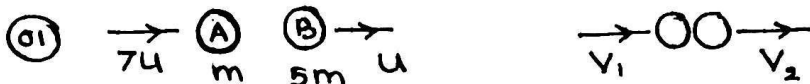


උඟව පළාත් අධ්‍යාපන දෙපාර්තමේන්තුව
අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය 2025

අවසාන වාර පරීක්ෂණය

සංයුක්ත ගණිතය 11

ලකුණු ලබාදීමේ පටිපාටිය



ആക്കത്തിന്റെ $I = \Delta mV \rightarrow$

$$0 = (mV_1 + 5mV_2) - (7mu + 5mu) \quad 05$$

$$V_1 + 5V_2 = 12u \quad \text{--- ①}$$

തലത്തിന്റെ ദർശനത്തിൽ തിരിയുമ്പോൾ

$$V_2 - V_1 = -e(u - 7u) \quad 05$$

$$V_2 - V_1 = 6eu \quad \text{--- ②}$$

$$\text{①} + \text{②} \quad 6V_2 = 6u(e+2)$$

$$V_2 = u(e+2) \quad 05$$

$$\text{②} \Rightarrow V_1 = V_2 - 6eu$$

$$= u(e+2) - 6eu$$

$$= 2u - 5eu$$

$$= u(2-5e) \quad 05$$

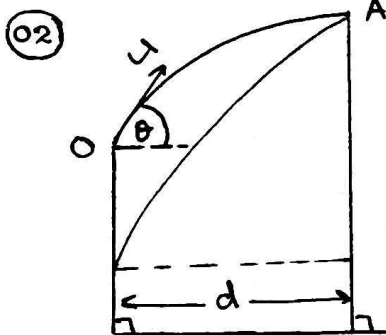
A ന്റെ ദിശയിൽ പ്രതിബിംബം ഉണ്ടാകാൻ

$$u(2-5e) < 0$$

$$e > 2/5$$

$$e \leq 1 \text{ തന്നെ } 2/5 < e \leq 1 \quad 05$$

25



$O \rightarrow A$ ചലനം

$$\uparrow v = u + at$$

$$0 = u \sin \theta - gt$$

$$t = \frac{u \sin \theta}{g} \quad 05$$

$$\rightarrow s = ut$$

$$d = u \cos \theta \cdot \frac{u \sin \theta}{g}$$

$$\Rightarrow u = \sqrt{\frac{2dg}{\sin 2\theta}} \quad 05$$

$$\leftarrow s = ut$$

$$d = u \cos \theta \cdot t_1$$

$$d = \frac{1}{\sqrt{2}} u \cos \theta \cdot t_1$$

$$t_1 = \frac{\sqrt{2}d}{u \cos \theta} \quad 05$$

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

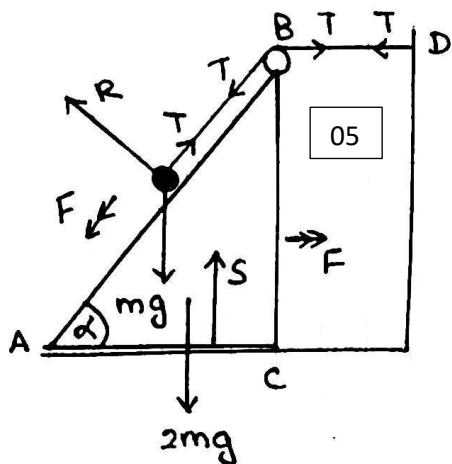
$$h = 0 + \frac{1}{2}g \left(\frac{2d^2}{u^2 \cos^2 \theta} \right) \quad 05$$

$$= gd^2 \frac{\sin 2\theta}{2gd \cos^2 \theta}$$

$$= \frac{1}{2} \frac{d \sin 2\theta}{\cos^2 \theta} \quad 05$$

25

03



$$F = ma$$

$$mg \sin \alpha - T = m(F - F \cos \alpha)$$

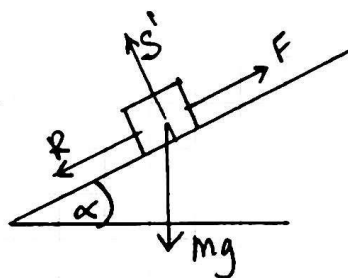
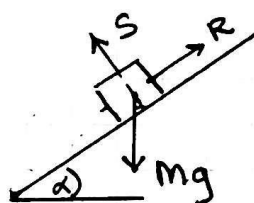
$$2m \sin \alpha \rightarrow T = 2mF + m(F - F \cos \alpha)$$

$$T = 2mF + m(F - F \cos \alpha)$$

$$T = 2mF + m(F - F \cos \alpha)$$

25

04



$$F = ma$$

$$Mg \sin \alpha = R$$



$$F = R + Mg \sin \alpha = 2Mg \sin \alpha$$

$$H = PV \cdot \text{time}$$

$$= 2Mg \sin \alpha v$$

$$H' = 2H = 4Mg \sin \alpha v$$

$$\text{Work done by } F' = 4Mg \sin \alpha$$

$$F = ma$$

$$4Mg \sin \alpha - R - Mg \sin \alpha = ma$$

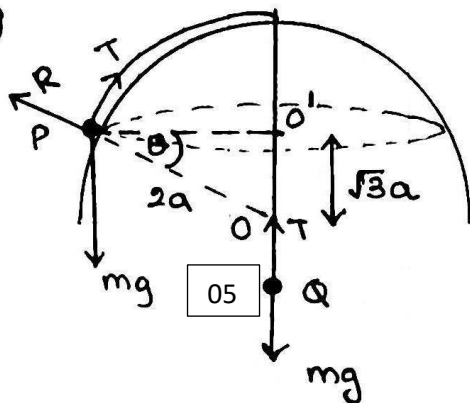
$$4Mg \sin \alpha - 2Mg \sin \alpha = ma$$

$$a = 2g \sin \alpha$$

25

(02)

