

SECTION 1 (50 MARKS)

Answer all questions in this section.

1. Solve for x in the equation $-x^2 + x + 18 = 0$ using completing the square method. (3 marks)

$$x^2 - x = 18$$

$$x^2 - x + \left(-\frac{1}{2}\right)^2 = 18 + \left(-\frac{1}{2}\right)^2 \quad \checkmark \quad m1$$

$$\left(x - \frac{1}{2}\right)^2 = 18\frac{1}{4}$$

$$x = \frac{1}{2} \pm 18\frac{1}{4} \quad \checkmark \quad m1$$

$$x = 4.772 \text{ or } -3.772 \quad \checkmark \quad \frac{A1}{03}$$

2. The length and breadth of a rectangular floor garden were measured and found to be 3.1m and 1.2m respectively. Find the percentage error in its area. (3marks)

$$\text{Actual Area} = 3.1 \times 1.2 = 3.72 \quad \checkmark \quad m1$$

$$\text{max. area} = 3.15 \times 1.25 = 3.9375$$

$$\text{A. Error} = 3.9375 - 3.72 = 0.2175 \quad \checkmark$$

$$\% \text{ error} = \frac{0.2175}{3.72} \times 100 \quad \checkmark \quad m1$$

$$= 5.85\% \quad \checkmark \quad \frac{A1}{03}$$

3. Solve for x in the equation $3(\log x)^2 - \log x^5 - 2 = 0$ (3marks)

$$3(\log x)^2 - 5\log x - 2 = 0$$

$$3(\log x)^2 - 6\log x + \log x - 2 = 0 \quad \checkmark \quad m1$$

$$3\log x(\log x - 2) + 1(\log x - 2) = 0 \quad m1$$

$$(3\log x + 1)(\log x - 2) = 0 \quad \checkmark \quad m1$$

$$3\log x = -1 \text{ or } \log x = 2$$

$$\log x = -\frac{1}{3} \quad \checkmark$$

$$x = 0.4642$$

$$x = 100 \quad \checkmark$$

$$\frac{A1}{03}$$

4. Given that $\vec{a} = 3\vec{i} - 2\vec{j} + 3\vec{k}$ and $\vec{b} = 2\vec{i} - 4\vec{j} - 3\vec{k}$ where $\vec{i}$, $\vec{j}$ and $\vec{k}$ are unit vectors. Find $|2\vec{a} + 3\vec{b}|$ (3 Marks)

$$|2(3\vec{i} - 2\vec{j} + 3\vec{k}) + 3(2\vec{i} - 4\vec{j} - 3\vec{k})| \quad \checkmark \quad m1$$

$$|(6\vec{i} - 4\vec{j} + 6\vec{k} + 6\vec{i} - 12\vec{j} - 9\vec{k})|$$

$$|12\vec{i} - 16\vec{j} - 3\vec{k}| = \sqrt{12^2 + (-16)^2 + (-3)^2} \quad \checkmark \quad m1$$

$$= 20.22 \quad \checkmark \quad A1$$

5. Use logarithms to evaluate: $\sqrt[3]{\frac{45.3 \times 0.00697}{0.534}}$

(4marks)

No	log
45.3	1.6561 +
0.00697	3.8432
	1.4993 -
0.534	1.7275
	1.7718 $\times \frac{1}{3}$
	$\frac{3}{3} + \frac{2.7718}{3}$
	1.9239

M1 ✓ logs

M1 ✓ attempt to add & sub.

