SECTIONI (50MARKS)

ANSWER ALL QUESTIONS IN THIS SECTION

1. Evaluate using logarithms. [4 Marks]

$$\frac{\sqrt[3]{0.04689}}{51.64 \times 0.793}$$

No	S.f	log.
$(0.04689)^{1/3}$	$(4.689\times10^{-2})^{1/3}$	$\bar{2}.6711 \times \frac{1}{3}$ $= \bar{1}.5570$
51.64	5.164×10^{1}	1.7130
0.793	7.93×10^{-1}	$\bar{1}.8993$ +
		1.6123 −
0.008804	8.804×10^{-3}	$\bar{3}.9447$

$= 0.008804.$

WORKING

$\frac{\bar{2} + 0.6711}{3}$

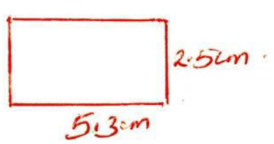
$= \frac{\bar{3}}{3} + \frac{1.6711}{3}$

$= \bar{1}.5570$

All Logarithms correct ⇒ 1 mk.
Attempt to divide ⇒ 1 mk
Correct addition & subtraction ⇒ 1 mk.
Correct answer ⇒ 1 mk.

2. A rectangular card measures 5.3cm by 2. 5cm.Find

a) The absolute Error in the area of the card. [2Marks]



Minimum	Actual	Maximum
5.25	5.3	5.35
2.45	2.5	2.55

Max. Area $= 5.35 \times 2.55$
$= 13.6425 \text{ cm}^2$ ✓ M_1

Min. Area $= 5.25 \times 2.45$
$= 12.8625 \text{ cm}^2$ ✓

Absolute Error $= \frac{\text{Max} - \text{Min}}{2}$ $= \cancel{12.8625}$

$= \frac{13.6425 - 12.8625}{2} = 0.78$ ✓ A_1

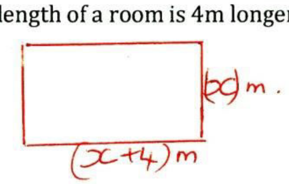
b) The Percentage Error in the Area of the card [2Marks]

$\%$ Error $= \frac{\text{Absolute Error}}{\text{Actual area}} \times 100$

$= \frac{0.78}{5.3 \times 2.5} \times 100\ \%$ ✓ M_1

$= 5.8868\ \%$ ✓ A_1

3. The length of a room is 4m longer than its width. Find the length of the room if its area is 32m².[3 Marks]



$x(x+4) = 32$

$x^2 + 4x - 32 = 0$ ✓ M_1

$x^2 + 8x - 4x - 32 = 0$

$x(x+8) - 4(x+8) = 0$ ✓ M_1

$(x-4)(x+8) = 0$

$x = 4$ or -8

length $= 8$ m. ✓ A_1

4. If 20 Men can lay 36m of a pipe in 8 hours. How long would 25 Men take to lay the next 54m of the pipe? [2 Marks]

Men	Length	hours
20	36	8
25	54	?

✓ m_1

$= \frac{25}{20} \times \frac{54}{36} \times 8 = 15.$ hours ✓ A_1

5. Expand $(2 + x)^5$ in ascending powers of x up to the term in x^3. Hence, approximate the value of $(2.03)^5$ to 4s.f. (4marks)

$(2+x)^5 \Rightarrow$

Co-efficients	1	5	10	10	5	1
Expansion	2^5x^0	2^4x^1	2^3x^2	2^2x^3	2^1x^4	2^0x^5
Combined	32	$80x$	$80x^2$	$40x^3$	$10x^4$	x^5

✓ m_1

$= 32 + 80x + 80x^2 + 40x^3$ ✓ B_1

$(2+x)^5 = 2.03^5$

$2 + x = 2.03$

$x = 2.03 - 2$

$= 0.03$ ✓ m_1

$\therefore 2.03^5 = 32 + 80(0.03) + 80(0.03)^2 + 40(0.03)^3$

$= 32 + 2.4 + 0.072 + 0.00108$

$= 34.47308 \approx 34.47$ ✓ A_1

6. Simplify by rationalizing the denominator; [2 Marks]

$$\frac{3}{2\sqrt{3} - \sqrt{2}}$$

$= \frac{3}{2\sqrt{3} - \sqrt{2}}\left(\frac{2\sqrt{3}+\sqrt{2}}{2\sqrt{3}+\sqrt{2}}\right)$ ✓ m_1