(05)



$$2a \sin \theta = \sqrt{3}a$$

$$\sin \theta = \frac{\sqrt{3}}{2}$$

$$\theta = \pi/3 \quad \boxed{05}$$

$$T = mg \quad \boxed{05}$$

$$F = ma \quad \swarrow$$

$$T - mg \cos \theta = maw^2 \sin \theta \quad \boxed{05}$$

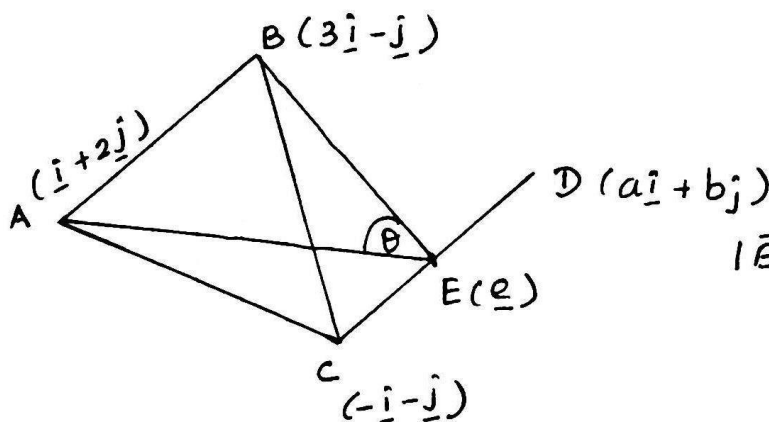
$$mg - mg \cdot \frac{1}{2} = maw^2 \frac{\sqrt{3}}{2} \quad \boxed{05}$$

$$2g - g = \sqrt{3}aw^2$$

$$w^2 = \frac{g}{\sqrt{3}a}$$

25

(06)



$$|\overrightarrow{BE}| = |-3\hat{i} - \frac{3}{2}\hat{j}|$$

$$= \sqrt{9 + \frac{9}{4}} = \frac{3\sqrt{5}}{2}$$

$$\overrightarrow{AB} = \overrightarrow{CD}$$

$$(3\hat{i} - \hat{j}) - (\hat{i} + 2\hat{j}) = (a\hat{i} + b\hat{j}) - (-\hat{i} - \hat{j}) \quad \boxed{05}$$

$$2\hat{i} - 3\hat{j} = (a+1)\hat{i} + (b+1)\hat{j}$$

$$a+1=2 \Rightarrow a=1 \quad \boxed{05}$$

$$b+1=-3 \Rightarrow b=-4$$

$$\therefore \overrightarrow{OD} = \hat{i} - 4\hat{j} \quad \boxed{05}$$

$$\underline{e} = 0\hat{i} - \frac{5}{2}\hat{j}$$

$$= -\frac{5}{2}\hat{j}$$

$$|\overrightarrow{AE}| = |-\hat{i} - \frac{9}{2}\hat{j}| =$$

$$= \frac{\sqrt{5} \cdot \sqrt{17}}{2}$$

$$\frac{3\sqrt{5}}{2} \cdot \frac{\sqrt{5} \cdot \sqrt{17}}{2} \cos \theta = \frac{39}{4} \quad \boxed{05}$$

$$\cos \theta = \frac{13}{5\sqrt{17}}$$

25

(03)

09) $P(A) = \frac{1}{3}$ $P(A|B) = \frac{1}{2}$ $P(B|A) = \frac{2}{5}$

$$\frac{P(A \cap B)}{P(B)} = \frac{1}{2} \quad [05] \quad \frac{P(A \cap B)}{P(A)} = \frac{2}{5}$$

$$P(A \cap B) = \frac{2}{5} \times \frac{1}{3} = \frac{2}{15} \quad [05]$$

$$P(B) = 2 P(A \cap B) \\ = \frac{4}{15} \quad [05]$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) \quad [05] \\ = \frac{1}{3} + \frac{4}{15} - \frac{2}{15} \\ = \frac{5}{15} + \frac{2}{15} \\ = \frac{7}{15} \quad [05]$$

25

10) $a \quad \underline{3} \quad \underline{3} \quad \underline{b} \quad a+7$; $0 < a \leq 3$

$a=1$ විට $\frac{1+3+3+b+8}{5} = 4 \quad [05]$
 $15+b=20$
 $b=5$
 $\{1, 3, 3, 5, 8\} \quad [05]$

$a=2$ විට $2+3+3+b+9 = 20 \quad [05]$
 $b=3$
 $\{1, 3, 3, 3, 9\} \quad [05]$

$a=3$ විට $3+3+3+b+10 = 20 \quad [05]$
 $b=1$

$b > 3$ නිසා යුතු නිසි അംഗങ്ങൾക്ക് නොලැබේ.

25

$$g = \frac{V}{DF} \Rightarrow DF = \frac{2fT}{g}$$

$$C_{25} = \frac{1}{2} \times 2T \times 4gT + \frac{7}{2} gT \times T$$

$$= \frac{15}{2} gT^2 \quad 05$$

ii) ଓ କି ଗୁଣିତ ଗୁଣିତ = OCF Δ ଓ. ଓ. 05

$$= \frac{1}{2} (2T + DF) \quad \checkmark$$

$$= \frac{1}{2} (2T + 2\frac{fT}{g}) \quad 2fT \quad \text{05}$$

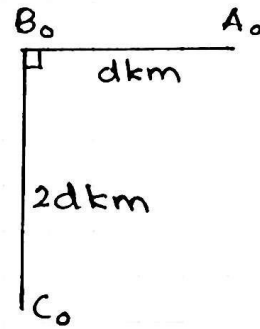
$$= \frac{fT^2 \cdot 2(g+f)}{2g}$$

$$= \frac{2fT^2}{g} (g+f) \quad \text{05}$$

$$b) \underline{V}(A, E) = \uparrow u$$

$$\underline{V}(B, A) = \begin{array}{c} \nearrow 30^\circ \\ \sqrt{3}u \end{array}$$

$$\underline{V}(C, B) = \begin{array}{c} \nwarrow 60^\circ \\ u \end{array}$$



$$i) \underline{V}(B, E) = \underline{V}(B, A) + \underline{V}(A, E) \quad [05]$$

$$= \begin{array}{c} \nearrow 30^\circ \\ \sqrt{3}u \end{array} + \uparrow u$$

$$= \begin{array}{c} u + u/2 = 3u/2 \\ \nearrow \theta \\ \sqrt{3}u/2 \end{array} \quad [05]$$

$$|\underline{V}(B, E)| = \sqrt{\frac{9u^2}{4} + \frac{3u^2}{4}} = \frac{2\sqrt{3}u}{2}$$

$$= \sqrt{3}u \text{ kmh}^{-1} \quad [05]$$

$$\tan \theta = \frac{1}{\sqrt{3}} \quad ; \quad \theta = 30^\circ \quad [05]$$

20

$\therefore$ B නි ඉඹෙගය නැගෙනහිරින් 30° ක් උතුර $\sqrt{3}u$ වේ.