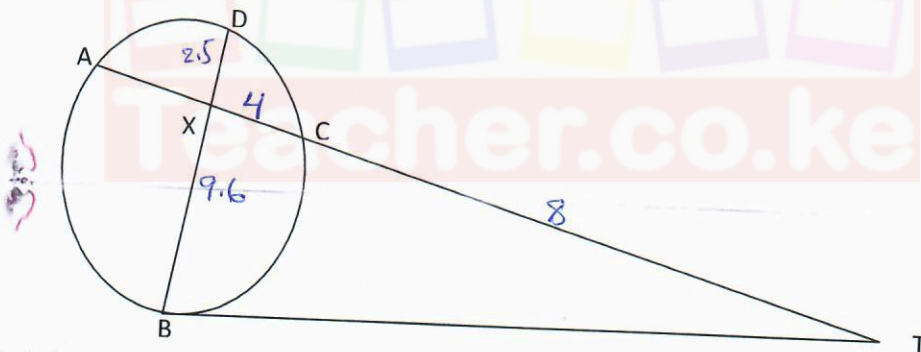
M1 ✓ attempt to divide by 3.

$$8.393 \times 10^{-1}$$

$$= 0.8393 \quad \checkmark$$

A1 (CAO) /04

6. In the figure below, BT is a tangent to the circle at B. AXCT and BXD are straight lines. Given that XC = 4cm, CT = 8cm, BX = 9.6cm and XD = 2.5cm.



Find the length of

(i) AX $4AX = 2.5 \times 9.6$
 $AX = \frac{2.5 \times 9.6}{4} \quad \checkmark \quad M1$

(2 Marks)

$$AX = 6 \text{ cm} \quad \checkmark \quad A1$$

(ii) BT

$$BT^2 = 6 \times 12 = 72 \quad \checkmark$$

(2 Marks)

$$BT = \sqrt{72}$$

$$BT = 8.485 \quad \checkmark$$

$$BT \approx \underline{\underline{8.5 \text{ cm}}} \quad \checkmark \quad B1$$

7. Given that $(5m - 2n) : (2m - n) = 7:5$, Find the ratio of $m:n$.

(2 Marks)

$$\frac{5m-2n}{2m-n} = \frac{7}{5}$$

$$5(5m-2n) = 7(2m-n)$$

$$25m - 10n = 14m - 7n$$

$$11m = 3n$$

$$\frac{m}{n} = \frac{3}{11}$$

$$m:n = 3:11$$

8. The equation of a circle is given by $x^2 + 4x + y^2 - 2y - 4 = 0$. Determine the centre and radius of the circle.

(4 marks)

$$x^2 + 4x + (2)^2 + y^2 - 2y + (-1)^2 = 4 + (2)^2 + (-1)^2$$

$$(x+2)^2 + (y-1)^2 = 3^2$$

$$\text{Centre } (-2, 1)$$

$$\text{radius} = 3$$

9. The amount of oil used by a ship travelling at a uniform speed varies jointly with the distance and the square of the speed. If the ship uses 200 barrels of oil in travelling 200 miles at 36 mile per hour, determine how many barrels of oil are used when the ship travels 360 miles at 18 miles per.

(3 marks)

$$A \propto ds^2$$

$$A = kds^2$$

$$k = \frac{200}{200 \times 36^2}$$

$$k = \frac{1}{1296}$$

$$A = \frac{1}{1296} ds^2$$

$$\text{If } d=360 \\ s=18 \\ \Rightarrow$$

$$A = \frac{1}{1296} \times 360 \times 18^2$$

10. Determine the values of x for which the matrix $\begin{pmatrix} 2x & x^2 \\ 2 & 1 \end{pmatrix}$ has no inverse (3 marks)

$$2x - 2x^2 = 0 \quad \checkmark \text{ M1}$$

$$2x(1-x) = 0$$

$$2x = 0 \Rightarrow x = 0 \quad \checkmark \text{ A1}$$

$$\text{or } 1-x = 0 \Rightarrow x = 1 \quad \checkmark \text{ B1}$$

11. Mr. Kiprono, a local retailer bought imported rice at sh. 96 per kilogram and local rice at sh. 88 per kilogram. He wants to mix the two types of rice so as to make a profit of 20%. If he sold the mixture at sh.160 per 2-kilogram packet, find the ratio the two types of rice were mixed. (3marks)

$$\frac{160}{2} = 80 \quad \checkmark \text{ B1}$$

(check alternative methods.)

