

CSSC MARKING GUIDE 2026
BASIC MATHEMATICS Pt 1

01 (a) $0.0695 \approx 0.07$ ——— $\frac{001}{2}$
 $19812 \approx 20000$ ——— $\frac{001}{2}$
 $6.8125 \approx 7$ ——— $\frac{001}{2}$

$$\frac{0.07 \times 20000}{7} = \frac{1400}{7} = 200 \text{ ——— } \frac{001}{2}$$

$$\therefore \frac{0.0695 \times 19812}{6.8125} = 200 \text{ ——— } 01$$

(b) $a = 0.8\dot{5}$ ——— (i)
 $10a = 8.5\dot{5}$ ——— (ii)
 Take eqn (ii) - eqn (i)
 $10a - a = 8.5\dot{5} - 0.8\dot{5}$

$$\frac{9a}{9} = \frac{7.7}{9}$$

$$a = \frac{77}{90} \text{ ——— } 01$$

$b = 0.2\dot{1}$ ——— (iii)
 $100b = 21.2\dot{1}$ ——— (iv)
 Take Eqn (iv) - Eqn (iii)
 $100b - b = 21.2\dot{1} - 0.2\dot{1}$

$$\frac{99b}{99} = \frac{21}{99}$$

$$b = \frac{7}{33} \text{ ——— } 01$$

Then $\frac{a}{b} = \frac{77}{90} \div \frac{7}{33} = \frac{77 \times 33}{90 \times 7} = \frac{121}{30}$

$\therefore$ The value of $\frac{a}{b}$ is $\frac{121}{30}$ ——— 01

Pg 01/25

$$2(a) \quad (\sqrt{2} - \sqrt{3}) - \frac{1}{\sqrt{2} - \sqrt{3}}$$

$$= \frac{(\sqrt{2} - \sqrt{3})^2 - 1}{\sqrt{2} - \sqrt{3}} \quad \text{--- } 00\frac{1}{2}$$

$$= \frac{2 - 2\sqrt{6} + 3 - 1}{\sqrt{2} - \sqrt{3}} \quad \text{--- } 00\frac{1}{2}$$

$$= \frac{(4 - 2\sqrt{6})(\sqrt{2} + \sqrt{3})}{(\sqrt{2} - \sqrt{3})(\sqrt{2} + \sqrt{3})} \quad \text{--- } 00\frac{1}{2}$$

$$= \frac{4\sqrt{2} + 4\sqrt{3} - 2\sqrt{12} - 2\sqrt{18}}{2 - 3} \quad \text{--- } 00\frac{1}{2}$$

$$= \frac{4\sqrt{2} + 4\sqrt{3} - 4\sqrt{3} - 6\sqrt{2}}{-1} \quad \text{--- } 00\frac{1}{2}$$

$$= \frac{-2\sqrt{2} + 0}{-1} = 2\sqrt{2} \quad \text{--- } 00\frac{1}{2}$$

$$\therefore \sqrt{2} - \sqrt{3} - \frac{1}{\sqrt{2} - \sqrt{3}} = 0 + 2\sqrt{2}$$

$$(b) \quad \log(3x+1) - \log(3x-2) = 1$$

$$\log\left(\frac{3x+1}{3x-2}\right) = 1$$

$$\frac{3x+1}{3x-2} = 10^1 \quad \text{--- } 01$$

~~3x+1~~

$$3x + 1 = 10(3x - 2) \quad \text{--- 01}$$

$$3x + 1 = 30x - 20$$

$$30x - 3x = 21$$

$$\frac{27x}{27} = \frac{21}{27}$$

$$x = 7/9$$

$\therefore$ The value of x is $7/9$ --- 01

$$3 \text{ (a) } n(Q) = n(P \cap Q) + n(P' \cap Q)$$

$$n(P) = n(P \cap Q) + n(P \cap Q')$$

$$\text{and } n(P \cup Q) = n(P) + n(Q) - n(P \cap Q) \quad \text{--- 00 1/2}$$

$$n(P \cup Q) = n(P \cap Q) + n(P \cap Q') + n(P' \cap Q) + n(P' \cap Q) - n(P \cap Q)$$

$$90 = 30 + 15 + n(P' \cap Q)$$

$$\therefore n(P' \cap Q) = 90 - 45$$

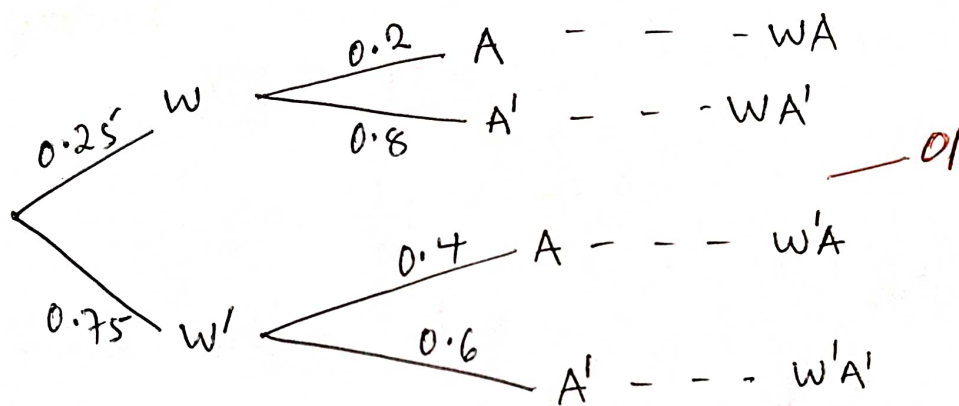
$$= 45 \quad \text{--- 01}$$

$$\text{Then from } n(Q) = n(P \cap Q) + n(P' \cap Q) \quad \text{--- 00 1/2}$$

$$= 30 + 45$$

$$n(Q) = 75 \quad \text{--- 01}$$

3(b) Let w = probability that I wake up early
 w' = probability that I wake up late
 A = probability that I arrive early
 A' = probability that I arrive late.