$$ii) \underline{V}(C, A) = \underline{V}(C, B) + \underline{V}(B, A) \quad [05]$$

$$= \begin{array}{c} \nwarrow 60^\circ \\ u \end{array} + \begin{array}{c} \nearrow 30^\circ \\ \sqrt{3}u \end{array}$$

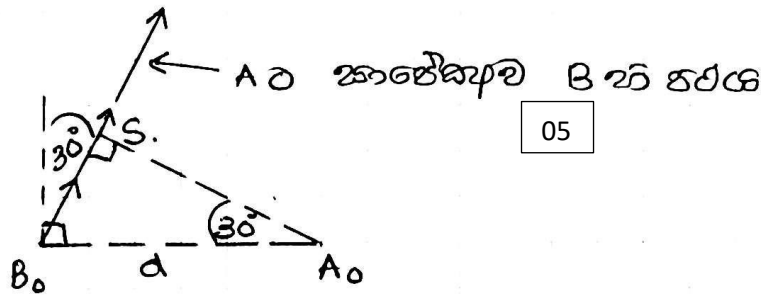
$$= \begin{array}{c} u/2 + 3u/2 = 2u \\ \rightarrow \sqrt{3}u/2 - \sqrt{3}u/2 = 0 \end{array} \quad [05]$$

$$= \uparrow 2u \text{ kmh}^{-1} \quad [05]$$

20

$\therefore$ A ට නාණ්ඩුව C නි ඉඹෙගය උතුර $2u$ වේ.

(07)



05

$$\begin{aligned}
 \text{A නා B අතර කෙටිම දුර} &= A_0S \\
 &= d \cos 30^\circ \\
 &= d \frac{\sqrt{3}}{2} \text{ km}
 \end{aligned}$$

05

$$\left. \begin{array}{l} \text{කෙටිම දුර ජිනිට්‍රම ගතවන} \\ \text{කාලය} \end{array} \right\} = \frac{B_0S}{|V(B,A)|}$$

t

$$= \frac{d \cos 60^\circ}{\sqrt{3}u} \quad 05$$

$$= \frac{d}{2\sqrt{3}u} \quad 05$$

t කාලය තුළ A ට නාභේද්‍යව C ගමන් කළ දුර

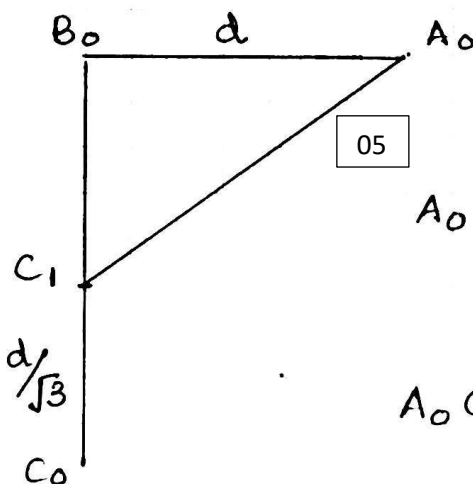
$$= |V(C,A)| t$$

$$= 2u \cdot \frac{d}{2\sqrt{3}u} = \frac{d}{\sqrt{3}} \text{ km} \quad 05$$

t කාලයේ දී A නා C අතර දුර = A_0C_1

$$B_0C_1 = 2d - \frac{d}{\sqrt{3}}$$

$$= \left(\frac{2\sqrt{3}-1}{\sqrt{3}} \right) d \quad 05$$



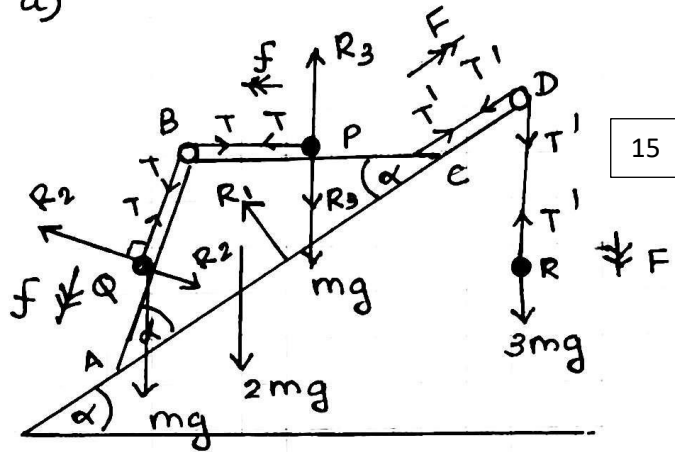
05

$$\begin{aligned}
 A_0C_1^2 &= \left[\frac{(2\sqrt{3}-1)d}{\sqrt{3}} \right]^2 + d^2 \\
 &= \frac{(12 - 4\sqrt{3} + 1 + 3)d^2}{3}
 \end{aligned}$$

$$A_0C_1 = 2\sqrt{\frac{4-\sqrt{3}}{3}} d \text{ km} \quad 05$$

(08)

12) a)



15

K, $\frac{1}{2}F$

$$\underline{a}(R, E) = \downarrow F$$

$$\underline{a}(K, E) = \nearrow F$$

$$\underline{a}(P, E) = \leftarrow f + \nearrow F$$

$$\underline{a}(P, K) = \leftarrow f$$

$$\underline{a}(Q, K) = \nearrow f$$

$$\underline{a}(Q, E) = \nearrow f + \nearrow F$$

10

$$F = ma \text{ ശാസ്ത്രം.}$$

$$P \leftarrow ; T = m(f - F \cos \alpha) \quad 10$$

$$Q \nearrow ; mg \sin 2\alpha - T = m(f - F \cos \alpha) \quad 10$$

$$R \downarrow ; 3mg - T' = 3mF \quad 10$$

$$P, Q, K \text{ ദ്വൈതം } \nearrow ;$$

$$4mg \sin \alpha - T' = -2mF + m(f \cos \alpha - F) + m(f \cos \alpha - F) \quad 15$$

