	2.4	9.6
Total	25.0				-23.5	155.9