$$\begin{aligned}
 P(W'A' \text{ or } WA') &= P(w' \cap A') + P(w \cap A') \\
 &= 0.75 \times 0.8 + 0.25 \times 0.6 \\
 &= 0.6 + 0.15 \\
 &= 0.75
 \end{aligned}$$

Therefore; The probability that I am late arriving on any one morning is 0.75

4(a) Rewriting $8px + 2y + 1 = 0$
in form of $y = mx + c$

$$\frac{2y}{2} = -\frac{8px}{2} - \frac{1}{2}$$

$$y = -4px - \frac{1}{2}$$

then $M_1 = -4p$ ----- $\infty \frac{1}{2}$

Again write $px - 8y + 7 = 0$ in form of
 $y = mx + c$

$$\frac{8y}{8} = \frac{px + 7}{8}$$

$$y = \frac{1}{8}p x + \frac{7}{8}$$

then $M_2 = \frac{1}{8}p$ ----- $\infty \frac{1}{2}$

Since lines are perpendicular to each other
then

$$M_1 M_2 = -1$$
 ----- $\infty \frac{1}{2}$

$$(-4p) \left(\frac{1}{8}p \right) = -1$$
 ----- $\infty \frac{1}{2}$

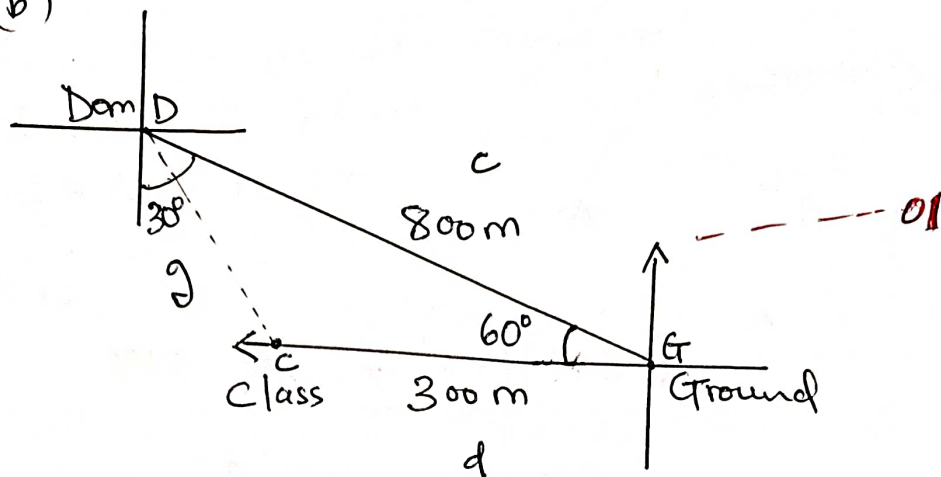
$$-\frac{p^2}{2} = -1$$

$$p^2 = 2$$

$$\therefore p = \pm \sqrt{2}$$
 ----- 01

Therefore the value of p is $\sqrt{2}$ or $-\sqrt{2}$

4(b)



By considering ΔCGD with their corresponding sides, $c = 800 \text{ m}$, $d = 300 \text{ m}$ and g (displacement from dormitory to class)

Using Cosine Rule

$$g^2 = c^2 + d^2 - 2cd \cos \hat{G} \text{ --- 01}$$

$$g^2 = (300)^2 + (800)^2 - 2(300)(800)\cos 60^\circ$$

$$g^2 = 490,000$$

$$\sqrt{g^2} = \sqrt{490,000}$$

$$g = 700 \text{ m}$$

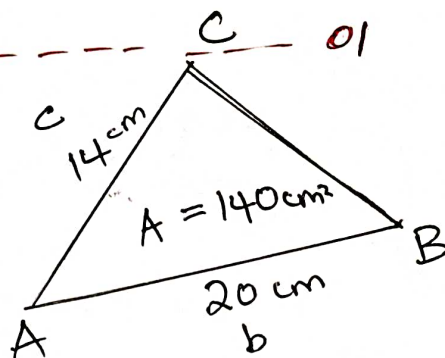
$\therefore$ The displacement from dormitory to class is 700 m. --- 01

$$5(a) \quad A = \frac{1}{2} bc \sin \hat{A}$$

$$\text{Given } A = 140 \text{ cm}^2$$

$$b = \overline{AB} = 20 \text{ cm}$$

$$c = \overline{AC} = 14 \text{ cm}$$



then

$$140 = \frac{1}{2} (20)(14) \sin \hat{A}$$

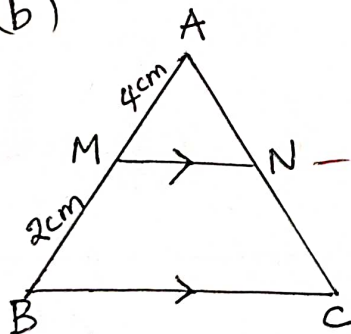
$$\sin \hat{A} = \frac{140 \times 2}{20 \times 14}$$

$$\sin \hat{A} = 1$$

$$\hat{A} = \sin^{-1}(1) = 90^\circ$$

$$\therefore \hat{A} = 90^\circ$$

(b)



