Date: දකුණු පළාත් අධ්‍යාපන දෙපාර්තමේන්තුව.
වර්ෂ අවසාන පරීක්ෂණය - 2025
සංයුක්ත ගණිතය - II 13 ශ්‍රේණිය.
ලකුණු දීමේ පටිපාටිය

A - කොටස

---

① පෙර $\overrightarrow{5u}$ $\overrightarrow{u}$

A (m) (3m) B

පසු $\overrightarrow{v_1}$ $\overrightarrow{v_2}$

ග:සං: නි. යෙදීමෙන් නිව් ප. නි. යෙදීමෙන්

$mv_1 + 3mv_2 = 5mu + 3mu$ ⑤ $v_1 - v_2 = -e(5u - u)$ ⑤

$v_1 + 3v_2 = 8u$ —① $v_1 - v_2 = -\frac{8u}{3}$ —②

①-② $4v_2 = \frac{32u}{3}$ ②හි $v_1 = -\frac{8u}{3} + \frac{8u}{3}$

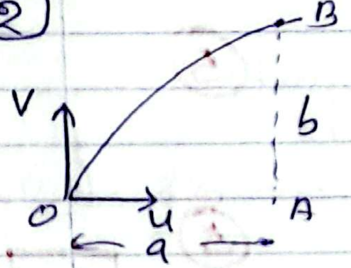
$v_2 = \frac{8u}{3}$ ⑤ $v_1 = 0$ ⑤

පසුවෙන් වස්තු A නිශ්චල වේ. $v_2 > 0$ නිසා B ඉදිරියට ගමන් කරයි ⑤

$\boxed{25}$

---

②



$O \to A$ ට $S = ut + \frac{1}{2}at^2$ යෙදීමෙන්

$\to a = ut$ —① ⑤ $\uparrow b = Vt - \frac{1}{2}gt^2$ ⑤ —②

① හි ② ට ආදේශය

$b = V \cdot \frac{a}{u} - \frac{1}{2}g \cdot \frac{a^2}{u^2}$ ⑤

$ga^2 - 2uVa + 2bu^2 = 0$

b හි ඕනෑම අගයක් සඳහා a ට අගයන් දෙකක් පැවතීමට $\Delta > 0$ ⑤

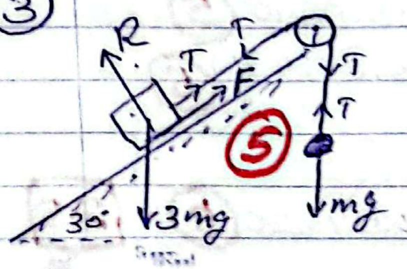
$\cancel{4}u^2V^2 - \cancel{4} \cdot g \cdot 2bu^2 > 0$ $u \neq 0$ නිසා ⑤

$V^2 > 2gb$

$\boxed{25}$

---

③



සීමාකාරී සමතුලිත නිසා $F = \mu R$

m ට ↑ $T = mg$ ⑤

3m ට ↗ $F + T = 3mg \cdot \cos 60°$

$F = \frac{mg}{2}$ ⑤

3m ට ↑ $R = 3mg \cdot \cos 30$ ⑤

$\frac{\cancel{mg}}{\cancel{2}} = \mu \cdot 3\cancel{mg}\frac{\sqrt{3}}{\cancel{2}}$

$\mu = \frac{1}{3\sqrt{3}}$ ⑤

$\boxed{25}$

④

$\longrightarrow V$

ත්වරණය $\longrightarrow F = ma$

$H = PV$ ⑤

$\frac{12800}{V} = P$

$P - 120 - 30 = (2500)a$ ⑤

$\frac{12800}{V} - 150 = 2500a$

$a = \frac{1}{250}\left(\frac{1280}{V} - 15\right)$ ⑤

V උපරිම වන T උපරිම වේ ⑤

සහ $a = 0$ වේලාවේ $F = ma$ යෙදීමෙන්

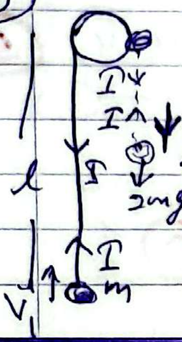
$T - 30 = m \times 0$ ⑤

$T = 30N$

$\boxed{25}$

---

⑤



⑤

2mට ↓

$V^2 = u^2 + 2as$

$V^2 = 0 + \cancel{2}g\frac{l}{\cancel{2}}$

$V^2 = gl$ ⑤

$I = \Delta mv$

2mට ↑ $I = -2mv_1 - (-2m\sqrt{gl})$ ⑤

mට ↑

$I = mv_1$

$-2\cancel{m}v_1 + 2\cancel{m}\sqrt{gl} = \cancel{m}v_1$ ⑤

$v_1 = \frac{2\sqrt{gl}}{3}$ ⑤

$\boxed{25}$

---

⑥ ~~$a = i + \sqrt{3}j$~~

~~$b = \alpha i + \frac{3}{2}j$~~

$\overrightarrow{AB} = (\alpha + 2)i + (-6j)$ ⑤

$\overrightarrow{OA} = -2i + 5j$

$\overrightarrow{AC} = 3i - 2j$

$\overrightarrow{OB} = \alpha i - j$

A, B, C ඒකරේඛීය නිසා

$\overrightarrow{OC} = i + 3j$

$\overrightarrow{AB} = \lambda\overrightarrow{AC}$ λ අදිශයකි ⑤

$(\alpha + 2)i - 6j = \lambda(3i - 2j)$

i හා j ඒකක දෛශික හා සංගුණක සමාන කිරීමෙන්

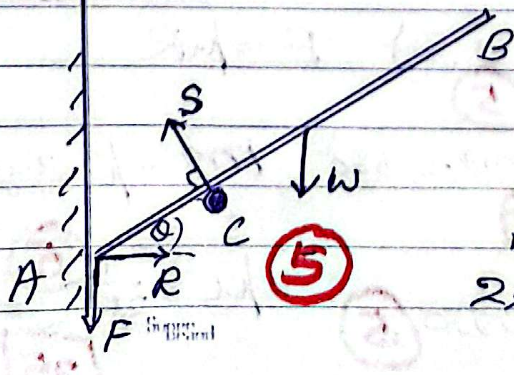
$\alpha + 2 = 3\lambda$ ⑤ හා $-6 = -2\lambda$ වේ. ⑤