$= \frac{6\sqrt{3} + 3\sqrt{2}}{(2\sqrt{3})^2 - (\sqrt{2})^2}$

$= \frac{6\sqrt{3} + 3\sqrt{2}}{10}$

$= \frac{3}{5}\sqrt{3} + \frac{3}{10}\sqrt{2}$. ✓ A_1

7. A scientific calculator is marked at sh. 1560. Under hire purchase it is available for a downpayment of sh. 200 and six monthly instalments of sh. 250 each. Calculate;

a. The Hire purchase price. [2 Marks]

$= 200 + (250 \times 6)$ ✓ m_1

$=$ Sh. 1700 ✓ A_1

b. The extra amount paid out over the cash price. [1 Mark]

$= 1700 - 1560$

$=$ Sh. 140 ✓ A_1

8. Solve the equation; [3 Marks]

$$\log(2x-10) - 2log8 = 2 + \log(9-2x)$$

$\log\left(\frac{2x-10}{64}\right) = \log(100 \times (9-2x))$ ✓ m_1

$\frac{2x-10}{64} = \frac{900-200x}{1}$ ✓ m_1

$2x-10 = 57600 - 12800x$

$12802x = 57610$

$x = \frac{57610}{12802}$

$= 4.5001$

$\approx 4.5.$

9. The Equation of a circle is given by $x^2 + y^2 - 6x + 4y - 3 = 0$ .Determine the center and the radius of the circle. [3 Marks]

$(x^2 - 6x + \_\_\_) + (y^2 + 4y + \_\_\_) = 3 + \_\_\_ + \_\_\_$

$x^2 - 6x + \left(\frac{6}{2}\right)^2 + y^2 + 4y + \left(\frac{4}{2}\right)^2 = 3 + \left(\frac{6}{2}\right)^2 + \left(\frac{4}{2}\right)^2$ ✓ m_1

$(x-3)^2 + (y+2) = 16$ ✓ m_1

$=$ Centre$(3, -2)$

Radius $= \sqrt{16}$ ✓ A_1

$= 4$ units ✓

10. Make x the subject of the formula in the equation. (3mrks)

$$y = \frac{bx}{\sqrt{ax^2+b}}$$

$y\sqrt{ax^2+b} = bx$

$y^2(ax^2+b) = b^2x^2$ ✓ m_1

$y^2ax^2 + by^2 = b^2x^2$

$by^2 = b^2x^2 - ay^2x^2$

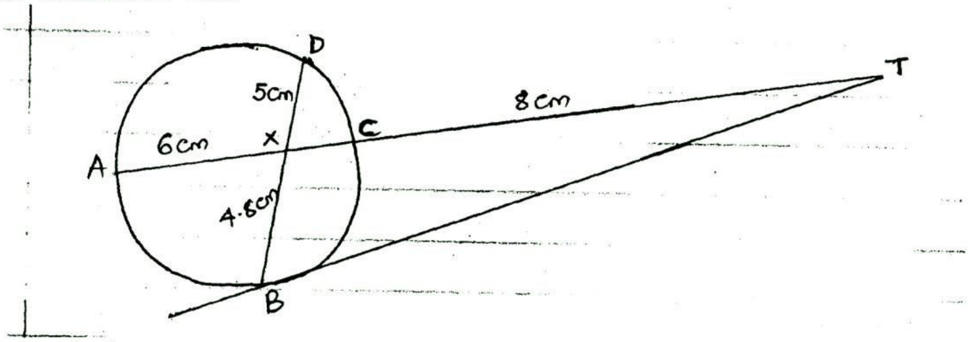
i.e $b^2x^2 - ay^2x^2 = by^2$

$x^2(b^2 - ay^2) = by^2$ ✓ B_1

$x^2 = \frac{by^2}{b^2-ay^2}$

$x = \pm\sqrt{\frac{by^2}{b^2-ay^2}}$ ✓ A_1

11. In the figure below, BT is a tangent to the circle to the circle at B. AXCT and BXD are straight lines. AX=6cm CT=8cm, BX=4.8cm and XD=5cm.



