ARUSHA REGION

FORM IV Mock EXAMINATION-202

B/MATH. MARKING SCHEME

CamScanner

SECTION A

Soln:

find Lcm of 30 and 36 minutes

	30	36
2	15	18
3	15	9
3	5	3
5	5	1
	1	1

(01)

$L.cm = 2^2 \times 3^2 \times 5$ (01)

$= 180$

∴ They will meet again after 180 minutes. (01)

b)

Soln:

(i) 0.09963 + 0

3. d.p

$0.09963 \approx 0.100$ (1½)

(ii) Hundreds

$0.09963 \approx 0.10$ (½)

2. a)

Soln:

$a^{3n} = 5$ find $4a^{12n} - 8$

$4(a^{3n})^4 - 8$

$4 \times 5^4 - 8$

$4 \times 625 - 8$

$2500 - 8 = 2492.$ / 03

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2b $\log(3x+8) - 3\log 2 = \log(x-4)$

$\log(3x+8) - \log 2^3 = \log(x-4)$ — 00 ½

$\log(3x+8) - \log(x-4) = \log 8$ — 00 ½

$\log\left(\frac{3x+8}{x-4}\right) = \log 8$ — 00 ½

$\frac{3x+8}{x-4} = \frac{8}{1}$

$3x+8 = 8x-32$ — 00 ½

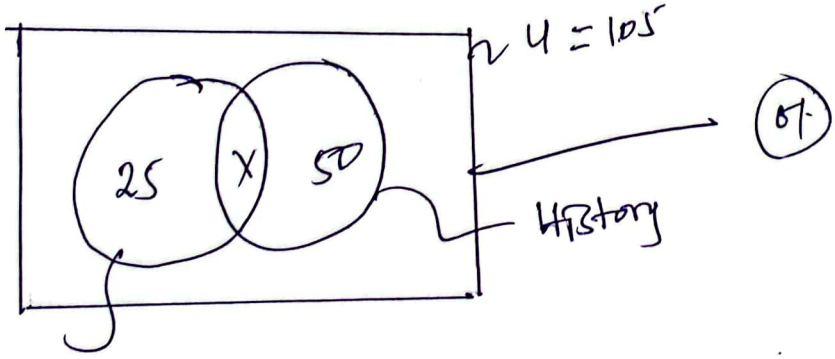
$+8+32 = 8x-3x$

$40 = 5x$

$\frac{5x}{5} = \frac{40}{5}$

$x = 8$ — (01)

3 @



$n(U) = 105$ — (01)

$25 + x + 50 = 105$

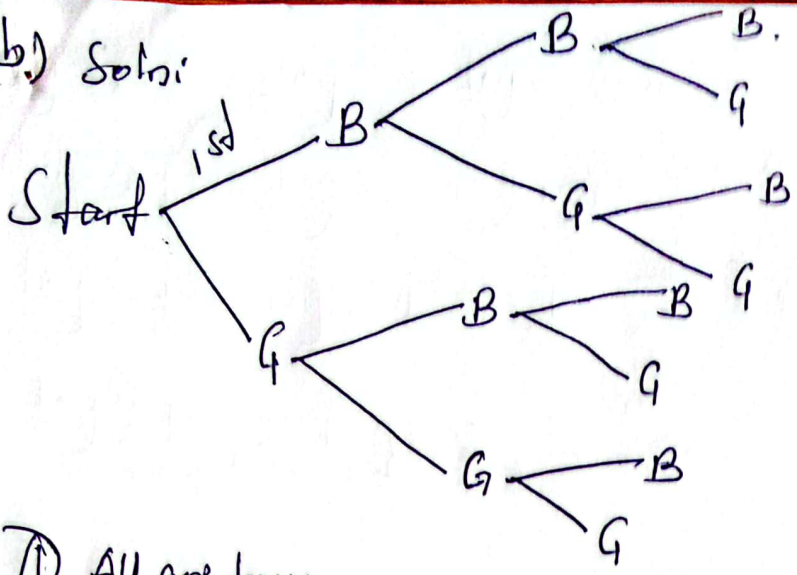
$x + 75 = 105$

$x = 105 - 75$

$x = 30$ — (01)