$$\begin{array}{cc} 96 & 88 \\ & \swarrow \searrow \\ & 80 \\ & \swarrow \searrow \\ 8 & 16 \\ 1 & 2 \end{array} \quad \checkmark \text{ M1}$$

$$\Rightarrow 1:2 \quad \checkmark \text{ A1}$$

12. Expand and simplify the binomial $\left(2 + \frac{3}{x}\right)^5$. Hence use the first four terms of your expansion to find the value of $(2.5)^5$ (4 marks)

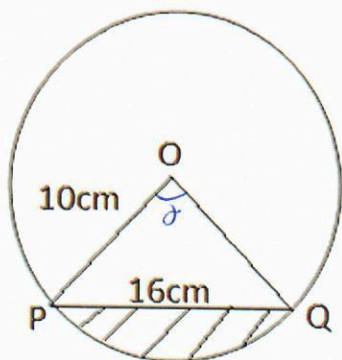
$$\begin{aligned} \left(2 + \frac{3}{x}\right)^5 &= 1 \cdot 2^5 + 5 \cdot 2^4 \left(\frac{3}{x}\right) + 10 \cdot 2^3 \left(\frac{3}{x}\right)^2 + 10 \cdot 2^2 \left(\frac{3}{x}\right)^3 + 5 \cdot 2 \left(\frac{3}{x}\right)^4 + \left(\frac{3}{x}\right)^5 - \text{M1} \\ &= 32 + \frac{240}{x} + \frac{720}{x^2} + \frac{1080}{x^3} + \frac{810}{x^4} + \frac{243}{x^5} - \text{A1} \end{aligned}$$

$$\begin{aligned} (2.5)^5 &= \left(2 + \frac{3}{6}\right)^5 = 32 + \frac{240}{6} + \frac{720}{6^2} + \frac{1080}{6^3} + \frac{810}{6^4} + \frac{243}{6^5} - \text{M1} \\ &= 32 + 40 + 20 + 5 + \dots - \text{A1} \end{aligned}$$

$$\boxed{97} \quad \text{--- A1}$$

04

13. The figure below shows a circle center O, radius 10 cm. The chord PQ = 16cm. Calculate the area of the unshaded region. (3 marks)



$$\sin \theta = \frac{8}{10} = 0.8$$

$$\theta = 53.13^\circ$$

$$\alpha = 106.26^\circ \checkmark B1$$

$$\text{Area of unshaded region} = \frac{106.26}{360} \times 3.142 \times 10 \times 10 - \frac{1}{2} \times 10 \times 10 \sin 106.26$$

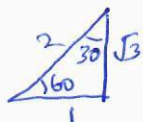
$$= 92.74 - 48$$

$$= 44.74 \text{ cm}^2 \checkmark A1$$

03



14. Evaluate $\frac{\sqrt{3}}{1 - \cos 30^\circ}$ leaving your answer in the form $a\sqrt{b} + c$ where a, b and c are constants. (3 Marks)



$$\cos 30^\circ = \frac{\sqrt{3}}{2} \checkmark B1$$

$$\left(\frac{\sqrt{3}}{1 - \frac{\sqrt{3}}{2}} \right) \left(\frac{1 + \frac{\sqrt{3}}{2}}{1 + \frac{\sqrt{3}}{2}} \right) \checkmark M1$$

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

$$= 4\sqrt{3} + 6 \checkmark A1$$

03

15. Make Q the subject of the formula.

$$T = P \sqrt{\frac{Q^2}{Q^2 - 1}}$$

(3 Marks)