(i) Suppose to show that

$$\triangle AMN \sim \triangle ABC$$

$$\hat{A}MN = \hat{A}BC \quad \text{--- Corresponding angle}$$

$$\hat{M}AN = \hat{B}AC \quad \text{--- Common angle}$$

$$\therefore \triangle AMN \sim \triangle ABC \quad \text{--- AA theorem}$$

□ Shown.

(ii) $\overline{BC} = 4.5 \text{ cm}$; Suppose to find $\overline{MN}$
Since $\triangle AMN \sim \triangle ABC$ then their corresponding sides are proportional

$$\frac{\overline{AM}}{\overline{AB}} = \frac{\overline{MN}}{\overline{BC}} = \frac{\overline{AN}}{\overline{AC}}$$

$$\frac{4}{6} = \frac{\overline{MN}}{4.5}; \quad \overline{MN} = 2 \times 1.5 = 3 \text{ cm}$$

6 (a) $X : Y : Z$

$$\frac{800000}{10000} : \frac{1200000}{10000} : \frac{850000}{10000}$$

$$\frac{80}{5} : \frac{120}{5} : \frac{85}{5}$$

$$16 : 24 : 17$$

$\therefore$ The Ratio of their contribution in its simplest form is

$$X : Y : Z = 16 : 24 : 17 \text{ --- 01}$$

$$Y \text{ will get } \frac{24}{16+24+17} \times 1,900,000 \text{ --- 01}$$

$$= \frac{24}{57} \times 1,900,000 \text{ ---}$$

$$= 800,000 \text{ ---}$$

Therefore Y will get 800,000 --- 01

(b) $y \propto \frac{x^2}{z} \text{ --- 001/2}$

$$y = \frac{kx^2}{z} \text{ --- 001/2}$$

$$x_2 = x_1 + 0.1x_1 = 1.1x_1 \text{ --- 001/2}$$

$$z_2 = z_1 - 0.2z_1 = 0.8z_1 \text{ --- 001/2}$$

$$y_2 = ??$$

$$k = \frac{yz}{x^2}$$

Therefore

$$\frac{y_1 z_1}{x_1^2} = \frac{y_2 z_2}{x_2^2}$$

$$\frac{y_1 \cancel{x_1}}{\cancel{x_1}^2} = \frac{y_2 \times 0.8 \cancel{x_1}}{(1.1 \cancel{x_1})^2}$$

$$y_1 = \frac{0.8 y_2}{(1.1)^2} = \frac{0.8 y_2}{1.21}$$

$$\text{Then } y_2 = \frac{121 y_1}{0.8} = \frac{121 y_1}{80}$$

$$\Delta y\% = \frac{y_2 - y_1}{y_1} \times 100\% \text{ --- } \frac{100}{2}$$

$$= \frac{\frac{121}{80} y_1 - y_1}{y_1} \times 100\%$$

$$= \frac{121 - 80}{80} \times 100\%$$

$$= \frac{410}{8} \%$$

$$= 51.25\% \quad \text{--- --- --- --- } \frac{1}{2}$$

$$\begin{aligned}
 7(a) \quad \text{Total ratio} &= 2 + p + p + 2 \\
 &= 4 + 2p \quad \text{--- 01} \\
 &= 2(2 + p)
 \end{aligned}$$

The largest shareholders has the ratio of $p+2$

$$\frac{p+2}{2(p+2)} \times \text{Property} = 39,100 \quad \text{--- 01}$$

$$\begin{aligned}
 \text{Property} &= 39100 \times 2 \\
 &= 78200 \quad \text{--- 01}
 \end{aligned}$$

∴ The Value of the property is 78200

(b) Trading profit loss account for the year ending 31st July 2008.

Dr		Cr	
Purchases	900,000	Sales	700,000
		Gross loss $\frac{c}{d}$	200,000 --- 01
	<u>900,000</u>		<u>900,000</u>
Gross loss $\frac{b}{d}$	200,000	Net Loss	1,900,000 --- 01
Add Expenses	1500,000		
Rent	200,000		
Wages			
	<u>1,900,000</u>		<u>1,900,000</u>

$$8(a) \quad S_n = \frac{G_1 (1 - r^n)}{1 - r} \dots \dots \infty \frac{1}{2}$$

Given $G_1 = 1$ $\gamma = \frac{1}{2}$ $S_n = \frac{63}{32}$

Required to find n

$$\frac{63}{32} = \frac{1(1 - \frac{1}{2}^n)}{1 - \frac{1}{2}} \dots \dots \infty \frac{1}{2}$$

$$\frac{63}{32} \times \frac{1}{2} = 1 \left(1 - \frac{1^n}{2} \right)$$

$$\frac{63}{64} = 1 - \left(\frac{1}{2}\right)^n \dots \dots \dots \infty \frac{1}{2}$$

$$\left(\frac{1}{2}\right)^n = 1 - \frac{63}{64} = \frac{64-63}{64}$$

$$\left(\frac{1}{2}\right)^n = \frac{1}{64} = \left(\frac{1}{2}\right)^6 \quad \text{--- } \frac{1}{2}$$

$$\left(\frac{1}{2}\right)^n = \left(\frac{1}{2}\right)^6$$

$n = 6$ _____ 01

$\therefore$ There were 6 terms.