∴ The number of students who study history is $30 + 50 = 80$

3 (b.) Soln:



B B B
B B G
B G B
B G G
G B B
G B G
G G B
G G G

(07)

(i) All are boys

$n(S) = 8$

$n(E) = 1$

$P(E) = \frac{n(E)}{n(S)}$ —— 00½

$= \frac{1}{8}$ or 0.125 —— 00½

(ii) At most two are girls

$n(S) = 8$

$n(E) = 6$

$P(E) = \frac{n(E)}{n(S)}$

$= \frac{6}{8}$

$= \frac{3}{4}$ or 0.75

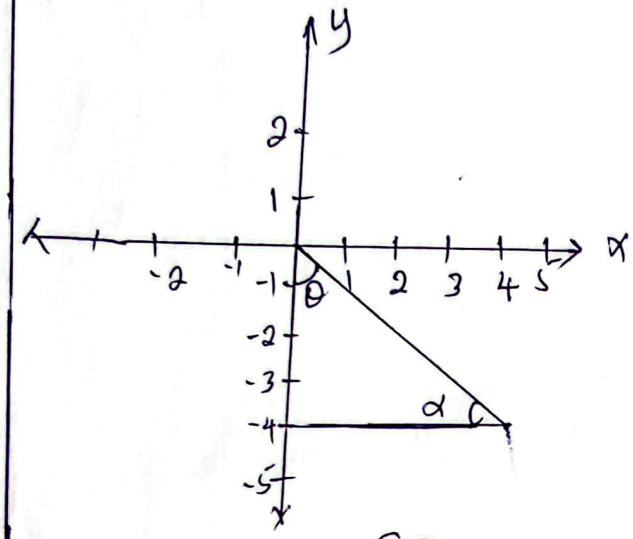
4 Soln

a) $\underset{\sim}{d} = 6\left(\frac{1}{6}\underset{\sim}{i} + \frac{1}{6}\underset{\sim}{j}\right) + 3\left(\frac{2}{3}\underset{\sim}{i} + \frac{1}{3}\underset{\sim}{j}\right) - \underset{\sim}{i} + 6\underset{\sim}{j}$

$\underset{\sim}{d} = 3\underset{\sim}{i} + 2\underset{\sim}{j} + 2\underset{\sim}{i} + \underset{\sim}{j} - (\underset{\sim}{i} + 6\underset{\sim}{j})$ —— 00 1/2

$\underset{\sim}{d} = 4\underset{\sim}{i} - 3\underset{\sim}{j}$ —— 00 1/2

$\underset{\sim}{d} = 4\underset{\sim}{i} - 3\underset{\sim}{j}$



Alternatively

Magnitude

$|\underset{\sim}{d}| = \sqrt{x^2 + y^2}$

$|\underset{\sim}{d}| = \sqrt{3^2 + 4^2}$

$|\underset{\sim}{d}| = \sqrt{25}$

$|\underset{\sim}{d}| = 5.$

$\cos\theta = 3/5$ — 00 1/2

$\cos\alpha = 4/5$

4 (b)

$A = \frac{1}{2}ab\sin\hat{C}$

$140 = \frac{1}{2} \times 20 \times 14 \times \sin\hat{C}$

$280 = 280\sin\hat{C}$

$\sin\hat{C} = 1$

$\hat{C} = \sin^{-1}(1)$

$\hat{C} = 90^\circ$

5. Consider ΔACD and ΔABD

$\overline{AB} = \overline{AC}$ Given S 00½

$\overline{BD} = \overline{DC}$ Given S 00½

$AD = AD$ Common 00½

$\Delta ADB = \Delta ADC$ Perpendicular 00½.