$\alpha = 7$ ⑤ $\lambda = 3$

$\boxed{25}$

---

⑦



⑤

A↻ $S \cdot \frac{a}{2} = W \cdot a\cos\theta$ ⑤

$S = 2W\cos\theta$

$\rightarrow R = 2W\cos\theta \cdot \sin\theta$ ⑤

$\downarrow F = 2W\cos\theta \cdot \cos\theta - W$ ⑤

$F < \mu R$

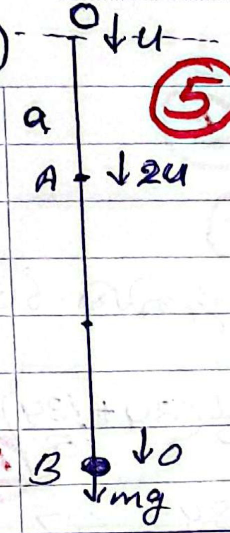
$2\cancel{W}\cos^2\theta - \cancel{W} < \mu\cancel{W}\sin 2\theta$ ⑤

$\cot 2\theta < \mu$

$\boxed{25}$

Date:..........................

⑧



$A \to B \downarrow v^2 = u^2 + 2as$

$4u^2 = u^2 + 2ga$

$u = \sqrt{\frac{2ga}{3}}$ ⑤

⑤

O හිදී ක්ෂණික නිශ්චලතාව

චා.ශ: = 0 වේ.

O හා B ට යාන්ත්‍රික ශ:සං:නියමයෙන්

$\frac{1}{2}m\cdot 0 + mg\cdot 3a + \frac{1}{\cancel{2}}\lambda\frac{\overset{2}{\cancel{4}}a^2}{\cancel{a}} = \frac{1}{\cancel{2}}m\cdot\frac{\cancel{2}ga}{3}$ ⑤ ⑤ ⑤

$\lambda\cdot 2\cancel{a} = \frac{mg\cancel{a}}{3} + 3mg\cancel{a}$

$\lambda = \frac{5mg}{3}$

---

⑨ $P(A) = P(A/B) = 1/4 \qquad P(B/A) = \frac{1}{2}$

$P(B/A) = \frac{P(B\cap A)}{P(A)} \qquad P(A/B) = \frac{P(A\cap B)}{P(B)}$

$\frac{1}{2}\times\frac{1}{4} = P(B\cap A) \qquad \frac{1}{4}\times P(B) = \frac{1}{8}$

$P(B) = \frac{1}{2}$ ⑤

$P(B\cap A) = \frac{1}{8}$ ⑤

$P(A)\cdot P(B) = \frac{1}{4}\times\frac{1}{2} = \frac{1}{8}$ ⑤

$P(A\cap B) = P(A)\cdot P(B)$ A හා B ස්වායත්ත වේ. ⑤

$P(B'/A') = \frac{P(A'\cap B')}{P(A')} = \frac{P(A')\cdot P(B')}{P(A')}$ ⑤

$P(B'/A') = P(B') = \frac{1}{2}$

$\boxed{25}$

---

⑩

a, b, c, d, e, f, g
$\quad$ 3 $\quad$ 5 5 7

$Q_1 = b = 3$ ⑤

$Q_3 = f = 7$

මධ්‍යස්ථය $d = 5$

මාතය $e = 5$ ⑤

c, 5 හෝ 3 විය නොහැක.

$c = 4$ ⑤

$\frac{(a-5)^2 + 4 + 1 + 0 + 0 + 4 + (g-5)^2}{7} = \frac{34}{7}$ ⑤

$(a-5)^2 + (g-5)^2 = 25$

$a = 2$ හා $g = 9$ ⑤

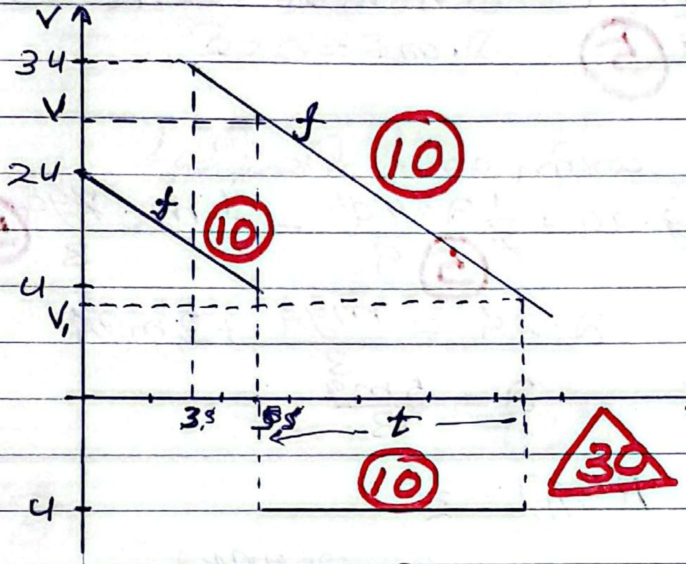
පරාසය 7 ;

2, 3, 4, 5, 5, 7, 9

$\boxed{25}$

Date:............................

⑪ (a)



$f = \frac{4}{5}$ ⑤

$\frac{4}{5} = \frac{34 - V}{2}$ ⑤

$V = \frac{134}{5}$ ⑤

x වල B හි ත්වරණය වල
[illegible]

$\frac{1}{2}(24+4)\cdot 5 - \frac{1}{2}\left(34 + \frac{134}{5}\right) \times 2 = 57$ ⑤