Find the length of;

a. XC [2 Marks]

$6(XC) = 4.8 \times 5$ ✓ M_1

$XC = \frac{4.8 \times 5}{6}$

$= 4$ cm. ✓ A_1

b. BT [2 Marks]

$BT^2 = AT \cdot CT$

$= 18 \times 8$ ✓ M_1

$BT = \sqrt{144}$

$= \cancel{5.099cm} = 12$ cm.

12. Find the value of x if the matrix $\begin{pmatrix} x & 1 \\ 4 & x-3 \end{pmatrix}$ is a singular matrix. [3 Marks]

For singular Matrix det = 0

$\therefore \{x(x-3)\} - (4 \times 1) = 0$ ✓ M_1

$x^2 - 3x - 4 = 0$

$x^2 + x - 4x - 4 = 0$ ✓ M_1

$x(x+1) - 4(x+1) = 0$

$(x-4)(x+1) = 0$

$\Rightarrow x = -1$ or 4 ✓ A_1

13. The first term of an arithmetic sequence is -7 and the common difference is 4.

a. List the first 6 terms of the sequence [2 Marks]

1st term = −7

2nd term = −7+4 = −3 ✓

3rd term = −3+4 = 1 ✓

4th term = 1+4 = 5

5th term = 5+4 = 9 ✓

6th term = 9+4 = 13. ✓ M_2.

b. Determine the sum of the first 30 terms of the sequence [2 Marks]

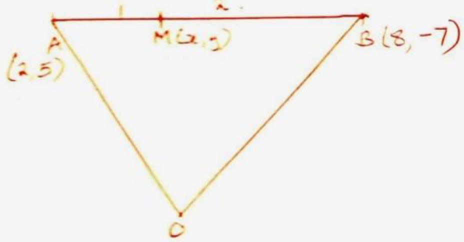
$S_{30} = \frac{30}{2}\{2(-7) + (30-1)4\}$ ✓ M_1

$= 15\{-14 + 116\}$

$= 1530$ ✓ A_1

14. The coordinates of points A and B are (2,5) and (8, -7) respectively. Find the

a) Coordinates of M Which Divides AB in the Ratio 1:2 [2 Marks]



$\vec{AB} = \begin{pmatrix}8\\-7\end{pmatrix} - \begin{pmatrix}2\\5\end{pmatrix} = \begin{pmatrix}6\\-12\end{pmatrix}$

$\vec{AM} = \frac{1}{3}\begin{pmatrix}6\\-12\end{pmatrix} = \frac{1}{3}\begin{pmatrix}6\\-12\end{pmatrix} = \begin{pmatrix}2\\-4\end{pmatrix}$

$\begin{pmatrix}x\\y\end{pmatrix} - \begin{pmatrix}2\\5\end{pmatrix} = \begin{pmatrix}2\\-4\end{pmatrix}$ Any method ✓ M_1

$\therefore \begin{pmatrix}x\\y\end{pmatrix} = \begin{pmatrix}2\\-4\end{pmatrix} + \begin{pmatrix}2\\5\end{pmatrix}$

$= \begin{pmatrix}4\\1\end{pmatrix}$

$= M(4, 1)$ ✓ A_1

15. Tap A Fills a tank in 6 hours, tap B fills it in 8 hours and tap C empties it in 10 hours. Starting with an empty tank and all the three taps are opened at the same time, how long will it take to fill the tank. [3 Marks]

Tap A ⇒ 6 hours

In 1 hr = $\frac{1}{6}$ of the tank.

Tap B ⇒ 8 hours

In 1 hrs = $\frac{1}{8}$ of the tank.

In 1 hr both = $\frac{1}{6} + \frac{1}{8} = \frac{4+3}{24} = \frac{7}{24}$ ✓ M_1

Tap C ⇒ 10 hours to empty.

In 1 hr = $\frac{1}{10}$

All three in 1 hour = $\frac{7}{24} - \frac{1}{10} = \frac{35-12}{120} = \frac{23}{120}$ ✓ M_1

$\frac{23}{120}$ ⇒ 1 hr

1 ⇒ ?