Hence $\Delta ACD \cong \Delta ABD$ SAS, AAS, RHS

b) $\frac{A_1}{A_2} = \left(\frac{L_1}{L_2}\right)^2$ ——— 01

$\frac{5cm^2}{3.2cm^2} = \left(\frac{165}{L_2}\right)^2$ — 01

$\frac{5}{3.5} = \frac{165 \times 165}{L_2^2}$

$5L_2^2 = 3.5 \times 27225$

$\frac{5L_2^2}{5} = \frac{95287.5}{5}$

$\sqrt{L_2^2} = \sqrt{19057.5}$

$L_2 = 132cm$

∴ her daughter is 132cm tall 01

6. $V \propto \frac{x^2}{y}$ ——— 00½

$V = \frac{kx^2}{y}$ ——— 00½

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

$\therefore K = \frac{18 \times 4}{3^2}$

$K = 8$ —— 01

From

$K = \frac{Vy}{x^2}$ —— 01/2.

$V = \frac{x^2 K}{y}$ ——

$V = \frac{8 \times 5^2}{2}$ —— 01/2

$V = 100$ —— 01/2

6b

Soln:

No of bottles = ?

Capacity of bottle = 400 ml

Total capacity of a bucket = 20 litres.

from

$1L = 1000 ml$ (1/2)

$20l = ? y$

$y = 20 \times 1000$ (01)

$y = 2000 ml$

$1 \text{ bottle} = 400 ml$

$x = 2000 ml$ (1/2)

$400x = 2000$

$x = \frac{2000}{400}$ 01

$x = 50$. ∴ They will be 50 bottles of 400ml.

7 (a) Soln:

$S.P = B.P - \%\ loss$

$= 8,000,000 - \left(\frac{20}{100} \times 8,000,000\right)$

$= 8,000,000 - 160,000$

$= 6,400,000$ Ans

Selling price is 6,400,000 Tshs.

b) TRADING PROFIT & LOSS ACCOUNT FOR THE YEAR ENDING 31 JULY 2008 (0½)

DR			CR		
Particular	Folio	Amount	particular	Folio	Amount (½)
Purchases		900,000	Sales		700,000
			Gross loss	c/d	200,000
		900,000			900,000 (0½)
Gross loss	b/d				(0½)
Rent					
Wages		550,000			
Net loss		550,000	(0½)		550,000 (0½)
~~Net loss~~					

Soln:

8 (a)

$A_4 = A_1 + 3d = 17$
$A_{11} = A_1 + 10d = 52$ } —— 01/2

$\frac{-7d}{-7} = \frac{-35}{-7}$

$d = 5.$ —— 01/2

From

$A_1 + 3d = 17$
$A_1 + 3(5) = 17$ —— 01/2

$A_1 = 17 - 15$
$A_1 = 2.$ —— 01/2

(i) 1st term = 2.

Common difference = 5

(ii) $A_n = A_1 + (n-1)d$ —— 01/2

$A_n = 2 + (n-1)5$

$A_n = 5n - 3$ —— 01/2

$P = 5000$
$r = 5\%$
$n = 12.$

Amount of money after 10 years

8. b

from

$$A_n = A_1\left(1+\frac{r}{100n}\right)^{nt}$$ ——— 01/2

$$A = 5000\left(1+\frac{0.05}{12}\right)^{12\times10}$$ ——— 01/2

$$= 5000\left(\frac{245}{240}\right)^{120}$$ ——— 01/2

$$= 8235.0474$$

∴ Mr Severua invested 8235.0474 for 10 yrs — 01

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9. (a) Soln:

From cosine rule

(i) $a^2 = b^2 + c^2 - 2bc\cos A$.