$$T^2 = P^2 \left(\frac{Q^2}{Q^2 - 1} \right)$$

$$T^2 = \frac{P^2 Q^2}{Q^2 - 1} \quad \checkmark M_1$$

$$T^2 Q^2 - T^2 = P^2 Q^2$$

$$T^2 Q^2 - P^2 Q^2 = T^2 \quad \checkmark M_1$$

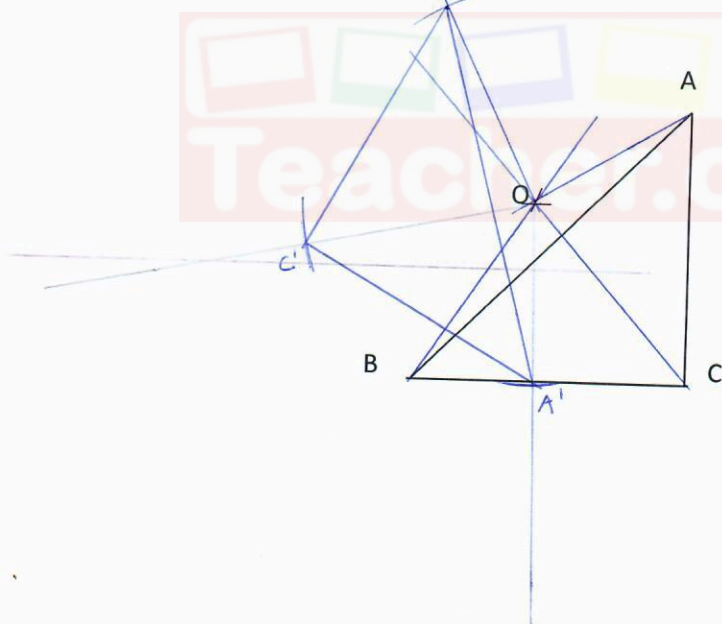
$$Q^2 (T^2 - P^2) = T^2$$

$$Q^2 = \frac{T^2}{T^2 - P^2}$$

$$Q = \sqrt{\frac{T^2}{T^2 - P^2}} \quad \checkmark A_1$$

$$T^2 (Q^2 - 1) = P^2 Q^2$$

16. The diagram below shows a triangle ABC. Construct its image $A'B'C'$ under a rotation of -120° about Centre O. (3 marks)



B_1 - for the first rotation A'

B_1 - for both B' & C'

B_1 - Completed Image.

SECTION II (50 marks)

Answer **only** Five questions in this section.

17. (a.) Find the quadratic equation whose roots are $-\frac{3}{4}$ and $\frac{2}{3}$ and write it in the form $ax^2 + bx + c = 0$ where a , b and c are integers. (3 marks)

$$(x + \frac{3}{4})(x - \frac{2}{3}) = 0 \quad -m1$$

$$x^2 - \frac{2}{3}x + \frac{3}{4}x - \frac{6}{12} = 0 \quad \checkmark m1$$

$$12x^2 + x - 6 = 0 \quad \checkmark A1$$



- (b.) The length of a floor of a rectangular hall is 9m more than its width. The area of the floor is $136m^2$.

- i) Calculate the perimeter of the floor (4 marks)

$$w(w+9) = 136 \Rightarrow w^2 + 9w - 136 = 0 \quad \checkmark m1$$

$$w^2 + 17w - 8w - 136 = 0$$

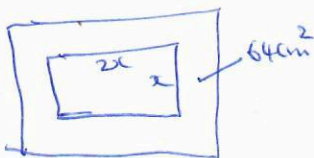
$$(w-8)(w+17) = 0$$

$$w = 8 \text{ or } w = -17 \text{ (ignore)}$$

$$\text{length} = 8 + 9 = 17m \quad \text{width} = 8m \quad -m1$$

$$\text{Perimeter} = 2 \times 17 + 2 \times 8 \quad -m1$$

$$= 50m \quad \checkmark A1$$



- ii) A rectangular carpet is placed on the hall leaving an area of $64cm^2$. If the length of the carpet is twice its width, determine the width of the carpet (3 marks)

$$\text{Area of Carpet} = 136 - 0.0064$$

$$= 135.9936 \quad \checkmark B1$$

$$x(2x) = 135.9936 \quad \checkmark m1$$

$$2x^2 = 135.9936$$

$$x^2 = 67.9968$$

$$x = 8.246$$

$$\text{width} = 8.2m \quad \checkmark A1$$

18. Three taps X, Y and Z are used to fill and drain a reservoir tank. Tap X can fill the tank in 10 minutes. Tap Y can fill it in 15 minutes while tap Z drains the tank in t minutes. The three taps are open fully for 4 minutes and the tap Z is closed and it takes tap X and Y 3 minutes more to fill the tank.