$= 1 \times 1 \times \frac{120}{23}$

$= 5.22$ hours

$= 5$ hrs 13 min. ✓ A_1

16. Grade X of Tobacco Costs Sh.81.50 per Kg and grade Y cost sh 109 per Kilogram. In what ratio must the two grades be mixed in order to make a profit of 20% when the mixture sells at sh. 112.80 per kg.[3 Marks]

	Grade X	Grade Y.	Mixture
B.P	sh. 81.50	Sh. 109	
Ratio	x	: y	
Total	$81.50x$	$109y$	$81.50x + 109y$.

$\frac{\frac{120}{100}(81.50x + 109y)}{x+y} = 112.80$ ✓ M_1

$97.8x + 130.8y = 112.80x + 112.80y$

$97.8x - 112.80x = 112.80y - 130.8y$ ✓ M_1

$-15x = -18y$ ✓ A_1

$\frac{x}{y} = \frac{18}{15} \Rightarrow x:y = 6:5$

or

120% ⇒ 112.80

100% ⇒ ?

$= \frac{100 \times 112.80}{120}$

$= 94$

81.50 109

94 ✓ M_1

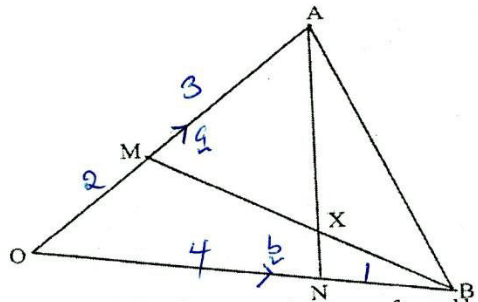
15 12.5

Ratio $x:y = 15 : 12.5$

$= 6 : 5$. ✓ A_1

SECTION II: ANSWER ANY 5 QUESTIONS IN THIS SECTION(50MARKS)

17. The figure below shows triangle OAB in which M divides OA in the ratio 2: 3 and N divides OB .in the ratio 4:1 AN and BM intersect at X.



(a) Given that OA = **a** and OB = **b**, express in terms of a and b:

(i) **AN**

$\vec{AN} = \vec{AO} + \vec{ON}$

$= -a + \frac{4}{5}b$.

or $\frac{4}{5}b - a$. ✓✓

(2mks)

(ii) **BM**

$\vec{BM} = \vec{BO} + \vec{OM}$

$= -b + \frac{2}{5}a$.

or $\frac{2}{5}a - b$ ✓✓

(2mks)

(b)If **AX** = s **AN** and **BX** = t**BM**, where s and t are constants, write two expressions for **OX** in terms of.**a, b,** s and t. Find the value of s and t. Hence write **OX** in terms of **a** and **b**

(6mks)

$\vec{OX} = \vec{OA} + \vec{AX}$

$= a + s\vec{AN}$

$= a + s\left(\frac{4}{5}b - a\right)$

$= a - sa + \frac{4}{5}sb$.

$= a(1-s) + \frac{4}{5}sb$.

Also:

$\vec{OX} = \vec{OB} + \vec{BX}$

$= b + t\vec{BM}$

$= b + t\left(\frac{2}{5}a - b\right)$

$= b - tb + \frac{2}{5}ta$.

$= b(1-t) + \frac{2}{5}ta$.

$a(1-s) + \frac{4}{5}sb = b(1-t) + \frac{2}{5}ta$.

$1 - s = \frac{2}{5}t \quad t = \frac{5}{2} - \frac{5}{2}s \text{ ---(i)}$

$\frac{4}{5}s = 1 - t \text{ --- (ii)}$

$\frac{4}{5}s = 1 - \left(\frac{5}{2} - \frac{5}{2}s\right)$

$\frac{10}{17} \times \frac{17}{10}s = \frac{3}{2} \times \frac{10}{17}$

$s = \frac{15}{17}$ ✓✓ $\quad t = \frac{5}{2} - \left(\frac{5}{2} \times \frac{15}{17}\right)$

$t = \frac{5}{17}$ ✓✓

$\therefore \vec{OX} = b\left(1 - \frac{5}{17}\right) + \left(\frac{2}{5} \times \frac{5}{17}\right)a$

$= \frac{12}{17}b + \frac{2}{17}a$ ✓✓

18. Kamau, Njoroge and Kariuki are practicing archery. The probability for Kamau hitting the target is $\frac{2}{5}$, that of Njoroge hitting the target is $\frac{1}{4}$ and that of Kariuki hitting the target is $\frac{3}{7}$.