$= 55^2 + 82^2 - 2(55)(82)\cos 78^\circ$

$a^2 = 7566.8645$

$a = 86.987m \simeq 87M$

∴ The length AB = 87 M

(ii) from sine rule

$$\frac{\sin A}{a} = \frac{\sin \hat{C}}{c}$$ ——— 01/2

$$\sin \hat{C} = \frac{\sin A \times c}{a}$$

$$= \frac{82\times \sin 76}{87}$$ ——— 01/2

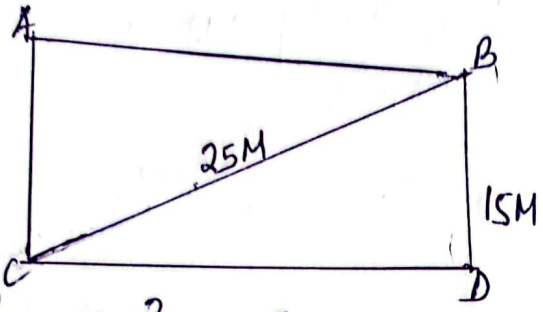
$\sin \hat{C} = 0.9145$

$\hat{C} = \sin^{-1}(0.9145)$

$\hat{C} = 66.13°$

Angle $ACB = 66°$ ——— 01/2

9 (b) Soln:



$CD^2 = BC^2 - BD^2$

$= 25^2 - 15^2$

$= 625 - 225$

$\sqrt{CD^2} = \sqrt{400}$

$CD = 20M$

∴ The length of the frame = 20M

10. a) Soln:

$x = 5$ and $x = -4/5$

quadratic expression.

$x = 5 \Rightarrow x - 5 = 0$

$x = -4/5 \Rightarrow x + 4/5 = 0$ } factors ——— 01/2

$= (x-5)(x+4/5)$ ——— 01/2

$= x(x+4/5) - 5(x+4/5)$ ——— 01/2

$= x^2 + 4/5x - 5x - 20/5$ ——— 01/2

$-5x^2 + 4x - 25x - 20$

$= 5x^2 - 21x - 20$ ——— (01)

$\therefore$ quadratic expression is $5x^2 - 21x - 20$

10 b) soln:

$2x^2 + 3x - 5 = 0$

$\frac{2x^2}{2} + \frac{3x}{2} - \frac{5}{2} = \frac{0}{2}$ ——— 01/2

$x^2 + \frac{3}{2}x - 5/2 = 0$

$x^2 + 3/2 x = 5/2$ ——— 01/2

Add $\frac{2}{2}$ both sides

$x^2 + \frac{3}{2}x + \frac{9}{16} = \frac{5}{2} + \frac{9}{16}$

$\left(x + \frac{3}{4}\right)^2 = \frac{49}{16}$

$\sqrt{\left(x + \frac{3}{4}\right)^2} = \sqrt{\frac{49}{16}}$ ——— 01/2

$x + 3/4 = \pm 7/4$

$x = -3/4 + 7/4$ or $x = -3/4 - 7/4$ ——— 01/2

$x = 1$ or $x = -5/2$. ——— 01

SECTION B.

Solⁿ:

Frequency distribution table

X	F	d = X - A	fd	C.f	R.H.L
34.5	2	-30	-60	2	39.5
44.5	8	-20	-160	10	49.5
54.5	16	-10	-160	26	59.5
64.5	20	0	0	46	69.5
74.5	4	10	40	50	79.5

(01/2) $\Sigma f = 50$ (01/2) $\Sigma fd = -340$ (01/2) (01/2) (01/2)

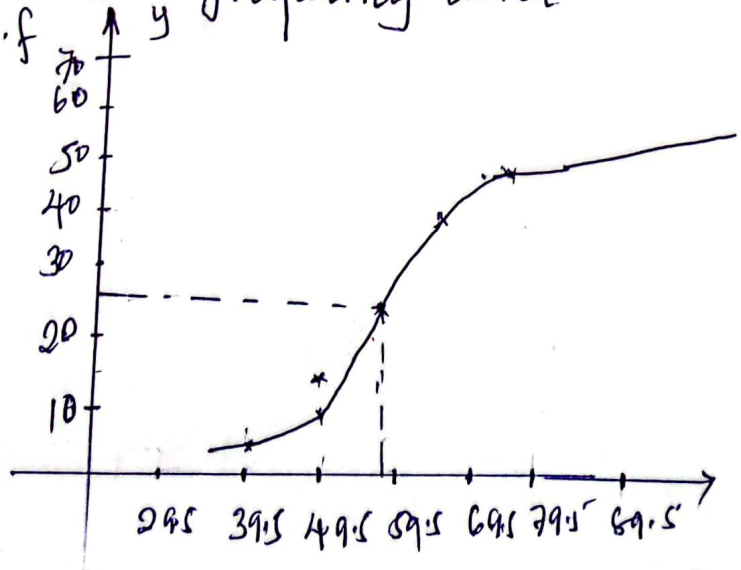
$$\bar{x} = A + \frac{\Sigma fd}{\Sigma f}$$

$$\bar{x} = 64.5 + \frac{-340}{50}$$

$$\bar{x} = 64.5 - 6.8$$

$\therefore$ Mean $(\bar{x}) = 57.7$ (01)