$$8(b) \quad A_t = P \left(1 + \frac{r}{100n} \right)^{nt} \text{---cal } \frac{1}{2}$$

$$r = 10\%$$

$$n = 1$$

$$t = 3$$

$$A_3 = 13,310,000$$

$$P = ?$$

$$13,310,000 = P \left(1 + \frac{10}{100} \right)^{1 \times 3} \text{---cal } \frac{1}{2}$$

$$\frac{13,310,000}{(1.1)^3} = \frac{P (1.1)^3}{(1.1)^3} \text{---cal } \frac{1}{2}$$

$$P = \frac{13,310,000}{(1.1)^3} \text{---cal } \frac{1}{2}$$

$$= 10,000,000 \text{---cal } 1$$

$\therefore$ They invested 10,000,000

9(a) If two angles are Complementary α and β , then

$$\alpha + \beta = 90^\circ$$

$$\cos \alpha = \sin \beta = \frac{\sqrt{3}}{2} \quad \text{--- } \alpha = \frac{\pi}{2}$$

From

From $\cos^2 \alpha + \sin^2 \alpha = 1 \dots\dots\dots \text{oo} \frac{1}{2}$

$$\sin^2 \alpha = 1 - \cos^2 \alpha$$

$$\sin \alpha = \sqrt{1 - \cos^2 \alpha}$$

$$= \sqrt{1 - \frac{3}{4}}$$

$$= \sqrt{\frac{4-3}{4}} = \frac{1}{2}$$

Therefore $\sin \alpha = \frac{1}{2} \dots \dots \dots \frac{\infty!}{2}$

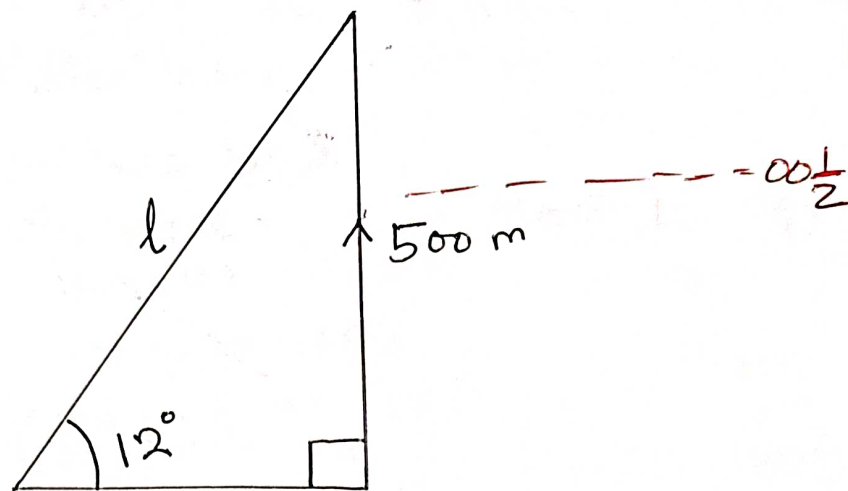
Suppose to Find the value of

$$\sin \alpha \sin \beta = \left(\frac{1}{2} \right) \left(\frac{\sqrt{3}}{2} \right)$$

$$= \frac{\sqrt{3}}{4}$$

$$\therefore \sin \alpha \sin \beta = \frac{\sqrt{3}}{4} \text{ --- 01}$$

9(b)



$$\sin \theta = \frac{\text{Opposite}}{\text{Hypotenuse}} \quad \text{--- } 00 \frac{1}{2}$$

$$\therefore \sin 12^\circ = \frac{500 \text{ m}}{l}$$

$$l = \frac{500}{\sin 12^\circ} \text{ m}$$

$$= 2405 \text{ m} \quad \text{--- } 01$$

But

$$\begin{array}{lcl} 1 \text{ km} & = & 1000 \text{ m} \quad \text{--- } 00 \frac{1}{2} \\ ? & = & 2405 \text{ m} \end{array}$$

$$= \frac{2405 \text{ m} \times 1 \text{ km}}{1000 \text{ m}}$$

$$= 2.405 \text{ km} \quad \text{--- } 00 \frac{1}{2}$$

$\therefore$ To get at the top of the hill one should walk 2.405 kilometers.