Find the probability that in one attempt;

a) Only one hits the target (2mks)

$$\left(\frac{2}{5} \times \frac{3}{4} \times \frac{4}{7}\right) + \left(\frac{3}{5} \times \frac{1}{4} \times \frac{4}{7}\right) + \left(\frac{3}{5} \times \frac{3}{4} \times \frac{3}{7}\right)$$

$$= \frac{6}{35} + \frac{3}{35} + \frac{27}{140}$$

$$= \frac{9}{20}. \checkmark\checkmark$$

b) All three hit the target (2mks)

$$P(\text{H H H}) = \frac{2}{5} \times \frac{1}{4} \times \frac{3}{7}$$

$$= \frac{3}{70} \checkmark\checkmark$$

c) None of them hits the target (2mks)

$$P(\text{H}'\text{H}'\text{H}') = \frac{3}{5} \times \frac{3}{4} \times \frac{4}{7}$$

$$= \frac{9}{35} \checkmark\checkmark$$

d) Two hit the target (2mks)

$$\left(\frac{2}{5} \times \frac{1}{4} \times \frac{4}{7}\right) + \left(\frac{2}{5} \times \frac{3}{4} \times \frac{3}{7}\right) + \left(\frac{3}{5} \times \frac{1}{4} \times \frac{3}{7}\right)$$

$$= \frac{2}{35} + \frac{9}{70} + \frac{9}{140} \quad = \frac{1}{4} \checkmark\checkmark$$

e) At least one hits the target (2mks)

$$P(1 \text{ or } 2 \text{ or } 3) = 1 - \left(P(\text{None Hits})\right)$$

$$= 1 - \frac{9}{35}$$

$$= \frac{26}{35} \checkmark\checkmark$$

19. A matrix T is given by T=$\begin{pmatrix} 4 & 5 \\ 6 & 4 \end{pmatrix}$. Find T^{-1} [2 Marks]

$\det = (4 \times 4) - (6 \times 5)$
$= 16 - 30$
$= -14.$

$T^{-1} = \frac{-1}{14}\begin{pmatrix} 4 & -5 \\ -6 & 4 \end{pmatrix}$

$= \begin{pmatrix} -2/7 & 5/14 \\ 3/7 & -2/7 \end{pmatrix}$

b) Wanjiku bought 20 bags of maize and 25 bags of beans at a total cost of sh. 77,000. If she had bought 30 bags of maize and 20 bags of beans, she would have spent sh. 7,000 more.

i. Form a matrix equation from this information. [1 Mark]

$\cancel{20}^{4}m + \cancel{25}^{5}b = \cancel{77000}^{15,400}$
$\cancel{30}_{6}m + \cancel{20}_{4}b = \cancel{84000}_{16,800}$

$\begin{pmatrix} 4 & 5 \\ 6 & 4 \end{pmatrix}\begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 15400 \\ 16,800 \end{pmatrix}$

ii. Determine the cost of a bag of maize and a bag of beans. [3 Marks]

$\begin{pmatrix} -2/7 & 5/14 \\ 3/7 & -2/7 \end{pmatrix}\begin{pmatrix} 4 & 5 \\ 6 & 4 \end{pmatrix}\begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} -2/7 & 5/14 \\ 3/7 & -2/7 \end{pmatrix}\begin{pmatrix} 15,400 \\ 16,800 \end{pmatrix}$

$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} 1600 \\ 1800 \end{pmatrix}$

A bag of maize = shs 1600
A bag of Beans = shs. 1800.

c) She sold all the maize and beans at a profit of 10% on a bag of maize and 12 ½ % on a bag of beans. Calculate the total percentage profit. [4 Marks]