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

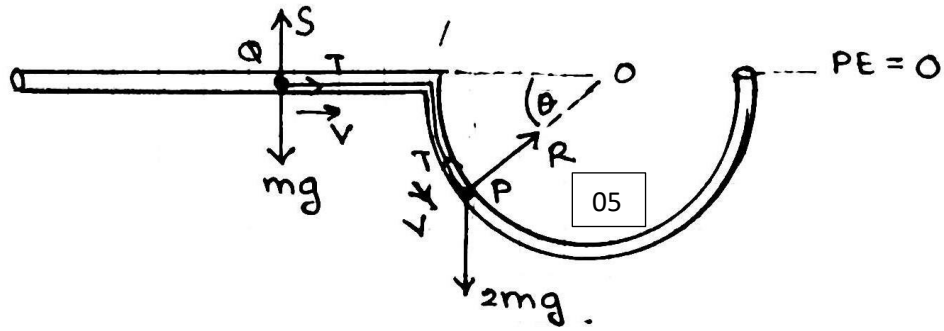
$$a = 0 + \frac{1}{2}(f - F)t^2$$

$$a = -\frac{F}{2}t^2 \quad 10$$

80

(09)

b)



ශක්ති සංස්ථිති නියමයෙන්

$$0 + 0 = \frac{1}{2}mv^2 + \frac{1}{2}2mv^2 - 2mga \sin \theta \quad 15$$

$$3mv^2 = 4mga \sin \theta$$

$$3v^2 = 4ga \sin \theta$$

$$3(a\dot{\theta})^2 = 4ga \sin \theta$$

$$\dot{\theta}^2 = \frac{4g}{3a} \sin \theta \quad 05$$

25

$$\frac{d}{dt} \dot{\theta}^2 = \frac{4g}{3a} \cos \theta \dot{\theta} \quad 05$$

$$2\dot{\theta} \ddot{\theta} = \frac{4g}{3a} \cos \theta \dot{\theta} \quad 05$$

$$\ddot{\theta} = \frac{2g}{3a} \cos \theta \quad 05$$

$$a\ddot{\theta} = \frac{2g}{3} \cos \theta \quad 05$$

$$\therefore Q \text{ න් කැපයුම} \rightarrow \frac{2g}{3} \cos \theta$$

$$V_{\text{පරිමිත}} \text{ වන්නේ } \theta = \pi/2 \text{ වීමට} \quad 05$$

$$\text{එවිට } v^2 = \frac{4ga}{3} \Rightarrow v = 2\sqrt{\frac{ga}{3}}$$

05

30

$$P \text{ ට } \overrightarrow{PO} \text{ ට } F = ma$$

$$R - 2mg \sin \theta = 2ma\dot{\theta}^2 \quad 05$$

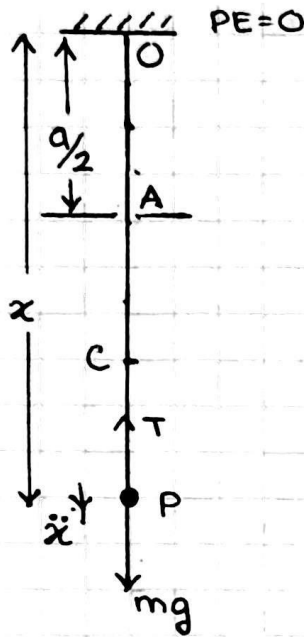
$$\theta = \pi/2 \text{ වීම } R = 2mg + 2m \frac{4g}{3} \quad 05$$

$$= \frac{14mg}{3} \quad 05$$

15

(10)

(13)



$$\downarrow F = ma$$

$$mg - T = m\ddot{x} \quad 05$$

$$mg - mg \frac{(x-a)}{a} = m\ddot{x} \quad 05$$

$$g - g \frac{x}{a} + g = \ddot{x}$$

$$2g - g \frac{x}{a} = \ddot{x}$$

$$-\frac{g}{a} (x - 2a) = \ddot{x}$$

$$\ddot{x} + \frac{g}{a} (x - 2a) = 0 \quad 05$$

∴ ເສັ້ນໂຕ ສະໜອງ ຂໍ້ $\ddot{x} = 0$

$$x = 2a \quad 05$$

$$OC = 2a$$

20

ສະນັ້ນ ຈຸດປະສານ

$$-mg \cdot 4a + 0 + \frac{1}{2} mg \left(\frac{3a}{a} \right)^2 = -mgx + \frac{1}{2} m\dot{x}^2 + \frac{1}{2} mg \left(\frac{x-a}{a} \right)^2 \quad 20$$

$$-8ga + 9ga = -2gx + \dot{x}^2 + \frac{g}{a} (x^2 - 2ax + a^2)$$

$$ga = -2gx + \dot{x}^2 + \frac{g}{a} x^2 - 2gx + ga$$

$$\dot{x}^2 = 4gx - \frac{g}{a} x^2 \quad 05$$

$$\dot{x}^2 = \frac{g}{a} (4ax - x^2) \quad 05$$

30

$$y = x - 2a \quad \text{ຫຼື}$$

$$\dot{y} = \dot{x} \quad 05$$

$$\dot{y}^2 = \frac{g}{a} [4a(y+2a) - (y+2a)^2] \quad 05$$

$$= \frac{g}{a} [4ay + 8a^2 - y^2 - 4ya - 4a^2]$$

$$= \frac{g}{a} [4a^2 - y^2] \quad 05$$

$$\text{ເພາະ } \dot{y}^2 = \frac{g}{a} [D^2 - y^2] \text{ ຖ້າ ກວດ ສອບ}$$

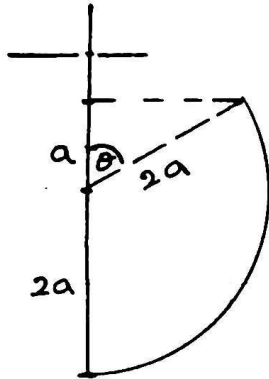
$$D = 2a \quad \text{ຫຼື ກວດ ສອບ } y = 2a \quad \text{ເພາະ } 05$$