10(a) $x - y = 8$ ——— (i) ——— $\text{val } \frac{1}{2}$

$$xy = 105 \quad \text{--- (ii) --- } \frac{1}{2}$$

Consider eqn(i)

$$x = y + 8$$

Substitute $x = y + 8$ in equation (ii)

$$xy = 105$$

$$xy = 105$$

$$(y+8)y = 105 \quad \text{--- -- -- } 00\frac{1}{2}$$

$$y^2 + 8y - 105 = 0 \quad \text{---} \frac{\infty}{2}$$

$$y = \frac{-8 \pm \sqrt{8^2 - 4(1)(-105)}}{2(1)}$$

$$= \frac{-8 \pm \sqrt{64 + 420}}{2}$$

$$= \frac{-8 \pm \sqrt{484}}{2}$$

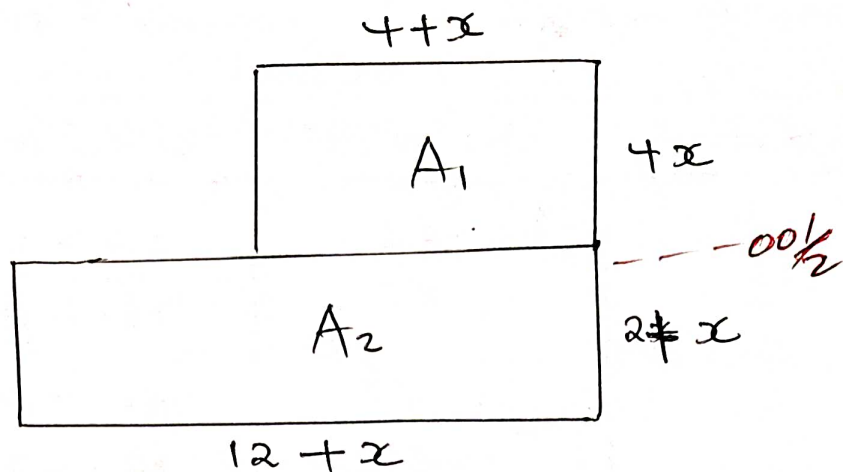
$$= \frac{-8 \pm 22}{2}$$

$$\therefore y = \frac{-8+22}{2} \text{ or } \frac{-8-22}{2}$$

$$= 7 \text{ or } -15$$

The larger number is $15\bar{.}01$

10(b)



$$\begin{aligned}
 \text{Expression of } A_1 &= L W \\
 &= 4x(4+x) \\
 &= 4x(4) + 4x(x) \\
 &= 16x + 4x^2 \quad \text{--- } 00 \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{Expression of } A_2 &= L W \\
 &= (2+x)(12+x) \\
 &= 2(12+x) + x(12+2) \\
 &= 24 + 2x + 12x + x^2 \\
 &= x^2 + 14x + 24 \quad \text{--- } 00 \frac{1}{2}
 \end{aligned}$$

Expression for Total Area

$$A_1 + A_2 = 5x^2 + 30x + 24 \quad \text{--- } 00 \frac{1}{2}$$

$$\text{If } A_T = 104 \text{ cm}^2$$

$$\therefore 5x^2 + 30x + 24 = 104$$

$$5x^2 + 30x + 24 - 104 = 0$$

$$5x^2 + 30x - 80$$

Solving Quadratically

$$\therefore x = -8 \text{ or } 2 \quad \text{--- } 01$$

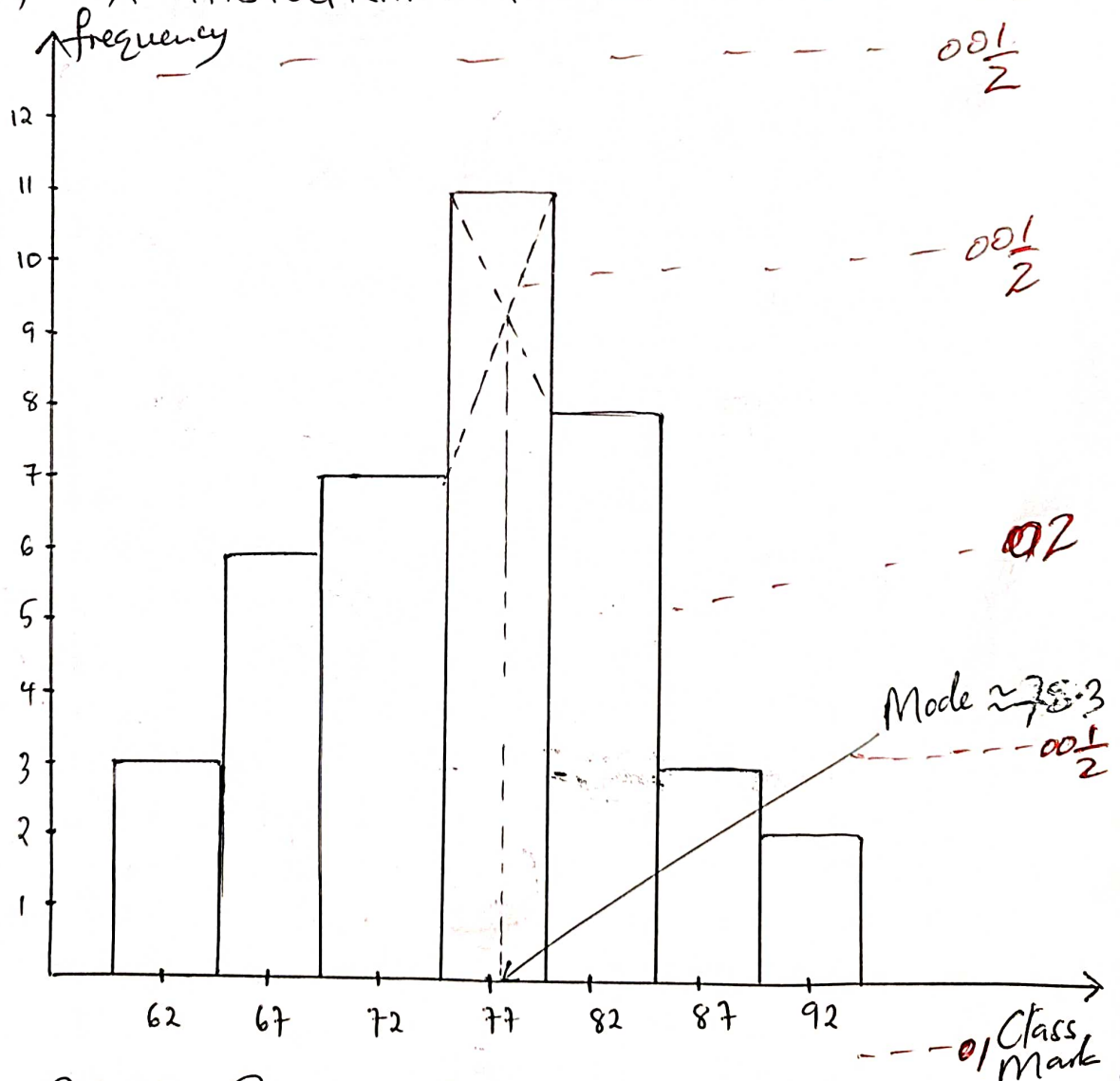
The Value of the number is 2cm.