$\frac{154}{2} - \frac{284}{5} = 57$

$\frac{194}{10} = 57.$

$u = 30$ ⑤

$f = 6$ ⑤ 30

B සහ A0 හමුවීමට ගත වන
කාලය t නම්

$\frac{1}{2} \times 34 \times 5 = t \cdot 4$ ⑤

$t = 7.5\,s$ ⑤ 10

X, A [illegible] Y හි ප්‍රවේගය V_1 නම්

$f = \frac{34 - V_1}{9.5}$ ⑤

$6 \times 9.5 = 3 \times 30 - V$ ⑤

$V_1 = 90 - 57$

$V_1 = \underline{33}$ 10

80

(b) $V_{S_1,E} = \downarrow 4$

$V_{S_2,E} = \overset{24}{\nearrow}\ 30°$

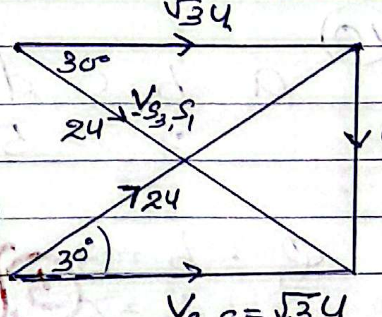
$V_{S_3,E} = \xrightarrow{\sqrt{3}4}$

$V_{S_2,S_1} = V_{S_2E} + V_{ES_1}$

$= \overset{24}{\nearrow}\,30° + \uparrow 4$ ⑤

$V_{S_3S_1} = V_{S_3E} + V_{ES_1}$ ⑤

$= \underset{\sqrt{3}4}{\longrightarrow} + \uparrow 4$



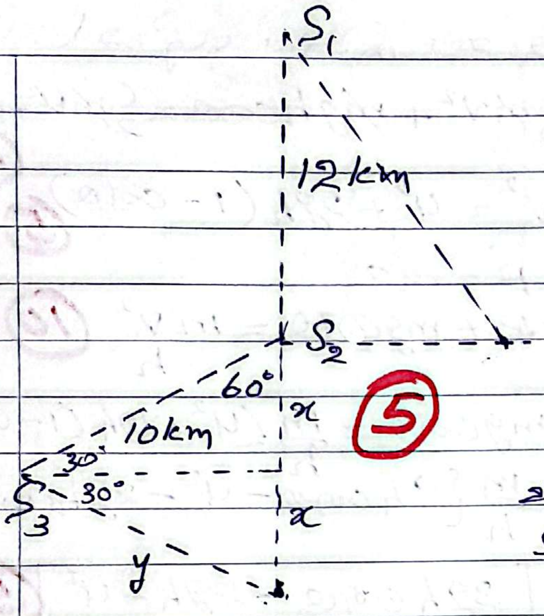
$V_{S_2S_1} = \sqrt{3}4$

⑩ + ⑩ 30

$\underline{V}_{S_2S_1}$ දිශාව නැගෙනහිරට ⑤

$V_{S_3S_1}$ දිශාව නැගෙනහිර සිට 30° දකුණට ⑤ [illegible] 10

No.: 58



(5)

$x = 10\cos 60$
$= 5$ (5)

S_1 හා S_3 දුරත්වය $= 12+5+5$
$= 22\,km$ (5)

$V_{S_3S_1}$ දිශාවෙන් y දුරකට
ගමන් කාලය $= \frac{10}{2} = 5s$ (5)

එම කාලය තුළ $V_{S_2S_1}$ දිශාවෙන්
S_2 යනදුර $= \sqrt{3}\,4.5$ (5)
$= 5\sqrt{3}\cdot 4$

එවිට S_1S_2 දුර $= \sqrt{12^2 + 5^2\sqrt{3}^2}$
$= \sqrt{219}\,km$ (5)

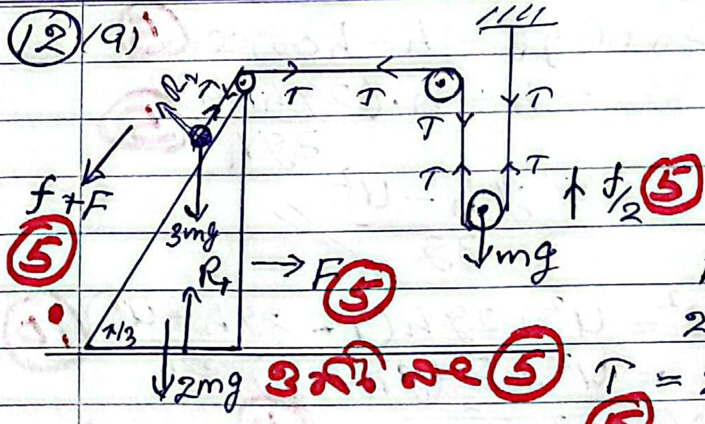
30

70

150

---

(12)(a)



(5) (5) (5) ඉතිරි බල (5)

$F = ma$ යෙදීමෙන්.

3m ට ↙

$3mg\cdot\frac{\sqrt{3}}{2} - T = 3m(f + F - \frac{F}{2})$ (5) (5)

m ට ↑ $2T - mg = m\frac{f}{2}$ (5) (5)

2m+3m ට →

$T = 2mF + 3m(F - \frac{f+F}{2})$ (5) (5)

2m ට $S = ut + \frac{1}{2}at^2$ → B සිට C ට

$l = \frac{1}{2}Ft^2$

$t^2 = \frac{2l}{F}$ (10)

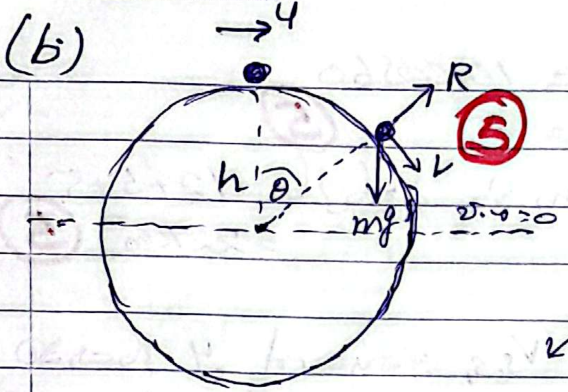
3m ට ↙ $S = ut + \frac{1}{2}at^2$

$S = \frac{1}{\cancel{2}}(f+F)\cdot\frac{\cancel{2}l}{F}$

$S = (f+F)\frac{l}{F}$ (10)

70

(b)



⑤

ශ. සං. නියමය යෙදීමෙන්

$$\frac{1}{2}\cancel{m}v^2 + \cancel{m}gh\cos\theta = \frac{1}{2}\cancel{m}u^2 + \cancel{m}gh$$ ⑩

$$v^2 = u^2 + 2gh(1-\cos\theta)$$ ⑤

$$\swarrow \quad F = ma$$

$$-R + mg\cos\theta = \frac{mv^2}{h}$$ ⑩

ආරම්භයේදීම පෘෂ්ඨය හැර යාමට

$$-R + mg\cos\theta = \frac{m}{h}(u^2 + 2gh(1-\cos\theta))$$

$$R = \frac{m}{h}\{gh\cos\theta - u^2 - 2gh(1-\cos\theta)\}$$

$\theta = 0$ දී $R \leq 0$ ⑤

$$R = \frac{m}{h}[3gh\cos\theta - 2gh - u^2]$$ ⑤

35

$$\frac{m}{h}[3gh - 2gh - u^2]$$

$u^2 > gh$ // ⑤

10

$u^2 < gh$ නම් ආරම්භයේදී ඉවත් නොවේ,

ඉවත්වන විට $R = 0$ වේ ⑤

$3gh\cos\theta = 2gh + u^2$ වනවිට.