(a) How long does it take tap Z to empty the full tank?

(6 Marks)

$$\begin{aligned} \text{In 4 min} &\Rightarrow \left(\frac{1}{10} + \frac{1}{15} - \frac{1}{t}\right) \times 4 \quad \text{--- M1} \\ &= \frac{2t - 12}{3t} \quad \text{--- A1} \end{aligned}$$



$$\begin{aligned} \text{Tap X \& Tap Y} &\quad \text{M1} \\ \left(\frac{1}{10} + \frac{1}{15}\right) \times 3 &= \frac{1}{2} \quad \checkmark \end{aligned}$$

$$\text{But } \frac{2t - 12}{3t} + \frac{1}{2} = 1 \quad \checkmark \text{ M1}$$

$$7t - 6t = 24$$

$$t = 24 \quad \text{--- A1}$$

Tap Z takes 24 mins to empty the tank B1

- (b) If tap Z drained a total of 810 litres, calculate the capacity of the tank.

(4 Marks)

In 4 min Tap Z drains $\frac{4}{24}$ of the tank

$$\frac{4}{24} = 810 \quad \checkmark \text{ M1} \quad \left(\frac{\text{can be implied}}{\text{implied}}\right) \quad \checkmark \text{ B1}$$

$$\frac{24}{24} = ?$$

$$\frac{24}{24} \times \frac{24}{4} \times 810 \quad \checkmark \text{ M1}$$

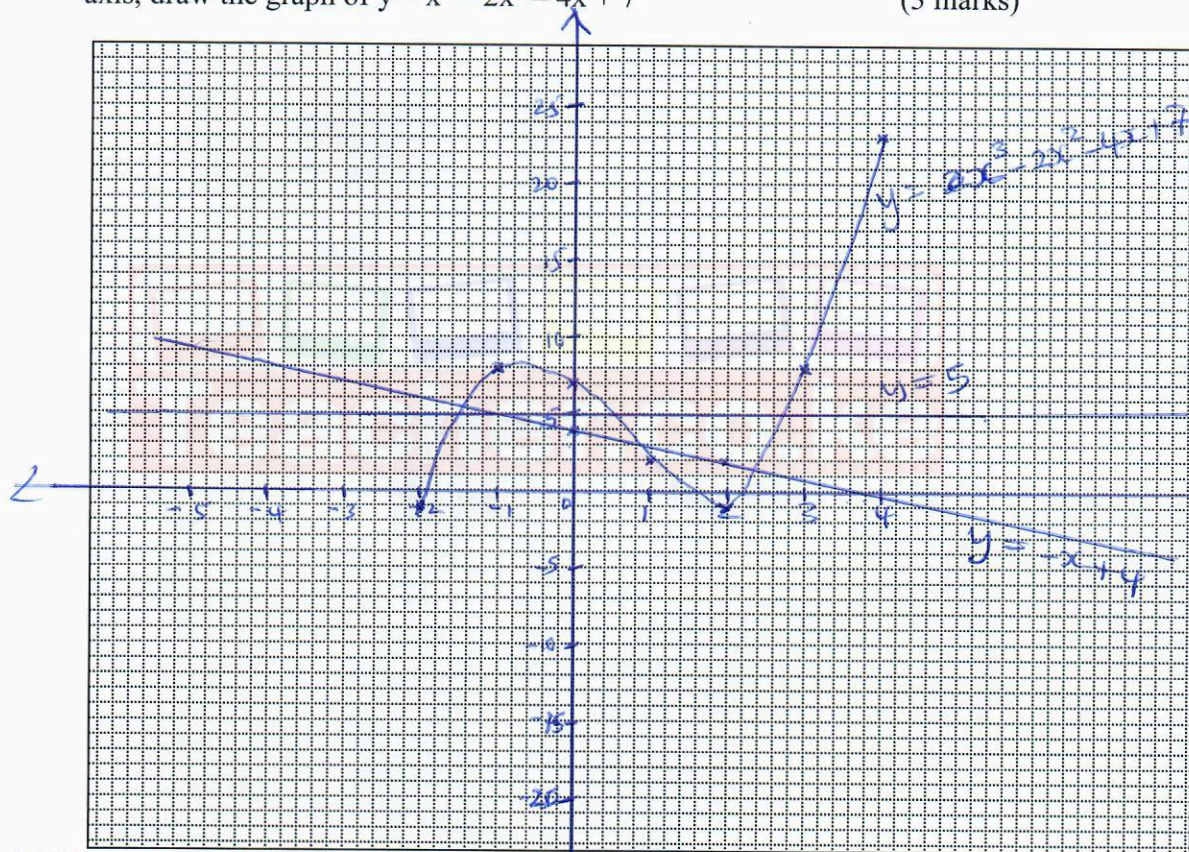
$$= 4860 \text{ litres} \quad \checkmark \text{ A1}$$