$$\text{ຈຸດປະສານ ຈະ ກວດ ສອບ ຫຼັງ ຈາກ ນີ້ } x = a, y = -a \quad 05 \quad (11)$$

$$\dot{y}^2 = \frac{g}{a} (4a^2 - a^2) = 3ga \quad 05$$

$$\dot{y} = \sqrt{3ga} \quad 05$$

35



$$\cos \theta = \frac{a}{2a} = \frac{1}{2} \quad 05$$

$$\theta = \pi/3 \quad 05$$

$$\text{കാലം} = \frac{\pi - \pi/3}{\omega} = \frac{2\pi/3}{\sqrt{g/a}} \quad 05$$

$$= \frac{2\pi}{3} \sqrt{\frac{a}{g}} \quad 05$$

20

ഗുരുജന്യ ഓരോ ചക്രത്തിലും

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

$$v^2 = 3ga - 2g \frac{a}{2} \quad 05$$

$$v^2 = 2ga \Rightarrow v = \sqrt{2ga} \quad 05$$

$$\downarrow e v = \frac{1}{\sqrt{2}} \sqrt{2ga} = \sqrt{ga} \quad 05$$

15

രജിത കോർഡിനേറ്റ് ഉപയോഗിച്ച്

$$-mg \frac{a}{2} + \frac{1}{2} m g a = -mgh + 0 + \frac{1}{2} m g \left(\frac{h-a}{a} \right)^2 \quad 15$$

$$-ga + ga = -2gh + \frac{g}{a} [h^2 - 2ah + a^2]$$

$$0 = -2agh + gh^2 - 2agh + ga^2$$

$$-h^2 = -4ah + a^2$$

$$h^2 - 4ah + a^2 = 0 \quad 05$$

$$h = \frac{4a \pm \sqrt{16a^2 - 4a^2}}{2}$$

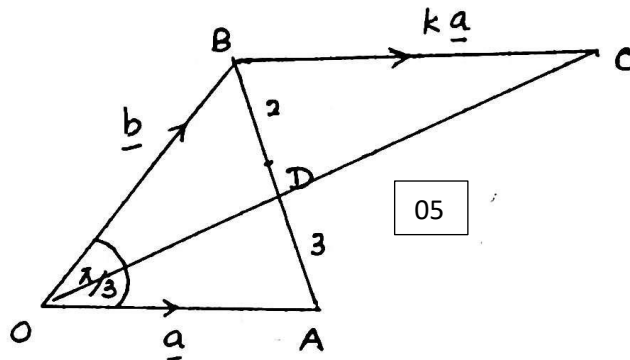
$$= +2a \pm \sqrt{3}a \quad 05$$

$h > a$

$$\therefore h = a(2 + \sqrt{3}) \quad 05$$

30

14



$$\begin{aligned}\vec{OC} &= \vec{b} + k\vec{a} \quad 05 \\ \vec{AB} &= \vec{b} - \vec{a} \\ \vec{OD} &= \vec{OA} + \vec{AD} \\ &= \vec{OA} + \frac{3}{5} \vec{AB} \\ &= \vec{a} + \frac{3}{5} (\vec{b} - \vec{a}) \quad 05 \\ &= \frac{2}{5} \vec{a} + \frac{3}{5} \vec{b} \quad 05\end{aligned}$$

20

$$\begin{aligned}\vec{OC} &= \lambda \vec{OD} \\ \therefore \vec{b} + k\vec{a} &= \lambda \left(\frac{2}{5} \vec{a} + \frac{3}{5} \vec{b} \right) \quad 05\end{aligned}$$

$\vec{a} \neq \vec{0}$, $\vec{b} \neq \vec{0}$ and $\vec{a} \nparallel \vec{b}$ නිසා

$$k = \frac{2\lambda}{5} \quad 1 = \frac{3\lambda}{5} \quad 05$$

$$\therefore k = \frac{2}{5} \times \frac{5}{3} = \frac{2}{3} \quad 05$$

15

$$\vec{BA} \cdot \vec{BC} = |\vec{BA}| |\vec{BC}| \cos \hat{ABC} \quad 05$$

$$(\vec{a} - \vec{b}) \cdot k\vec{a} = |\vec{a} - \vec{b}| |k\vec{a}| \cos \hat{ABC} \quad \text{--- ①} \quad 05$$

$$\begin{aligned}|\vec{a} - \vec{b}|^2 &= (\vec{a} - \vec{b}) \cdot (\vec{a} - \vec{b}) \quad 05 \\ &= |\vec{a}|^2 + |\vec{b}|^2 - 2\vec{a} \cdot \vec{b}\end{aligned}$$

$$\vec{a} \cdot \vec{b} = 2 \cdot 3 \cdot \frac{1}{2} = 3 \quad 05$$

$$|\vec{a} - \vec{b}| = \sqrt{4 + 9 - 6} = \sqrt{7} \quad 05$$

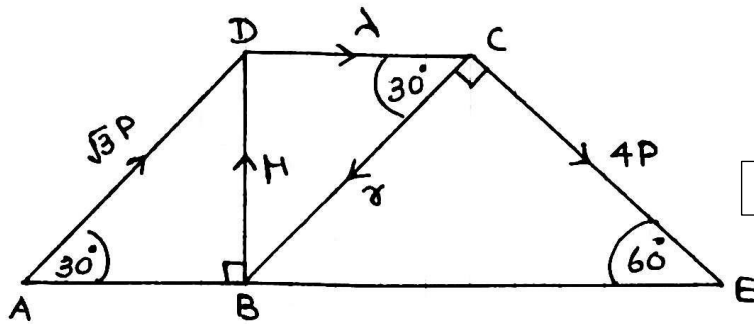
$$\text{① න් } k|\vec{a}|^2 - k\vec{a} \cdot \vec{b} = \sqrt{7} k \cdot 2 \cos \hat{ABC} \quad 05$$

$$4 - 3 = 2\sqrt{7} \cos \hat{ABC}$$

$$\hat{ABC} = \cos^{-1} \left(\frac{1}{2\sqrt{7}} \right) \quad 05$$

35

(13)