Maize
$S.P = \frac{1600 \times 110}{100}$
$= sh. 1760$

Beans
$S.P = \frac{1800 \times 112.5}{100}$
$= sh. 2025.$

$B.P = sh. 77,000$
$S.P = (20 \times 1760) + (25 \times 2025)$
$= sh. 85,825.$

$Profit = sh. 85,825 - 77,000$
$= sh. 8,825$

$\% \text{ profit} = \frac{8,825}{77,000} \times 100\%$
$= 0.115 \times 100\%$
$= 11.5\%.$

20. At the beginning of the year 2000, Kanyora bought two houses, one in Thika and the other in Nakuru each at 1,240,000. The value of the house in Thika appreciated at a rate of 12% p.a.

a. Calculate the value of the house in Thika after 9 years to the nearest shilling. [2 Marks]

$$A = P\left(1 + \frac{r}{100}\right)^n$$

$$= 1{,}240{,}000\left(1 + \frac{12}{100}\right)^9$$

$$= 1{,}240{,}000 \times 2.773$$

$$= \text{Sh. } 3{,}438{,}618$$

b. After n years, the value of the house in Thika was 2,741,245 while the value of the house in Nakuru was 2,917,231.

i. Find n [4 Marks]

$$A = P\left(1 + \frac{r}{100}\right)^n$$

$$2{,}741{,}245 = 1{,}240{,}000\left(1 + \frac{12}{100}\right)^n$$

$$\frac{2741245}{1240000} = \frac{1240000}{1240000}\left(1 + \frac{12}{100}\right)^n$$

$$2.211 = (1.12)^n$$

$$\log 2.211 = \log 1.12^n$$

$$\frac{\log 2.211}{\log 1.12} = n\frac{\log 1.12}{\log 1.12}$$

$$\frac{0.3445}{0.0492} = n$$

$$n = 7 \text{ years}$$

ii. Find the annual rate of appreciation of the house in Nakuru. [4 Marks]

$$2{,}917{,}231 = 1{,}240{,}000\left(1 + \frac{r}{100}\right)^7$$

$$\frac{2{,}917{,}231}{1{,}240{,}000} = \frac{1{,}240{,}000}{1240000}\left(1 + \frac{r}{100}\right)^7$$

$$2.3526 = \left(1 + \frac{r}{100}\right)^7$$

$$\sqrt[7]{2.3526} = 1 + \frac{r}{100}$$

$$1.13 - 1 = \frac{r}{100}$$

$$100 \times 0.13 = \frac{r}{100} \times 100 \qquad r = 13\% \text{ p.a.}$$

21. The table below shows income tax rates.

Taxable Income In K£ Per Month	Rate in shs. per k£
1 -325	2
326 – 650	3
651 - 975	4
976 - 1300	5
1301 - 1625	6
Over 1626	7

Mr. Wafula earns a basic salary of 30,500. He has a house allowance of sh. 6,000 per month, medical allowance of sh. 4,000 per month and transport allowance of sh. 3,000 per month. He claims a tax relief of sh. 1,056 per month.

a. Calculate

i. Wafula's taxable income in k£ per month. [2 Marks]

$T.I = B.S + T.A$

$= \frac{30{,}500 + 6000 + 4000 + 3000}{20}$

$= K£\ 2175$

ii. Gross tax. [3 Marks]

$325 \times 2 = sh.\ 650$

$325 \times 3 = sh.\ 975$

$325 \times 4 = sh.\ 1300$

$325 \times 5 = sh.\ 1625$

$325 \times 6 = sh.\ 1950$

$550 \times 7 = sh.\ 3850$

Gross Tax = Ksh. 10,350.

iii. Net Tax [2 Marks]

= Gross tax − Relief.

$= 10{,}350 - 1056$

= Ksh. 9294

b. His net income per month has the following deductions

Health insurance fund – sh. 150

Loan interest – sh. 200

Service charge – sh. 200

Sacco loan – sh. 2,500

Calculate his net income per month. [3 Marks]

Total Deductions $= 9294 + 150 + (200 \times 2) + 2500$

= Shs 12,344

Net Income: = Sh. 43500 − 12,344

= Shs. 31,156.