(ii) Commulative frequency curve

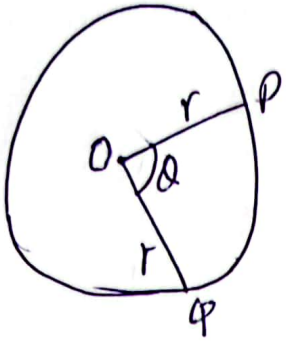


Median = 59.

Central or middle marks is 59.

11. b)i) Central angle

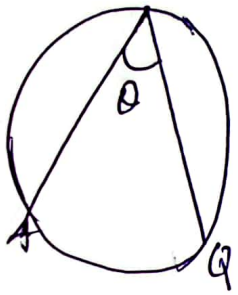
Is an angle formed by two radii at the centre of the circle.



$P\hat{O}Q$ – central angle

01/2

(ii) Inscribed angle: Is an angle formed by two chords at the circumference of the circle.



01/2

11 c) Soln:

$AB^2 = AC^2 + BD^2$ 01/2

$b^2 = 15^2 + 9^2$

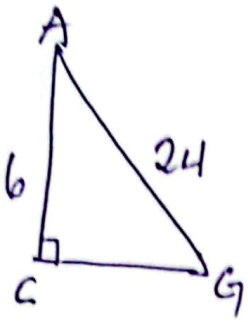
$b^2 = 225 + 81$ 01/2

$\sqrt{b^2} = \sqrt{306}$

$b = 3\sqrt{34}$ or 17.49 01

12a) Soln:

From ΔABC & ACG



—— (01/2)

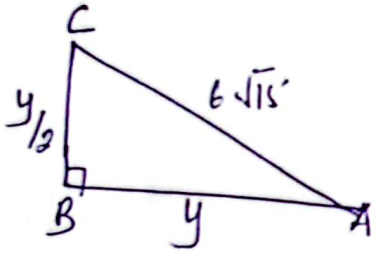
$AC^2 + 6^2 = 24^2$ —— (01/2)

$AC^2 = 24^2 - 6^2$

$AC^2 = 540$

$AC = 6\sqrt{15}$ or 23.24 cm —— (01/2)

Also from ΔABC



$y^2 + (y/2)^2 = (6\sqrt{15})^2$

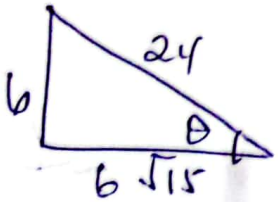
$540 = y^2 + y^2/4$

$5y^2 = 2160$

$y = 12\sqrt{3}$

$AB = 10\sqrt{3}$ cm.

(ii) from AGC



$\sin\theta = \text{Opp}/\text{Hyp}$

$\sin\theta = 1/4$

$\theta = \sin^{-1}(0.25)$

$\theta = 14°28'$

$\therefore \theta = 14°28'$

12 (b)

$d = 60' \times \theta$ ——— (01)

$\theta = 60(7^\circ - 5^\circ)$ ——— (1/2)

$\theta = 2^\circ$

$d = 60 \times 2 = 120\,nm$ ——— (01)

$S = d/t$

$t = d/S$ ——— (1/2)

$t = \frac{120}{12}$ ——— (01)

$t = 10\,hrs$, 12:00noon + 10hrs → 10:00pm or 22:00hrs

It will arrive at 10:00pm or 22:00hrs. ——— (01)

Alternatively

A(5°S, 39°E)