05

05

1) B) $-\sqrt{3}P \cdot 2a \cos 30^\circ \cos 60^\circ - \lambda \cdot 2a \cos 60^\circ - 4P \cdot 2a = 0$
 $-\sqrt{3}P \cdot \frac{\sqrt{3}}{2} \cdot \frac{1}{2} - \frac{\lambda}{2} - 4P = 0$
 $-\frac{3P}{4} - \frac{\lambda}{2} - 4P = 0$
 $\lambda = -\frac{19P}{2}$

10

05

c) $-\sqrt{3}P \cdot 2a \cos 30^\circ \cos 60^\circ - \mu \cdot 2a \cos 30^\circ = 0$

10

$$-\frac{\sqrt{3}P}{2} - \mu = 0$$

$$\mu = -\frac{\sqrt{3}P}{2}$$

05

D) $-\gamma \cdot 2a \cos 30^\circ \cos 60^\circ - 4P \cdot 2a \cos 30^\circ \cos 30^\circ = 0$
 $-\frac{\gamma}{2} - 4P \frac{\sqrt{3}}{2} = 0$

10

$$\gamma = -4\sqrt{3}P$$

05

45

ii) $\mu = \frac{\sqrt{3}P}{2}$ නිසා ශ්‍රිතවලින් ක්‍රමයෙන් ග) වෙ

c) $G = -\frac{\sqrt{3}P}{2} \cdot 2a \cos 30^\circ - \sqrt{3}P \cos 60^\circ \cdot 2a \cos 30^\circ$
 $= -\frac{\sqrt{3}P}{2} \cdot 2a \cdot \frac{\sqrt{3}}{2} - \sqrt{3}P \cdot \frac{1}{2} \cdot 2a \cdot \frac{\sqrt{3}}{2}$
 $= -3Pa$
 $G = 3Pa$

10

05

05

20

(15)

BC க்கு, $\Sigma F_x = 0$

$$-P \cdot 2a \cos 30^\circ + S \cdot \frac{a}{2} - W \cdot a \cos 60^\circ = 0 \quad [05]$$

$$-\frac{3\sqrt{3}W}{4} \cdot 2a \cdot \frac{\sqrt{3}}{2} + S \frac{a}{2} - W \cdot a \cdot \frac{1}{2} = 0$$

$$-\frac{9W}{4} + \frac{S}{2} - \frac{W}{2} = 0$$

$$\frac{S}{2} = \frac{11W}{4} \Rightarrow S = \frac{11W}{2} \quad [05]$$

$$\rightarrow P + S \cos 30^\circ - X = 0 \quad [05]$$

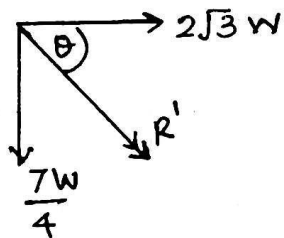
$$X = -\frac{3\sqrt{3}W}{4} + \frac{11W}{2} \cdot \frac{\sqrt{3}}{2}$$

$$= 2\sqrt{3}W \quad [05]$$

$$\uparrow Y = W - S \cos 60^\circ$$

$$= W - \frac{11W}{2} \times \frac{1}{2}$$

$$= -\frac{7W}{4} \quad [05]$$



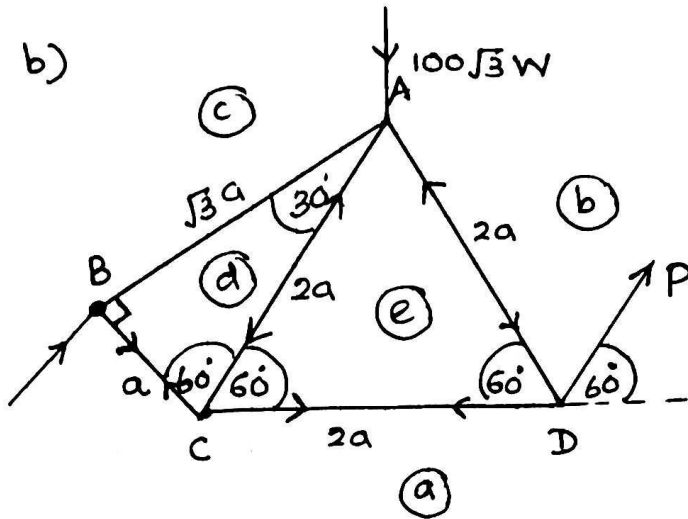
$$R' = \sqrt{(2\sqrt{3})^2 + \left(\frac{7W}{4}\right)^2}$$

$$= \sqrt{12 + \frac{49}{16}} W$$

$$= \frac{\sqrt{241}}{4} W \quad [05]$$

$$\tan \theta = \frac{7W/4}{2\sqrt{3}W} = \frac{7}{8\sqrt{3}}$$

$$\theta = \tan^{-1} \left(\frac{7}{8\sqrt{3}} \right) \quad [05]$$



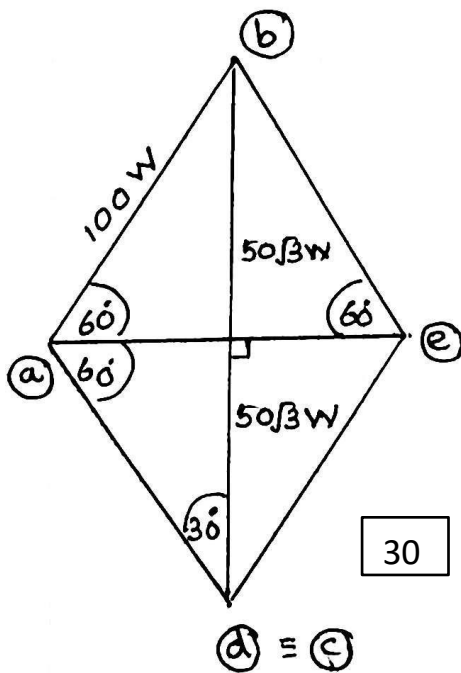
B) $-100\sqrt{3}W \cdot \sqrt{3}a \cos 30^\circ + P \cos 60^\circ \cdot a \cos 30^\circ + P \sin 60^\circ (2a + a \cos 60^\circ) = 0$ 05

$$-300W \cdot \frac{\sqrt{3}}{2} + \frac{P}{2} \cdot \frac{\sqrt{3}}{2} + \frac{P\sqrt{3}}{2} \cdot \frac{5}{2} = 0$$