$$\cos\theta = \frac{2gh + u^2}{3gh}$$ ⑤

ඉවත්වන විට ශීර්ෂය සිට ගැඹුර $= h - h\cos\theta$ ⑤

$$= h - \cancel{h}\cdot\frac{(2gh + u^2)}{3g\cancel{h}}$$ ⑤

$$= \frac{gh - u^2}{3g}$$ //

එවිට ප්‍රවේගය $= v^2 = u^2 + 2gh\left(1 - \frac{2gh + u^2}{3gh}\right)$ ⑩

$$= u^2 + \frac{2}{3}(gh - u^2)$$

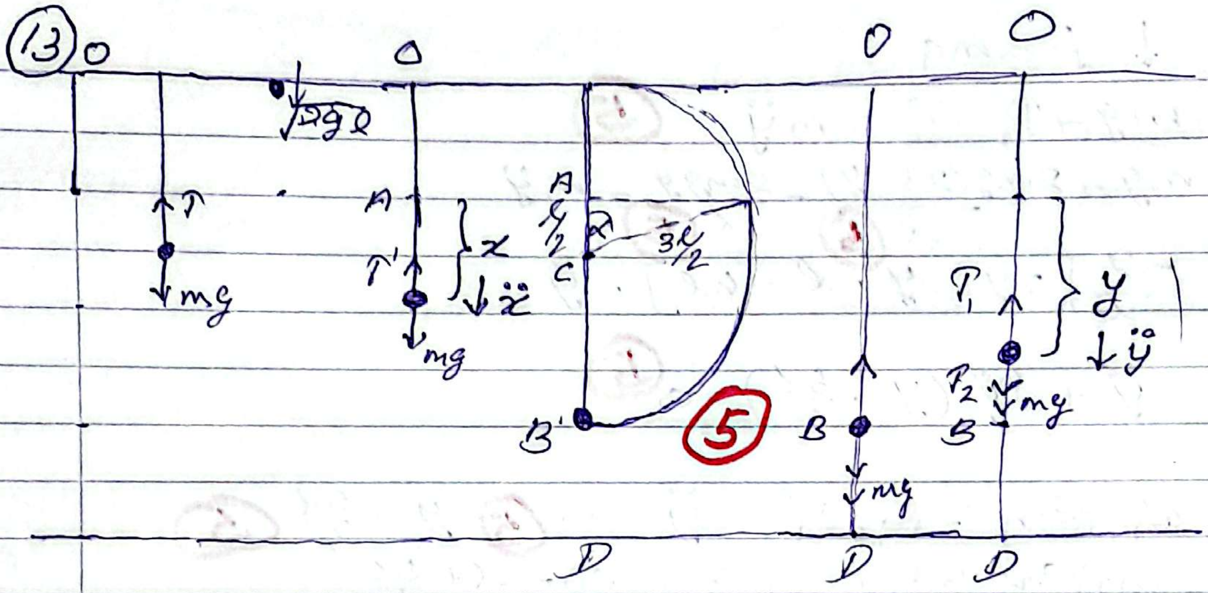
$$v = \sqrt{\frac{u^2 + 2gh}{3}}$$ // ⑤

35

80

150

⑬



$T = mg$ ⑤

$\frac{\lambda \frac{l}{2}}{l} = mg$ ⑤

$\lambda = 2mg$

$\downarrow F = ma$

$mg - T' = m\ddot{x}$ ⑤

$mg - 2mg\frac{x}{l} = m\ddot{x}$ ⑤

$\ddot{x} + \frac{2g}{l}\left(x - \frac{l}{2}\right) = 0$ ⑤ 25

$O \to A \downarrow v^2 = u^2 + 2as$

$v^2 = 2gl + 2gl$

$v = 2\sqrt{gl}$ ⑩

විස්තාරය c නම්

A හිදී $\dot{x}^2 = \omega^2(c^2 - x^2)$ ⑤

$4gl = \frac{2g}{l}\left(c^2 - \frac{l^2}{4}\right)$ ⑤

$c = \frac{3l}{2}$ ⑤ 25

$O \to A \downarrow$ කාලය t නම්

$v = u + at$

$2\sqrt{gl} = \sqrt{2gl} + gt$ ⑤

$t = \sqrt{\frac{l}{g}}(2 - \sqrt{2})$ ⑤

$\cos\alpha = \frac{l/2}{3l/2}$ ⑤

$\alpha = \cos^{-1}\frac{1}{3}$

මුළු කාලය $= \sqrt{\frac{l}{g}}(2 - \sqrt{2}) + \sqrt{\frac{l}{2g}}\left(\pi - \cos^{-1}\frac{1}{3}\right)$ ⑩

$= \sqrt{\frac{l}{2g}}\left(2\sqrt{2} - 2 + \pi - \cos^{-1}\frac{1}{3}\right)$

$A \to B$ ට කාලය t_1

$t_1 = \frac{\pi - \alpha}{\omega}$ ⑤

$t_1 = \left(\pi - \cos^{-1}\frac{1}{3}\right)\sqrt{\frac{l}{2g}}$ ⑤

$DB = l$ ⑤

[illegible]

45

$\downarrow F = mg$

$mg + T_2 - T_1 = m\ddot{y}$ ⑤

$mg + \frac{2mg(2l-y)}{l}$ ⑤ $- \frac{2mgy}{l}$ ⑤ $= m\ddot{y}$

$-\frac{g}{l}\left[2y + 2y - l - 4l\right] = \ddot{y}$

$\ddot{y} + \frac{4g}{l}\left(y - \frac{5l}{4}\right) = 0$ ⑤

දෝලන කේන්ද්‍රයේදී $\ddot{y} = 0$ ⑤ $y = \frac{5l}{4}$ ⑤

දෝලන කේන්ද්‍රය O සිට ගැඹුර $= l + \frac{5l}{4}$

$= \frac{9l}{4}$ ⑩

විස්තාරය $= 3l - \frac{9l}{4} = \frac{3l}{4}$ ⑤

දෝලන කේන්ද්‍රයේ සිට ඉහළට $\frac{3l}{4}$ දුරින් ඇති ලක්ෂ්‍යය දක්වා අංශුව ස.අ.ච. සිදුකරයි. ⑤