11(a) (i) The Frequency distribution table

Class Interval	Class Mark	Frequency
60 - 64	62	3
65 - 69	67	6
70 - 74	72	7
75 - 79	77	11
80 - 84	82	8
85 - 89	87	3
90 - 94	92	2

Column $\frac{001}{2} = 01\frac{1}{2}$

(ii) A HISTOGRAM TO ESTIMATE MODE



Mode Ranges from 77.4 - 78.

11 (b) Sum of Interior angles of $\triangle ABO$

$$\hat{BAO} + \hat{AOB} + \hat{ABO} = 180^\circ \text{ --- 01}$$

$$\text{but } \hat{BAO} = \hat{ABO} = 35^\circ$$

$$35^\circ + 35^\circ + \hat{AOB} = 180^\circ \text{ --- 01}$$

$$\hat{AOB} = 180^\circ - 70 = 110^\circ$$

$$\text{Then } \hat{ACB} \times 2 = \hat{AOB} \text{ --- 01}$$

"Twice the angle at the circumference of a circle is equal to the central angle
If they are subtended by the same ~~arc~~
arc

$$\text{ie } \frac{2x}{2} = \frac{110^\circ}{2}$$

$$x = 55^\circ \text{ --- 01}$$

12(a) A (32°N , 136°W)
 B (32°N , 158°W)

Town A and B lies on parallel of latitude

(i) distance = $\frac{\pi R \theta \cos \alpha}{180^{\circ}}$ ----- 00 $\frac{1}{2}$

$\theta = 158^{\circ} - 136^{\circ} = 22^{\circ}$ ----- 00 $\frac{1}{2}$

$\alpha = 32^{\circ}$

$R = 6400 \text{ km}$

distance = $\frac{3.14 (6400) (22^{\circ}) \cos 32^{\circ}}{180^{\circ}}$

= 2082.839 km ----- 01

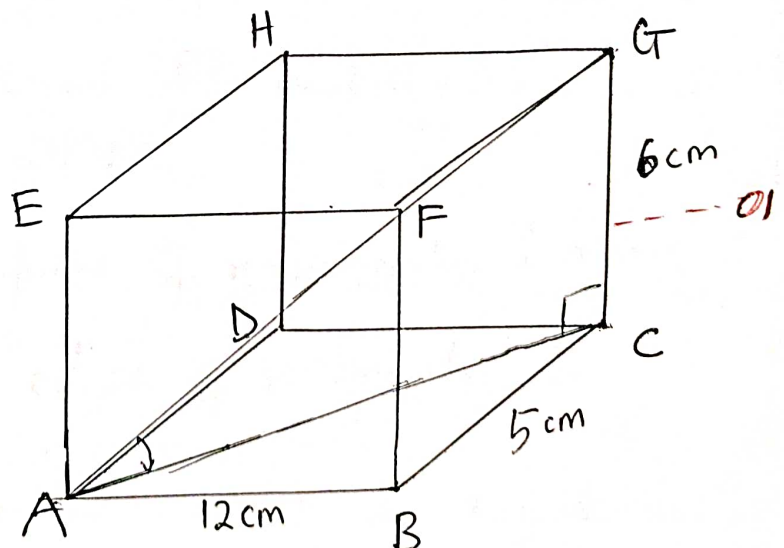
(ii) In nautical miles

distance = $\theta \times 60 \cos \alpha$ ----- 01

= $22^{\circ} (60) \cos 32^{\circ}$

= 1119.423 nm . ----- 01

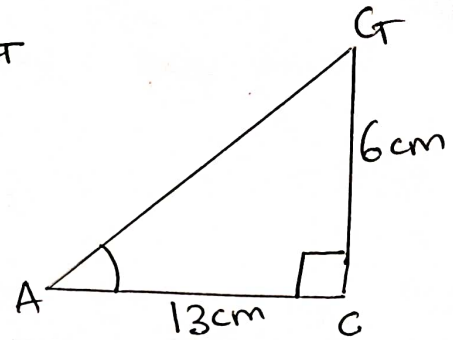
(b)