22.

a) P varies jointly as Q and the square of R. P = 18 when Q = 9 and R = 15. Find R when P=32 and Q=81. [5 Marks]

$P \propto QR^2$

$P = KQR^2$

$18 = K \times 9 \times (15)^2$

$18 = 225 \times 9 \times K$

$\frac{18}{2025} = \frac{\cancel{2025} K}{\cancel{2025}}$

$K = \frac{2}{225}$

$\therefore P = \frac{2}{225} QR^2$.

$\therefore 32 = \frac{2}{225} \times 81 \times R^2$.

$\frac{225 \times 32}{162} = \frac{\cancel{162}}{\cancel{225}} R^2 \times \frac{\cancel{225}}{\cancel{162}}$

$44\frac{4}{9} = R^2$

$R = \sqrt{44\frac{4}{9}}$

$= 6\frac{2}{3}$.

b) A varies Directly as B and inversely as the square root of C. Find the percentage change in A When B is decreased by 10% and C increased by 21%. [5 Marks]

$B = 100\%$

$?? = 90\%$ $= \frac{90 \times B}{100} = 0.9B$

$C = 100\%$

$?? = 121\%$ $= \frac{121 \times C}{100} = 1.21C$.

$A \propto \frac{B}{\sqrt{C}}$

$\therefore A = K\frac{B}{\sqrt{C}}$

$A = \frac{K \times 0.9B}{\sqrt{1.21C}}$.

$A = \frac{0.9KB}{1.1\sqrt{C}}$.

$= 0.818 \frac{KB}{\sqrt{C}}$

$\Delta \text{ in } A: 0.818 K\frac{B}{\sqrt{C}} - K\frac{B}{\sqrt{C}}$.

$= K\frac{B}{\sqrt{C}}(0.818 - 1)$

$\% \Delta \text{ in } A = \frac{K\cancel{\frac{B}{\sqrt{C}}}(0.818-1)}{K\cancel{\frac{B}{\sqrt{C}}}} \times 100\%$

$= -0.1818 \times 100\%$

A decreases by 18.18%.

23.

a) The first term of an arithmetic progression is 2. The sum of the first 8 terms of the AP is 240.

i. Find the common difference of the AP. [2 Marks]

$a = 2.$

$S_8 = \frac{n}{2}\left(2a + (n-1)d\right)$

$\therefore 240 = \frac{8}{2}\left((2\times 2) + (8-1)d\right)$

$240 = 4(4 + 7d)$

$240 = 16 + 28d$

$\frac{28d}{28} = \frac{224}{28}$ $d = 8$

ii. Given that the sum of the first n terms of the AP is 1,560. Find n [2 Marks]

$2 \times 1560 = \frac{n}{2}\left((2\times 2) + (n-1)8\right) \times 2$

$3120 = n(4 + 8n - 8)$

$\frac{3124}{8} = \frac{8n}{8}$ $2n^2 - n - 780 = 0.$

$n = \frac{-(-1) \pm \sqrt{1 + (4\times 2\times 780}}{4}$

$= \frac{80}{2}$ $n = 40$ terms;

b) The 3rd, 5th and 8th terms of another AP from the first three terms of a G.P. If the common difference of the AP is 3. Find.

i. The first term of G. P [4 Marks]

$a+2d,\ a+4d,\ a+7d$ .... G.P.

$\frac{a+4d}{a+2d} = \frac{a+7d}{a+4d}$

$a^2 + 8ad + 16d^2 = a^2 + 9ad + 14d^2$

$16d^2 - 14d^2 = 9ad - 8ad$

$\frac{2d^2}{d} = \frac{ad}{d}$

$a = 2d$

but $d = 3$

$\therefore a = 6.$

first term (A.P).

G.P formed:

$6+6,\ 6+12,\ 6+21$

$12,\ 18,\ 27$ ....