දෝලන කාලාවර්තය $\frac{2\pi}{\omega} = 2\pi\sqrt{\frac{l}{4g}}$ ⑤

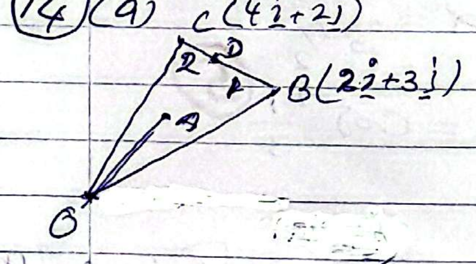
$= \pi\sqrt{\frac{l}{g}}$ //

55

150

---

(14) (a)



$\overrightarrow{OD} = \overrightarrow{OB} + \overrightarrow{BD}$ ⑤

$= 2i + 3j + \frac{2}{3}(2i - j)$

$= \frac{8}{3}i + \frac{8j}{3}$ ⑤

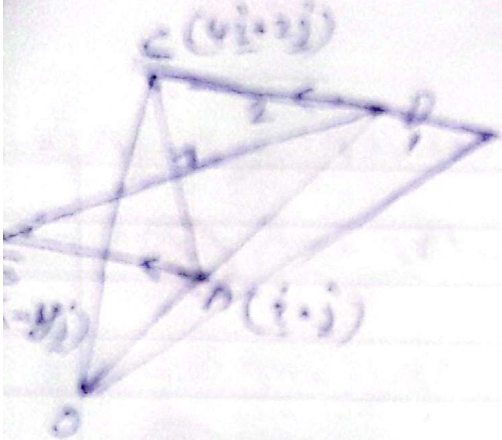
$= \frac{8}{3}(i + j)$ ⑤

$\overrightarrow{OD} = \frac{8}{3}\overrightarrow{OA}$ ⑤

O, A, D ඒක රේඛීය වේ.

$\frac{OA}{OD} = \frac{3}{8}$ $\quad OA : OD = 3 : 8$ ⑤

25



$\overrightarrow{OD} \cdot \overrightarrow{BC} = \frac{8}{3}(\underline{i}+\underline{j}) \cdot (2\underline{i}-\underline{j})$ ⑤

$= \frac{8}{3}(2-1)$

$\neq 0$ නිසා ⑤

OD හා BC ලම්බ නොවේ ⑤

15

$\overrightarrow{OE} = x\underline{i} + y\underline{j}$ ලෙස ගනිමු.

AE // BC නිසා

$\frac{y-1}{x-1} = \frac{3-2}{2-4}$ ⑤

$\overrightarrow{DE} \cdot \overrightarrow{AC} = 0$

$\left[(x-\frac{8}{3})\underline{i} + (y-\frac{8}{3})\underline{j}\right] \cdot (3\underline{i}+\underline{j}) = 0$ ⑤

$\frac{y-1}{x-1} = \frac{-1}{2}$

$x + 2y - 3 = 0$

$3(x-\frac{8}{3}) + (y-\frac{8}{3}) = 0$

$3(3-2y-\frac{8}{3}) + (y-\frac{8}{3}) = 0$ ⑤

$9 - 6y - 8 + y - \frac{8}{3} = 0$

$y = -\frac{1}{3}$ ⑤ $x = \frac{11}{3}$ ⑤

25

$\therefore$

$\overrightarrow{OE} = \frac{1}{3}(11\underline{i} - \underline{j})$ //

$\overrightarrow{CA} = -3\underline{i} - \underline{j}$ $\quad \overrightarrow{CB} = -2\underline{i} + \underline{j}$ ⑤

$\overrightarrow{CA} \cdot \overrightarrow{CB} = |\overrightarrow{CA}||\overrightarrow{CB}| \cos\theta$ ⑤

$(-3\underline{i}-\underline{j}) \cdot (-2\underline{i}+\underline{j}) = \sqrt{10} \cdot \sqrt{5} \cos\theta$

$6 - 1 = 5\sqrt{2} \cos\theta$ ⑤

$\cos\theta = \frac{1}{\sqrt{2}}$

$\theta = \cos^{-1} \frac{1}{\sqrt{2}}$

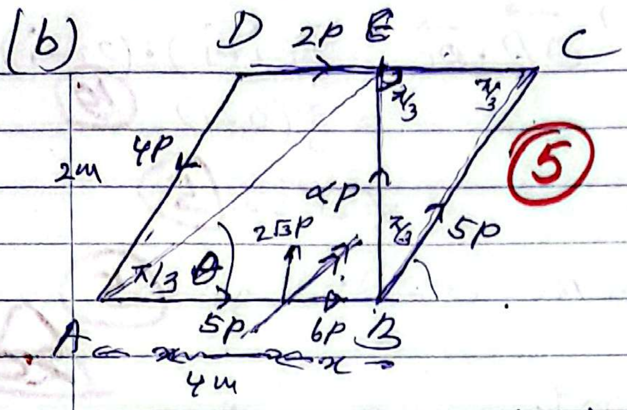
$\theta = \pi/4$ ⑤ //

20

$7 + \frac{?}{2}$

Date:..............................

(b)



⑤

$$\overrightarrow{X} = 5p + 5p.\frac{1}{2} + 2p - 4p.\frac{1}{2} - \alpha p.\frac{1}{2}$$

$$X = \frac{15p - \alpha p}{2}$$ ⑤

$$\uparrow Y = 5p.\frac{\sqrt{3}}{2} + \alpha p.\frac{\sqrt{3}}{2} - 4p\frac{\sqrt{3}}{2}$$

$$Y = \frac{(p + \alpha p)\sqrt{3}}{2}$$ ⑤

$$\tan\theta = \frac{Y}{X} = \frac{p(1+\alpha)\sqrt{3}}{2} \times \frac{2}{p(15-\alpha)}$$ ⑤

$$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}(1+\alpha)}{15-\alpha}$$

$$15 - \alpha = 3 + 3\alpha$$

$$\alpha = 3 //$$ ⑤

$$R = \sqrt{\left(\frac{12p}{2}\right)^2 + \left(\frac{4\sqrt{3}p}{2}\right)^2}$$ ⑤

$$= \sqrt{36p^2 + 12p^2}$$

$$= 4\sqrt{3}p\ N //$$

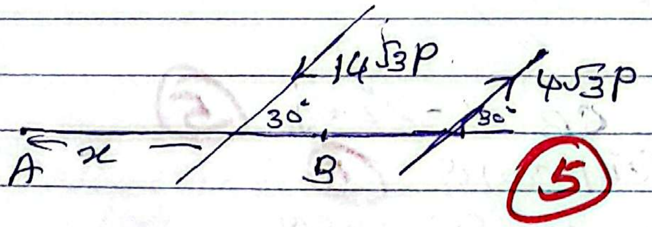
~~B~~ $\overset{\curvearrowright}{B}$ සම්ප්‍රයුක්ත ඝූර්ණ = ඝටක ඝූර්ණ