19. (a.) Complete the table below for the equation $y = x^3 - 2x^2 - 4x + 7$ (2 marks)

X	-2	-1	0	1	2	3	4
Y	-1	8	7	2	-1	8	23

B2 ✓ all values
or
B1 ✓ 3 values

(b.) Using the scale 1 cm to represent 1 unit on x-axis and 1 cm to represent 5 units on the y-axis, draw the graph of $y = x^3 - 2x^2 - 4x + 7$ (3 marks)



S₁
P₁
C₁

(c.) Use your graph to estimate the roots of the equation $x^3 - 2x^2 - 4x + 7 = 0$ (1 mark)

$x = -1.9, 1.6, 2.2 (\pm 0.1)$ ✓ B1

(d.) By drawing straight lines, use your graph to solve the equation. (2 marks)

i) $x^3 - 2x^2 - 4x + 2 = 0$

$$\begin{array}{r} x^3 - 2x^2 - 4x + 7 = y \\ \hline 5 = y \end{array}$$

✓ L₁

$x = -1.5$ or 0.5 or $2.7 (\pm 0.1)$

✓ B1

ii) $x^3 - 2x^2 - 3x + 3 = 0$

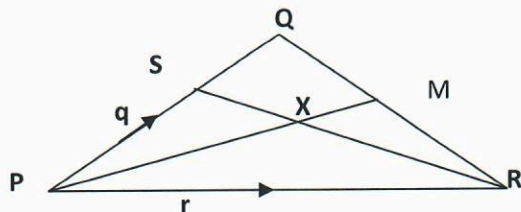
$$\begin{array}{r} x^3 - 2x^2 - 4x + 7 = y \\ \hline -x + 4 = y \end{array}$$

$$\begin{array}{r} x \ 0 \ 2 \\ y \ 4 \ 2 \end{array}$$

(2 marks)

L₁ ✓ line drawn

20. In the figure below, $PQ=q$ and $PR=r$. $QM:MR=1:2$. The point S is the mid-point of PQ . X is the intersection of PM and SR . $SX=hSR$, $PX=kPM$ where h and k are constants.



Find:

- (a) QR in terms of q and r

(1 mark)

$$\underline{-q + r} \quad \checkmark \quad B1$$

- (b) PM in terms of q and r

(2 marks)

$$Qm = \frac{1}{3}r - \frac{1}{3}q \quad \checkmark \quad m1$$

$$\underline{pm} = \underline{q} + \frac{1}{3}\underline{r} - \frac{1}{3}\underline{q} = \frac{1}{3}\underline{r} + \frac{2}{3}\underline{q} \quad \checkmark \quad A1$$

- (c) SR in terms of q and r

(2 marks)

$$\underline{-\frac{1}{2}q + r} \quad \checkmark \quad m1$$

$$\underline{= r - \frac{1}{2}q} \quad \checkmark \quad A1$$

- (d) Express vector SX in two ways: in terms of h , r and q and in terms of k , r and q .