12(b)(i) Diagonal $\overline{AG}$
Consider $\triangle ACG$

$$\begin{aligned}\overline{AC}^2 &= \overline{AB}^2 + \overline{BC}^2 \\ &= 12^2 + 5^2 \\ &= 169\end{aligned}$$

$$AC = \sqrt{169} = 13 \text{ cm}$$



Then $\overline{AG}^2 = \overline{AC}^2 + \overline{CG}^2$

$$\overline{AG}^2 = 13^2 + 6^2$$

$$AG = \sqrt{169 + 36}$$

$$AG = 14.318 \text{ cm} \text{ --- 01}$$

(ii) The angle between $\overline{AG}$ and the base is $\angle CAG$

$$\tan \angle CAG = \frac{6}{13}$$

$$\angle CAG = \tan^{-1}\left(\frac{6}{13}\right) = 24.78^\circ \text{ or } 24^\circ 47'$$

$\therefore$ The angle between $\overline{AG}$ and the base is 24.78° or $24^\circ 47'$ --- 01

(iii) - Number of faces of rectangular box are 6 --- 01

- Number of edges of rectangular box is 12 edges --- 01

- Number of vertices of Rectangular box is 8 vertices. --- 01

13(a) A singular matrix has zero determinant

$$\begin{vmatrix} 2t+2 & t \\ 4t-3 & t+3 \end{vmatrix} = 0$$

$$(2t+2)(t+3) - t(4t-3) = 0 \text{ --- } 01$$

$$2t^2 + 6t + 2t + 6 - 4t^2 + 3t = 0$$

$$-2t^2 + 11t + 6 = 0 \text{ --- } 01$$

$$t = \frac{-11 \pm \sqrt{11^2 - 4(-2)(6)}}{2(-2)}$$

$$= \frac{-11 \pm \sqrt{169}}{-4}$$

$$= \frac{-11 \pm 13}{-4} = -\frac{1}{2} \text{ or } 6 \text{ --- } 01$$

$$(b) (i) \quad 2P - \frac{1}{3}Q = 2 \begin{pmatrix} 2 & -3 \\ 5 & 4 \end{pmatrix} - \frac{1}{3} \begin{pmatrix} 9 & 12 \\ -15 & 3 \end{pmatrix} \text{ --- } 01$$

$$= \begin{pmatrix} 4 & -6 \\ 10 & 8 \end{pmatrix} - \begin{pmatrix} 3 & 4 \\ -5 & 1 \end{pmatrix} \text{ --- } 01$$

$$= \begin{pmatrix} 1 & -10 \\ 15 & 7 \end{pmatrix} \text{ --- } 01$$

13 b(ii) Image of $y = 2x + 5$ after Reflection in line $y - x = 0$.

$y = 2x + 5$

x	0	$-\frac{5}{2}$
y	5	0

----- $\infty \frac{1}{2}$

$$(x_1, y_1) = (0, 5) \quad \text{and} \quad (x_2, y_2) = \left(-\frac{5}{2}, 0\right)$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \cos 2\alpha & \sin 2\alpha \\ \sin 2\alpha & -\cos 2\alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} \quad \text{--- do } \frac{1}{2}$$

$$\alpha = 45^\circ \quad \text{--- --- --- --- } \infty \frac{1}{2}$$

$$\begin{pmatrix} x_1' \\ y_1' \end{pmatrix} = \begin{pmatrix} \cos 90 & \sin 90 \\ \sin 90 & -\cos 90 \end{pmatrix} \begin{pmatrix} 0 \\ 5 \end{pmatrix} \quad \text{--- } 00\frac{1}{2}$$

$$= \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 0 \\ 5 \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x_2' \\ y_2' \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} -s/2 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ -s/2 \end{pmatrix} \text{ --- } -\frac{s}{2}$$

for (x_1', y_1') and (x_2', y_2') Gradient = $\left(\frac{\Delta y_2}{\Delta x'} \right) = \frac{-5/2 - 0}{0 - 5} = \frac{1}{2}$ - or $\frac{1}{2}$

It's Equation

$$y = m(x - x_1') + y_1' \quad \text{---} \quad \frac{-0.01}{2}$$

$$y = \frac{1}{2}(x-5) + 0$$

$$y = \frac{1}{2}x - \frac{5}{2}; \quad x - 2y - 5 = 0 \quad \text{or} \quad \frac{1}{2}$$

pg 22

$\therefore$ The Image of the line $y = 2x + 5$ is

$$y = \frac{1}{2}x - \frac{5}{2} \text{ or } x - 2y - 5 = 0.$$

14(a) $f(x) = 2^x + 2$, find $f^{-1}(18)$

Let $f(x) = y$

$y = 2^x + 2$

Interchanging the variables

$x = 2^y + 2$

$2^y = x - 2$. (Convert to logarithmic form).