$$2\cancel{\sqrt{3}}\cancel{p}x = 2\cancel{p}.\cancel{2} \times \frac{\cancel{\sqrt{3}}}{\cancel{2}} - 4\cancel{p}.\frac{\cancel{\sqrt{3}}}{\cancel{2}} \times \overset{2}{\cancel{4}}$$ ⑤

$$2x = 2 - 8$$

$$x = -3 //$$ ⑤

A සිට දිශාවේ AB මත 7m දුරින් හමුවේ. ⑤



45

⑤

ඝූර්ණය $A \curvearrowright = 0$ නං ⑤

$$\cancel{4\sqrt{3}p}.\frac{1}{2} \times 7 - \cancel{14\sqrt{3}p}.\frac{1}{2} \times x = 0$$

$$14 - 7x = 0$$ ⑤

$$x = 2$$

එනම් බලය AB හි ⑤ මධ්‍ය ලක්ෂ්‍යය හරහා ක්‍රියා කරයි

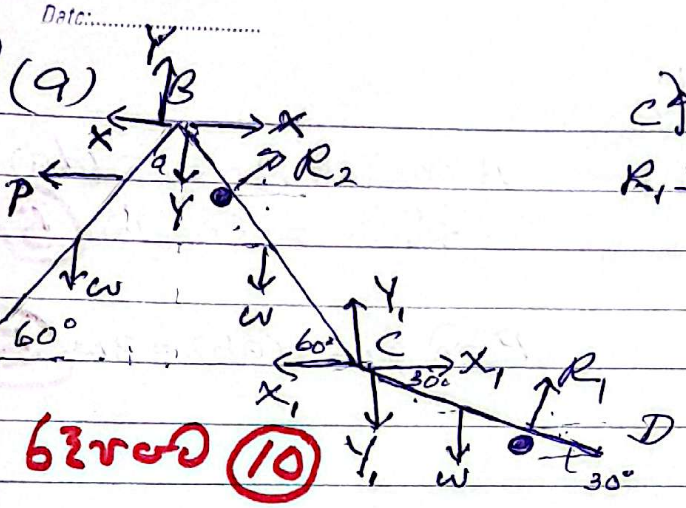
20

150

No.: 18

Date:......................

⑤ (a)



බලවලට ⑩

CD දණ්ඩට $C\circlearrowright = 0$

$R_1 3\cancel{a} - w\cdot \cancel{2}\cancel{a}\frac{\sqrt{3}}{\cancel{2}} = 0$ ⑩

$R_1 = \frac{\sqrt{3}w}{3}$ // ⑤

CDට $\rightarrow$ $X_1 = -\frac{\sqrt{3}w}{3}\times\frac{1}{2}$

$X_1 = -\frac{\sqrt{3}w}{6}$ ⑤

$\uparrow$ $-Y_1 - w + \frac{\sqrt{3}w}{\cancel{3}}\frac{\sqrt{3}}{2} = 0$

$Y_1 = -\frac{w}{2}$ ⑤

BCට $B\circlearrowright = 0$

$R_2\cdot a - w\cdot\cancel{2}a\cdot\frac{1}{\cancel{2}} + \left(-\frac{w}{\cancel{2}}\right)\cdot\cancel{4}a\cdot\frac{1}{\cancel{2}} - \left(-\frac{\sqrt{3}w}{\cancel{6}}\right)\cancel{4}a\cdot\frac{\sqrt{3}}{\cancel{2}} = 0$ ⑩

$R_2 = w + w - w$

$R_2 = w$ // ⑤

BC ට $\rightarrow$ $X - X_1 + R_2\cdot\frac{\sqrt{3}}{2} = 0$

$X = -\frac{\sqrt{3}w}{6} - \frac{{}^{3}\sqrt{3}w}{{}^{3\times}2}$

$X = -\frac{2\sqrt{3}w}{3}$ ⑤

$\uparrow$ $-Y + Y_1 - w + R_2\cdot\frac{1}{2} = 0$

$-Y + \frac{w}{2} - w + \frac{w}{2} = 0$

$Y = -w$ // ⑤

AB දණ්ඩට $A\circlearrowright = 0$

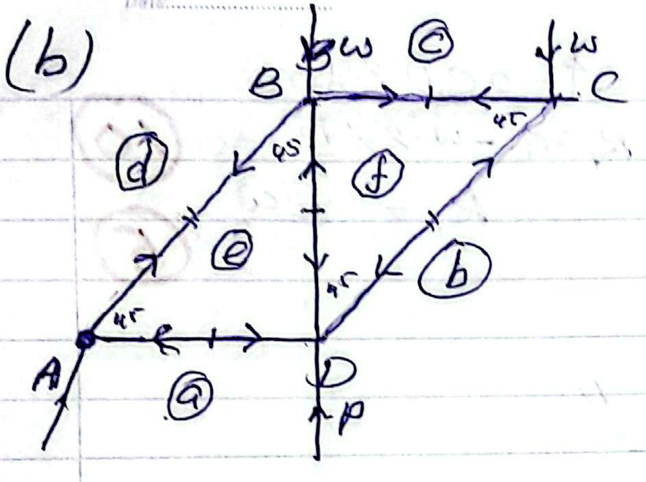
$P\cdot 3\cancel{a}\cdot\frac{\sqrt{3}}{2} - w\cdot\cancel{2}\cancel{a}\cdot\frac{1}{\cancel{2}} + X\cdot 4\cancel{a}\cdot\frac{\sqrt{3}}{2} + Y\cdot 4\cancel{a}\times\frac{1}{2} = 0$ ⑩

$\frac{3\sqrt{3}}{2}P - w - \frac{2\cancel{\sqrt{3}}w}{\cancel{3}}\cdot 2\cancel{\sqrt{3}} - W\times 2 = 0$

$P = 7w\cdot\frac{2}{3\sqrt{3}}$

75

(b)