$$\frac{6P}{4} = 150W$$

$$P = 100W$$
 05

10

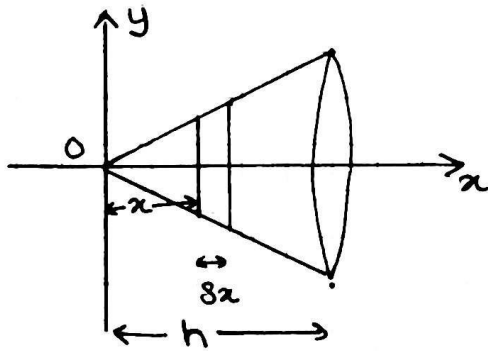


30

දිශාව	ප්‍රත්‍යක්ෂ ලය	අතති/තෙරපුම
AB	0	-
BC	100W	ආතති
CA	100W	තෙරපුම
AD	100W	තෙරපුම
DC	100W	ආතති

50

16



$$dm = 2\pi(x \tan \alpha) \rho dx \sec \alpha$$

ρ - ലക്കത ഉൾക്കൊള്ളുന്ന ജീക്കർഡെ

0x യാ ടെറ്റാക്കു അലിനക്ക ലെ.

05

0 കിറ ജീക്കർഡ കെറ്റുക്ക ദുര $\bar{x}$ നാ

$$\bar{x} = \frac{\int x dm}{\int dm}$$

$$= \frac{\int_0^h 2\pi x \tan \alpha \sec \alpha \rho dx \cdot x}{\int_0^h 2\pi x \tan \alpha \sec \alpha \rho dx}$$

05

$$= \frac{\int_0^h x^2 dx}{\int_0^h x dx}$$

05

$$= \frac{\left[\frac{x^3}{3} \right]_0^h}{\left[\frac{x^2}{2} \right]_0^h}$$

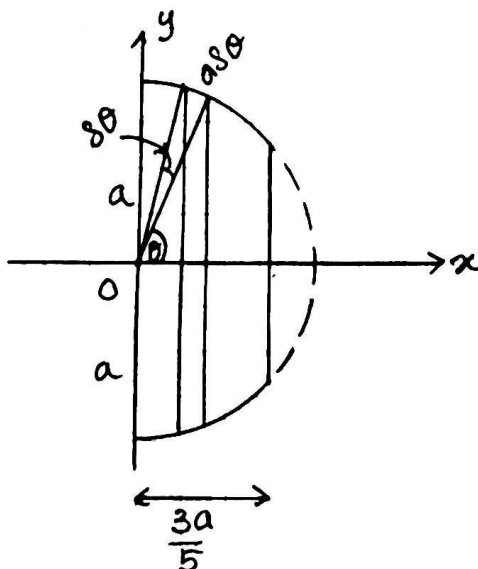
05

$$= \frac{\left[\frac{x^3}{3} \right]_0^h}{\left[\frac{x^2}{2} \right]_0^h} = \frac{2}{3} h$$

05

25

ജീക്കർഡ കെറ്റുക്ക കിർത്തൽ ജി $\frac{2h}{3}$ ദുരക്കു കിറാ കി.



$$dm = 2\pi(a \sin \theta) a \theta \rho$$

ρ - ലക്കത ഉൾക്കൊള്ളുന്ന ജീക്കർഡെ

$$\cos \alpha = \frac{3}{5}$$

05

$$\text{ജീക്കർഡ} = \int dm$$

05

$$= \int_0^{\pi/2} 2\pi a \sin \theta a \theta \rho d\theta$$

$$= 2\pi a^2 \rho \int_0^{\pi/2} \sin \theta d\theta$$

05

$$= 2\pi a^2 \rho [-\cos \theta]_0^{\pi/2}$$

$$= 2\pi a^2 \rho [\cos \pi/2 + \cos \alpha]$$

$$= \frac{6}{5} \pi a^2 \rho$$

05

20

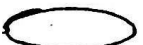
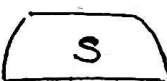
(18)

0x ലെ തന്മയ അളവ്. 0 കെ ജി. കെ. 36 x നെ

$$\begin{aligned} \bar{x} &= \frac{\int x dm}{\int dm} \\ &= \frac{\int_0^{3/2} 2\pi a \sin \theta \, a d\theta \, \rho (a \cos \theta)}{6\pi a^2 \rho / 5} \quad 05 \\ &= \frac{10\pi a^3 \rho \int_0^{3/2} \sin \theta \cos \theta \, d\theta}{6\pi a^2 \rho} \quad 05 \\ &= \frac{5a}{6} \int_0^{3/2} \sin 2\theta \, d\theta \\ &= \frac{5a}{6} \left[\frac{-\cos 2\theta}{2} \right]_0^{3/2} \quad 05 \\ &= \frac{-5}{12} [\cos \pi - \cos 0] \\ &= \frac{-5a}{12} [-1 - 1] \\ &= \frac{5a}{12} \times \frac{18}{25} = \frac{3a}{10} \quad 05 \end{aligned}$$

5 കെ ജി. കെ. 0 കെ 39/10 ഉള്ളത് കിട്ടി.

20

രൂപം	ജ്യാമിതീയ	0 കെ ജി. കെ. 36
	$\pi a^2 \rho = m$ 05	0 05
	$\frac{6\pi a^2 \rho}{5} = \frac{6m}{5}$ 05	$\frac{3a}{10}$ 05
	$2\pi \frac{4a}{5} \frac{a}{4} \rho = \frac{2}{5} m$ 05	$\frac{3a}{5} + \frac{a}{8} = \frac{29a}{40}$ 05
	$\pi \frac{4a}{5} \cdot a \rho = \frac{4}{5} m$ 05	$\frac{3a}{5} + \frac{a}{4} + \frac{a}{5} = \frac{21a}{20}$ 05
കുറുപ്പ്	$\frac{17m}{5}$ 05	$\bar{x}$

0x හා අද්ධනය කවරින්ද වේ. 0 නි නිකර්ධ
කේතය 36 x තව

05

නිකර්ධ කේතය අර්ථ දැක්වීමෙන්

$$\bar{x} = \frac{m \cdot 0 + \frac{6m}{5} \times \frac{3a}{10} + \frac{2m}{5} \cdot \frac{29a}{40} + \frac{4m}{5} \times \frac{21a}{20}}{17m/5}$$