$y = \log_2(x-2)$

$\therefore f^{-1}(x) = \log_2(x-2)$

Now $f^{-1}(18) = \log_2(18-2)$
 $= \log_2 16 = \log_2 2^4 = 4 \log_2 2$
 $= 4 \times 1 = 4$

$\therefore f^{-1}(18) = 4$

(b) Let x - The number of type A airplanes
 y - The number of type B airplanes

Constraints. $\begin{cases} 6x + 2y \leq 60 \\ 20x + 30y \leq 480 \\ x \geq 0, y \geq 0 \end{cases}$

Objective function: $f(x, y) = x + y$

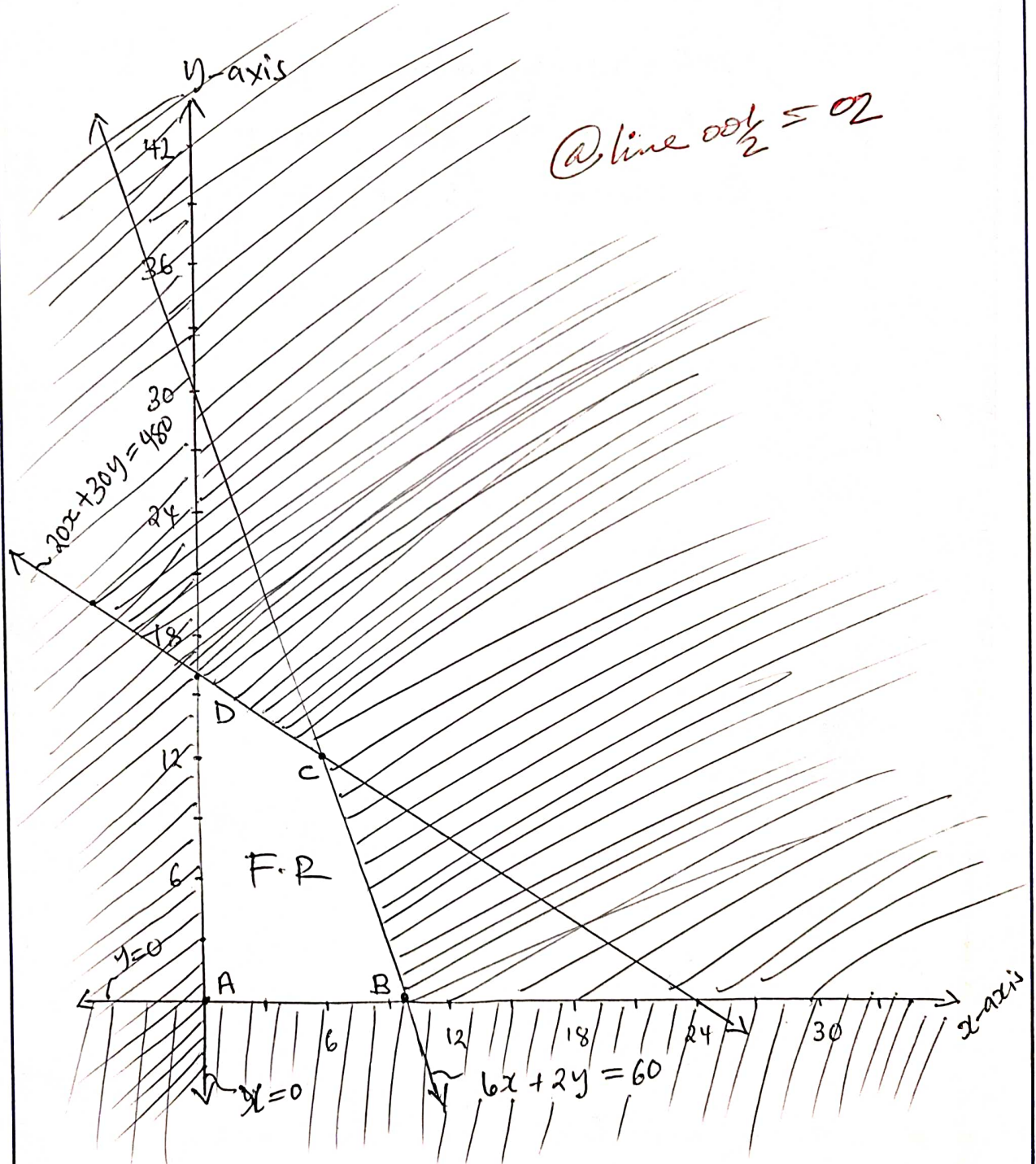
Table of values

$$6x + 2y = 60$$

x	0	10
y	30	0

$$20x + 30y = 480$$

x	0	24
y	16	0



Corner points	$F(x, y) = x + y$	Optimal Value
A (0, 0)	$0 + 0$	0
B (10, 0)	$10 + 0$	10 --- $\infty \frac{1}{2}$
C (6, 12)	$6 + 12$	18 --- $\infty \frac{1}{2}$
D (0, 16)	$0 + 16$	16 --- $\infty \frac{1}{2}$

$\therefore$ The greatest number of air planes the company
 can buy is 18 air planes 6 of type A
 and 12 of type B ----- 01