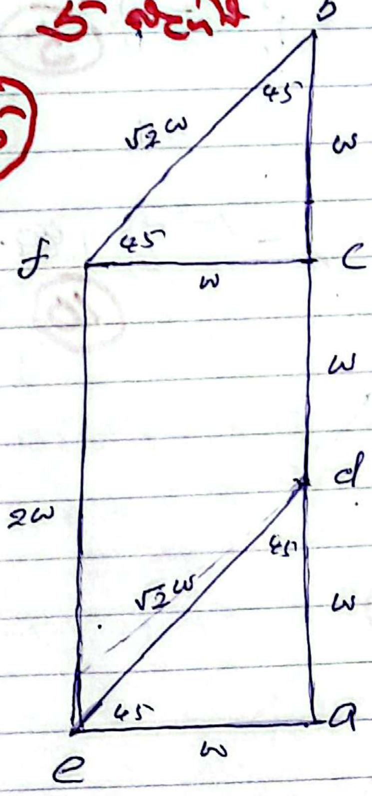


A ලක්ෂ්‍යයේ සමතුලිතතාව (da) සිරස්ව සලකා ω ⑤

P හි අගය (ab) = 3ω ⑤

B, C, D සඳහා
සටහන 5 බැගින්

(15)



දණ්ඩ	ප්‍රත්‍යාබලය	
	ආතතිය	තෙරපුම
AB	$\sqrt{2}\omega$	–
BC	ω	–
CD	–	$\sqrt{2}\omega$
DA	–	ω
DB	–	2ω

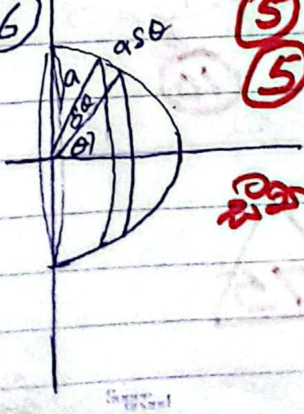
ආතති හෝ තෙරපුම 5 බැගින් (25)

ප්‍රත්‍යාබල 5 බැගින් (25)

75 $\boxed{150}$

---

(16)



⑤ $dm = 2\pi \cdot a\sin\theta \cdot a\,\delta\theta\,\rho$ ඝනත්වය ρ ⑤

⑤ $x = a\cos\theta$ $G(\bar{x},\bar{y})$ සමමිතියෙන් $\bar{y}=0$

$$\bar{x} = \frac{\int_0^{\pi/2} a\cos\theta \cdot 2\pi a\sin\theta \cdot a\rho\,d\theta}{\int_0^{\pi/2} 2\pi\, a\sin\theta\, a\rho\, d\theta}$$

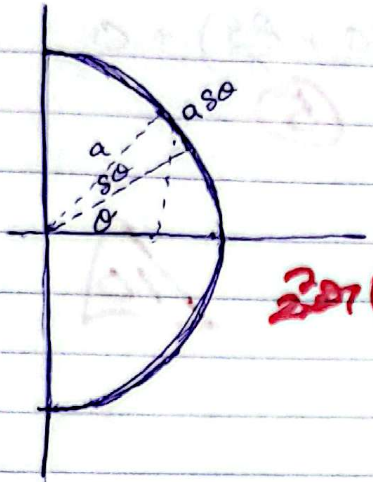
සීමා ⑤

30

$$\bar{x} = \frac{a}{2}\frac{\int_0^{\pi/2}\sin 2\theta\, d\theta}{\int_0^{\pi/2}\sin\theta\, d\theta} ⑤ = \frac{a}{2}\frac{\left[-\frac{\cos 2\theta}{2}\right]_0^{\pi/2}}{\{-\cos\theta\}_0^{\pi/2}} ⑤ = \frac{a}{4}\frac{(-1-1)}{0-1}$$

$$= \frac{a}{2}$$

Date:..............................



$dm = a\delta\theta\rho$ ⑤ ඝනත්වය ρ

$x = a\cos\theta$ ⑤ $G(\bar{x},\bar{y})$ සමමිතියෙන් $\bar{y}=0$

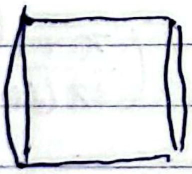
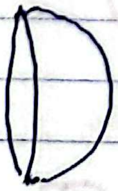
$$\bar{x} = \frac{\int_{-\pi/2}^{\pi/2} a\cos\theta \cdot a\rho\, d\theta}{\int_{-\pi/2}^{\pi/2} a\rho\, d\theta}$$

[illegible] ⑤

$$\bar{x} = \frac{a\left[\sin\theta\right]_{-\pi/2}^{\pi/2}}{\left[\theta\right]_{-\pi/2}^{\pi/2}} ⑤ = \frac{a(1+1)}{\pi/2+\pi/2} ⑤$$

20

$$= \frac{2a}{\pi}$$

වස්තුව	ස්කන්ධය	$\bar{x}$	$\bar{y}$
තැටිය 	$\pi a^2\rho = m_1$ ⑤	0 ⑤	0 ⑤
සිලින්ඩරය 	$2\pi a \cdot 4a\rho$ $8\pi a^2\rho = m_2$ ⑤	$2a$ ⑤	0 ⑤
කම්බිය. 	$\pi a\rho = m_3$ ⑤	$2a$ ⑤	$a+\frac{2a}{\pi}$ ⑤
[illegible] 	$2\pi a^2\rho = m_4$ ⑤	$\frac{9a}{2}$ ⑤	0 ⑤
කෝප්පය.	$m_1+m_2+m_3+m_4$ ⑤	$\bar{x}$	$\bar{y}$

65

$$(\pi a^2\rho + 8\pi a^2\rho + \pi a\rho + 2\pi a^2\rho)\bar{x}$$

$$= \pi a^2\rho \cdot 0 + 8\pi a^2\rho \cdot 2a + \pi a\rho \cdot 2a + 2\pi a^2\rho \cdot \frac{9a}{2}$$ ⑤