B(7°S, 39°E)

from $D = \frac{\pi R \theta}{180}$ ——— (01/2)

$D = \frac{22}{7} \times 6370 \times \frac{2}{180} = 222.4\,km$ ——— (01)

$t = 12.00noon + 10hrs$

1nm = 1.852km

? = 222.4km

∴ It will arrive at 10:00pm or 22hrs. ——— (01)

$= 120.09\,nm \approx 120\,nm$ ——— (01)

(01/2) ——— $t = d/S = \frac{120\,nm}{12} = 10hrs$ ——— (01)

Soln:

13 (a) (i)

$$2\begin{pmatrix} 2 & -2 \\ 5 & 6 \end{pmatrix} - \frac{1}{2}\begin{pmatrix} 8 & 4 \\ -12 & 6 \end{pmatrix} \text{ ——— } 00\tfrac{1}{2}$$

$$\begin{pmatrix} 4 & -4 \\ 10 & 12 \end{pmatrix} - \begin{pmatrix} 4 & 2 \\ -6 & 3 \end{pmatrix} \text{ ——— } 00\tfrac{1}{2}$$

$$2P + \frac{Q}{2} = \begin{pmatrix} 0 & -6 \\ 16 & 9 \end{pmatrix} \text{ ——— } 01$$

(ii) $2x + y = 7$

$4x + 3y = 17$

$$\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 7 \\ 17 \end{pmatrix} \text{ — } 00\tfrac{1}{2}$$

let $A = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$

$$A^{-1} = \frac{1}{6-4}\begin{pmatrix} 3 & -1 \\ -4 & 2 \end{pmatrix} \text{ — } 00\tfrac{1}{2}$$

$$A^{-1} = \begin{pmatrix} \frac{3}{2} & -\frac{1}{2} \\ -\frac{4}{2} & 1 \end{pmatrix} \text{ ——}$$

$$A^{-1} = \begin{pmatrix} \frac{3}{2} & -\frac{1}{2} \\ -2 & 1 \end{pmatrix} \text{ — } 01$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 & -1 \\ -2 & 1 \end{pmatrix}\begin{pmatrix} 7 \\ 17 \end{pmatrix} \quad x = 2 \; (01/2) \quad y = 3 \; (01/2)$$

13 :b) $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$

$P = (1,1)$

$P' = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} 1 \\ 1 \end{pmatrix}$

$P' = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$ ——— 1/2

$Q' = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} 4 \\ 1 \end{pmatrix}$

$= \begin{pmatrix} -4 \\ 1 \end{pmatrix}$ ——— 1/2

$R' = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ 5/4

$= \begin{pmatrix} -5 \\ 4 \end{pmatrix}$

$\therefore P' = (-1,1)$, $Q' = (-4,1)$ and $R'' = (-5,4)$

Also

$P'' = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}\begin{pmatrix} -1 \\ 1 \end{pmatrix}$

$P'' = (-1,-1)$ ——— 1/2

$$Q'' = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} -4 \\ 1 \end{pmatrix}$$