10

$$= \frac{(36 + 29 + 84)a}{100} \times \frac{5}{17}$$

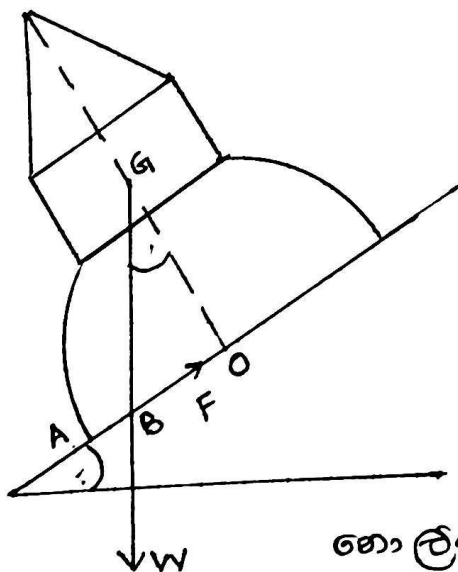
$$= \frac{149a}{20 \times 17}$$

$$= \frac{149a}{340}$$

05

20

නොපෙන්වීම නව



$$OB < OA$$

$$0 < \tan \theta < a$$

$$\frac{149a}{340} \tan \theta < a$$

$$\tan \theta < \frac{340}{149}$$

05

05

නොපෙන්වීම නව

$$\frac{|F|}{R} \leq \mu \text{ එය යුතුය}$$

05

$$F = W \sin \theta$$

$$R = W \cos \theta$$

$$\frac{F}{R} = \tan \theta$$

$$\therefore \tan \theta \leq \mu.$$

20

(20)

- (17) a) රළු ඔසර - A දොඳ ඔසර - B කොළ ඔසර - C
 සිහින්වලානකු වීම - X

$$P(A) = \frac{45}{100}$$

$$P(B) = \frac{30}{100}$$

$$P(C) = \frac{25}{100}$$

$$P(X/A) = \frac{15}{100}$$

$$P(X/B) = \frac{40}{100}$$

$$P(X/C) = \frac{25}{100}$$

$$P(X) = P(X/A)P(A) + P(X/B)P(B) + P(X/C)P(C) \quad 05$$

$$= \frac{15}{100} \times \frac{45}{100} + \frac{40}{100} \times \frac{30}{100} + \frac{25}{100} \times \frac{25}{100} \quad 10$$

$$= 0.0675 + 0.12 + 0.0625 \quad 15$$

$$= 0.25 \quad 05$$

35

$$P(A/X) = \frac{P(X/A) \cdot P(A)}{P(X)} \quad 05$$

$$= \frac{15}{100} \times \frac{45}{100} \times \frac{100}{25} \quad 10$$

$$= \frac{27}{100}$$

$$= 0.27 \quad 05$$

20

$$b) \quad \bar{x} = \frac{\sum x_i}{n} \quad 05 \quad \bar{y} = \frac{\sum y_i}{n}$$

$$y_i = ax_i + b$$

$$\frac{\sum y_i}{n} = \frac{\sum (ax_i + b)}{n} \quad 05$$

$$\bar{y} = a\bar{x} + b \quad 05$$

15

$$\sigma_x^2 = \frac{\sum (x_i - \bar{x})^2}{n} \quad \sigma_y^2 = \frac{\sum (y_i - \bar{y})^2}{n} \quad 05$$

$$\therefore \sigma_y^2 = \frac{\sum [(ax_i + b) - (a\bar{x} + b)]^2}{n} \quad 05$$

$$= \frac{\sum (ax_i - a\bar{x})^2}{n}$$

(21)

$$S_y^2 = a^2 \frac{\sum (x_i - \bar{x})^2}{n}$$

$$= a^2 S_x^2 \quad 05$$

$$S_y = 101 S_x^2 \quad 05$$

20

උතුරු	වයස කාණ්ඩය	f සංඛ්‍යාව	$u_i = \frac{x_i - A}{c}$	$f_i u_i$	$f_i u_i^2$
0-20	10	15	2	30	60
20-40	30	20	1	20	20
40-60	50	40	0	0	0
60-80	70	15	-1	-15	15
80-100	90	10	-2	-20	40
		100		15	135

$$\begin{aligned} \bar{x} &= A + c \bar{u} \\ &= 50 + 20 \frac{\sum f_i u_i}{\sum f_i} \\ &= 50 + 20 \cdot \left(\frac{15}{100} \right) \\ &= 53 \end{aligned} \quad \begin{array}{l} 05 \\ 10 \end{array}$$

$$\begin{aligned} S_x^2 &= c^2 \left[\frac{\sum f_i u_i^2}{\sum f_i} - \left(\frac{\sum f_i u_i}{\sum f_i} \right)^2 \right] \\ &= 20^2 \left[\frac{135}{100} - \left(\frac{15}{100} \right)^2 \right] \\ &= 20^2 \left[\frac{13500 - 225}{100 \times 100} \right] \\ S_x &= \frac{20}{100} \sqrt{13275} = \sqrt{531} \\ &= 23.04 \end{aligned} \quad \begin{array}{l} 20 \\ 05 \\ 10 \end{array}$$

$$\begin{aligned} y &= ax + b \\ 62 &= 50a + b \quad \text{--- ①} \\ 72 &= 62a + b \quad \text{--- ②} \\ \text{②} - \text{①} \quad 12a &= 10 \\ a &= 5/6 \end{aligned} \quad \begin{array}{l} 05 \\ 05 \end{array}$$

$$\begin{aligned} 62 &= 50(5/6) + 3b \\ 9b &= 186 - 125 \\ b &= 61/9 \end{aligned} \quad 05$$

$$\begin{aligned} \bar{y} &= a\bar{x} + b \\ &= \frac{5}{6} \cdot 53 + \frac{61}{9} \\ &= 50.94 \end{aligned} \quad 05$$

$$\begin{aligned} S_y &= |5/6| (23.04) \\ &= 19.2 \end{aligned} \quad \begin{array}{l} 05 \\ 25 \end{array}$$