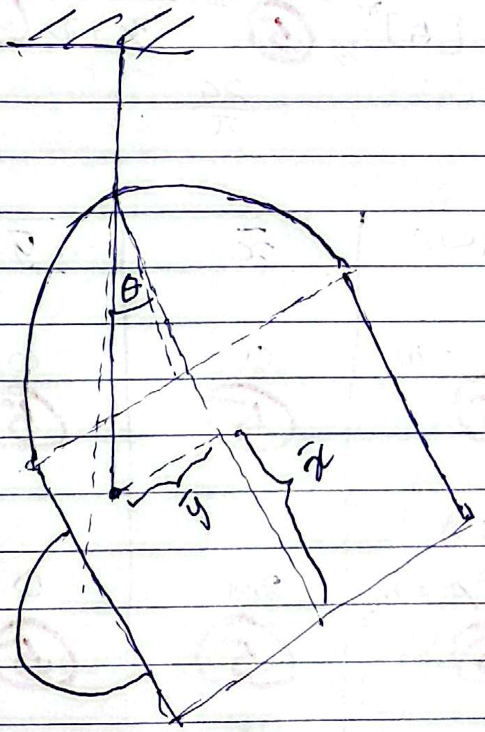
$$(11a+1)\bar{x} = 25a^2 + 2a$$

$$= a(25a+2)$$ ⑤

$$\pi a\rho(11a+1)\bar{y} = 0 + 0 + \pi a\rho\left(a + \frac{2a}{\pi}\right) + 0$$ (5)

$$\bar{y} = \frac{a(\pi+2)}{\pi(11a+1)}$$

$$G \equiv \left[\frac{a(25a+2)}{(11a+1)}, \frac{a(\pi+2)}{\pi(11a+1)}\right]$$ (5) 10



$$\tan\theta = \frac{\bar{y}}{5a-\bar{x}}$$ (5)

$$= \frac{a(\pi+2)}{\pi\cancel{(11a+1)}} \times \frac{\cancel{(11a+1)}}{a(30a+3)}$$ (5)

$$= \frac{\pi+2}{3\pi(10a+1)}$$

$$\theta = \tan^{-1}\left(\frac{\pi+2}{3\pi(10a+1)}\right)$$ (5)

15

$$5a - \frac{a(25a+2)}{(11a+1)} = \frac{a(55a+5-25a-2)}{11a+1}$$

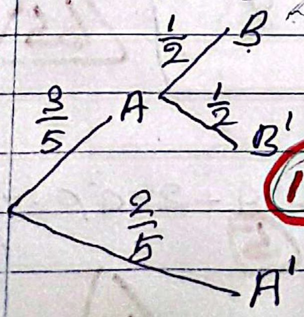
$\boxed{150}$

---

(17) (a) A - පාර සංඥාවේ වර්ණ හරිම.

B - මඟ අනුව ආපසු ලැබීම.

නියැදි අවකාශය = {AB, AB', A'} (10)



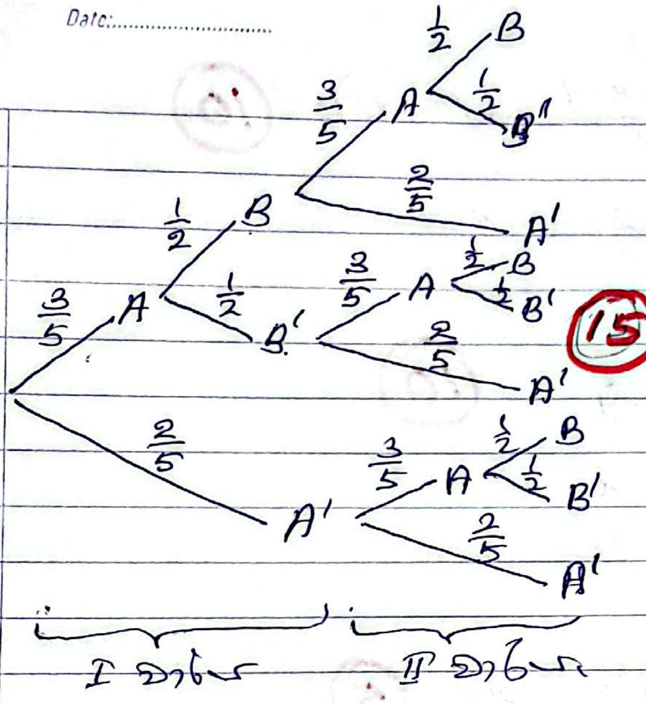
(10)

$P(AB) = \frac{3}{10}$ (5)

$P(AB') = \frac{3}{10}$ (5)

$P(A') = \frac{2}{5}$ (5)

35



⑮

$P(AB\,AB) = \frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$ ⑤

$P(AB\,AB' \cap AB'.AB)$

$= \frac{9}{100} + \frac{9}{100} = \frac{18}{100}$ ⑩

$P(AB\,A' \cap A'\,AB)$

$= \frac{6}{50} + \frac{6}{50} = \frac{12}{50}$ ⑩

40

(b) මධ්‍යස්ථය $= L_m + \frac{C}{f_m}\left(\frac{N}{2} - F_{m-1}\right)$ ⑩

L_m - මධ්‍යස්ථ පන්තියේ පහළ සීමාව
C - මධ්‍යස්ථ පන්තියේ තරම
f_m - මධ්‍යස්ථ පන්තියේ සංඛ්‍යාතය
N - සංඛ්‍යාත සියල්ලේ එකතුව.
F_{m-1} - මධ්‍යස්ථ පන්තියට පෙර පන්තිය තෙක් සමුච්චිත සංඛ්‍යාතය.

මාතය $= L + \frac{\Delta_1 C}{\Delta_1 + \Delta_2}$ ⑩

L - මාත පන්තියේ පහළ සීමාව
C - මාත පන්තියේ තරම
Δ_1 - මාත පන්තියේ සංඛ්‍යාතය හා ඊට පෙර පන්තියේ සංඛ්‍යාතය අතර වෙනස.
Δ_2 - මාත පන්තියේ සංඛ්‍යාතය හා ඊට පසු පන්තියේ සංඛ්‍යාතය අතර වෙනස.

20

$25 = 20 + \frac{10}{27}\left(\frac{56+x+y}{2} - (14+x)\right)$ ⑩

$27 = 56 + x + y - 28 - 2x$

$x - y = 1$ —— ① ⑤

$24 = 20 + \frac{(27-x)10}{27-x+27-y}$ ⑩

$2(54-x-y) = 135 - 5x$

$3x - 2y = 27$ —— ② ⑤

① × 2 − ②

$-x = -25$

$x = 25$ ⑤ $y = 24$ ⑤

මුළු ළමයින් ගණන = 105 ⑤ $\triangle 35$

පන්ති.	x_i	f_i	u_i $\frac{x_i - A}{c}$	$f_i u_i$
0-10	5	14	-2	-28
10-20	15	25	-1	-25
20-30	$\boxed{25}$	27	0	6
30-40	35	24	1	24
40-50	45	15	2	30

⑤ 105 ⑤ $\Sigma f_i u_i = 1$ ⑤

$\bar{x} = A + \frac{\Sigma f_i u_i \times 10}{\Sigma f}$

$= 25 + \frac{10}{105}$ ⑤

$\bar{x} = 25.09$ //

$\triangle 20$

$\boxed{150}$