$$Q'' = \begin{pmatrix} -4 \\ -1 \end{pmatrix}$$

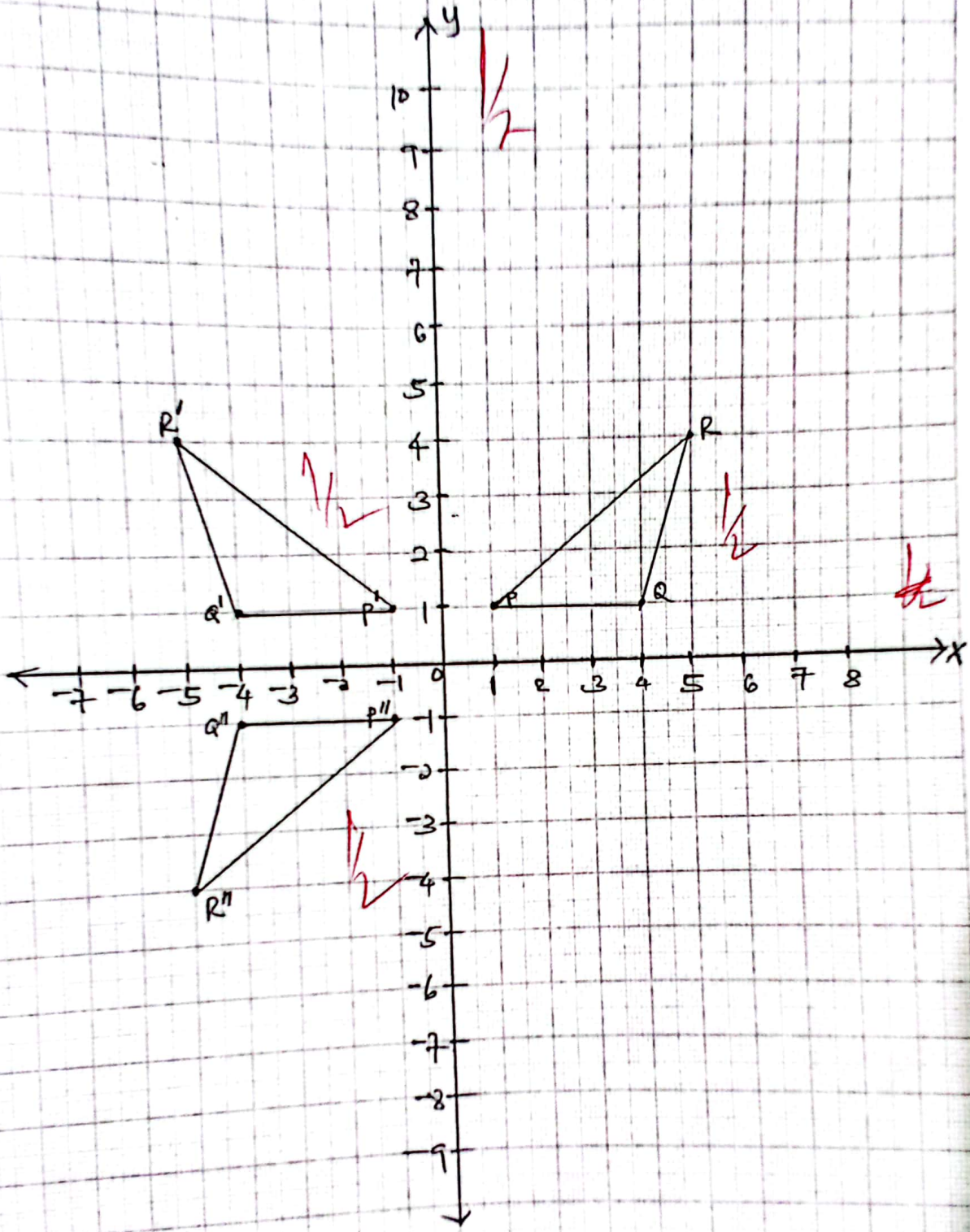
$$R'' = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} -5 \\ 4 \end{pmatrix}$$

$$R'' = (-5, -4)$$

$\therefore P'' = (-1, -1)$, $Q'' = (-4, -1)$, and $R'' = (-5, -4)$

CamScanner

13 (b)



½ ½ ½ ½ ½

(4)

Soln

Let Radio be x, TV be y

Constraints

$x \geq 0$, $y \geq 0$.

$1.8x + 1.5y \leq 18$ 01

$300000x + 500000y \leq 6000000$

Objective function

$f(x,y) = 40000x + 30000y$

T.V $\Rightarrow 1.8x + 1.5y = 18$

x	0	10
y	12	0

01/2

Radio

$300000x + 500000y = 6000000$

x	0	20
y	12	0

01/2

Corner points

Corner point (x,y)	objective function $f(x,y) = 40000x + 30000y$	Total
O(0,0)	40000(0) + 30000(0)	Rs 0.
A(0,12)	40000(0) + 30000(12)	Rs 360000
B(10,0)	40000(10) + 30000(0)	400000

01

He should sell 10 radio and 0 TV for Maximum profit of 400000. 01