First term G.P $= 12$

ii. The sum of the first 9 terms of the G.P to 4 s.f. [2 Marks]

$C.R = \frac{18}{12} = \frac{3}{2}$

$S_n = \frac{a(r^n - 1)}{r-1}$

$S_9 = \frac{12(1.5^9 - 1)}{1.5 - 1}$

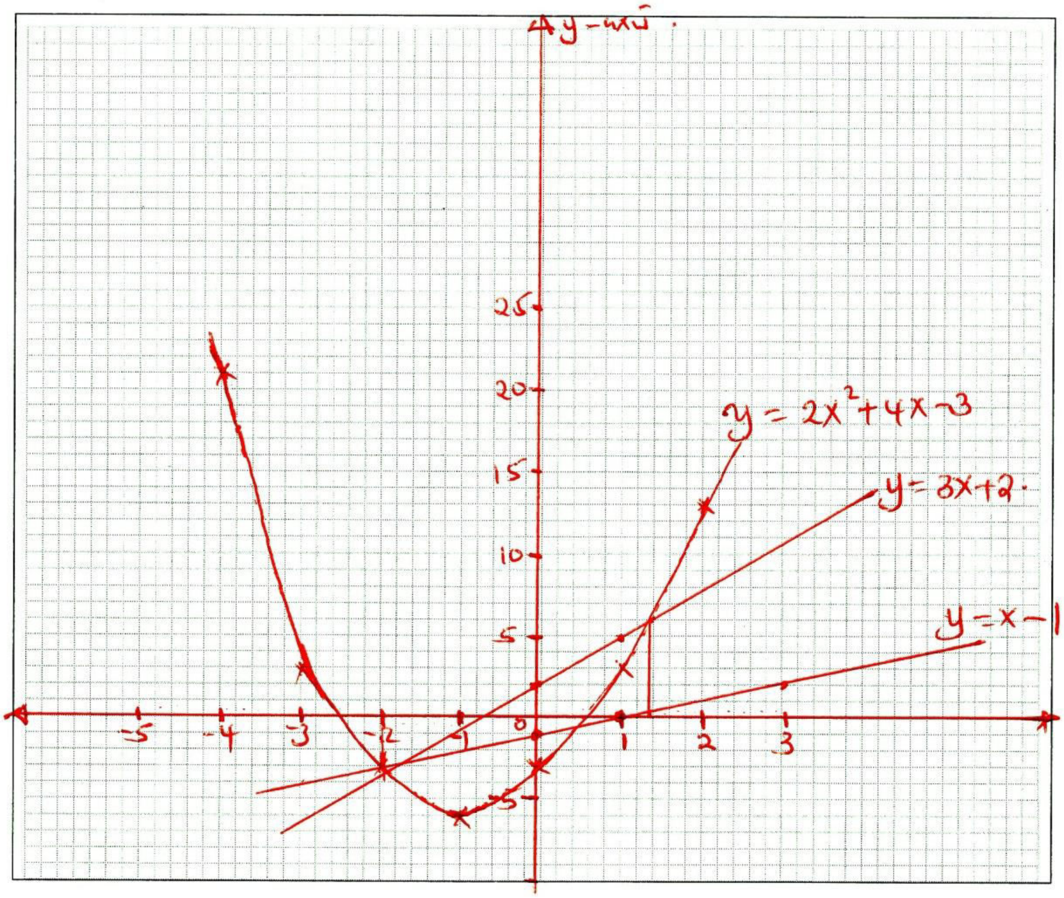
$= 898.6$

24.

a) Complete the table below for the function $Y=2x^2+4x-3$ [2 Marks]

x	-4	-3	-2	-1	0	1	2
$2x^2$	32	18	8	1	0	2	8
$4x$	-8	-12	-8	-4	0	4	8
-3	-3	-3	-3	-3	-3	-3	-3
y	21	3	-3	-6	-3	3	13

b) On the grid provided, draw the graph of the function $y = 2x^2 + 4x - 3$for $-4 \le x \le 2$[3 Marks]



c) Use your graph to solve the roots of the quadratic equations.

i) $2x^2 + x - 5 = 0$ [2 Marks]

$$\begin{aligned} & y = 2x^2+4x-3 \\ - & 0 = 2x^2+x-5 \\ \hline & y = 3x+2. \end{aligned}$$

x	0	1
y	2	5

$x = -2$ or 1.4 ± 0.1

ii) $2x^2 + 3x - 2 = 0$ [2 Marks]

$$\begin{aligned} & y = 2x^2+4x-3 \\ - & 0 = 2x^2+3x-2 \\ \hline & y = x-1 \end{aligned}$$

x	0	3
y	-1	2

$x = 0.4$ or -2 ± 0.1