Hence determine the ratio in which x divides SR .

(5 marks)

$$\text{Let } \underline{SX} = h \underline{SR} \Rightarrow \underline{SX} = h(\underline{r} - \frac{1}{2}\underline{q}) = h\underline{r} - \frac{1}{2}h\underline{q} \quad \checkmark \quad B1$$

$$\underline{PX} = k \underline{PM} \Rightarrow \underline{PX} = k(\frac{1}{3}\underline{r} + \frac{2}{3}\underline{q}) = \frac{1}{3}k\underline{r} + \frac{2}{3}k\underline{q}$$

Also

$$\underline{SX} = \underline{SP} + \underline{PX} = -\frac{1}{2}\underline{q} + \frac{1}{3}k\underline{r} + \frac{2}{3}k\underline{q} = \frac{1}{3}k\underline{r} + (\frac{2}{3}k - \frac{1}{2})\underline{q}$$

equ (i) and (ii) we get

$$h\underline{r} - \frac{1}{2}h\underline{q} = \frac{1}{3}k\underline{r} + (\frac{2}{3}k - \frac{1}{2})\underline{q} \quad \checkmark \quad B1$$

$$h = \frac{1}{3}k \quad -\frac{1}{2}h = \frac{2}{3}k - \frac{1}{2}$$

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

$$k = \frac{3}{5}$$

21. Rates of tax in operation in 2010 are given in the table below: -

K£ p.a	Rate of tax %
1-5208	10
5209-9744	25
9745-14292	20
14293-18840	15
Over 18840	30

- (a) Mrs. Makanda pays sh. 5,400 as P.A.Y.E monthly. She was entitled to house allowances of Ksh. 9,000p.m and getting a monthly tax relief of sh. 1093. Calculate her monthly basic salary. (7marks)

$$\text{Gross tax} = 5400 + 1093 = \text{Ksh } 6493 \quad \checkmark B1$$

$$\frac{\text{Income}}{100} = \frac{\text{Tax}}{520.8}$$

$$4536 \times \frac{25}{100} = 1134$$

$$4548 \times \frac{20}{100} = 909.6$$

$$4548 \times \frac{15}{100} = 682.2$$

$$x \times \frac{30}{100} = 3246.40 \quad \checkmark M1$$

$$x = 10821.33$$

$$\begin{aligned} \text{Taxable Income} &= 5208 + 4536 + 4548 + 1082 \\ &= 29661.33 \end{aligned}$$

$$\begin{aligned} \text{Basic salary} &= 29661 - 9000 \\ &= \text{Ksh } 20661 \end{aligned}$$

- (b) Mrs. Makanda other deductions per month were;
Co-operative society contribution sh. 2,000
Loan payment sh. 2,500

Calculate her net salary per month.

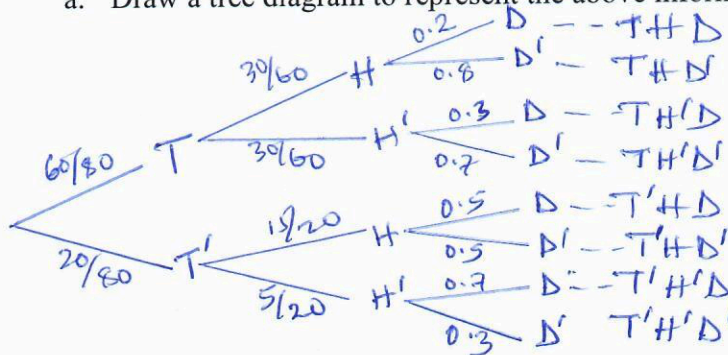
$$\begin{aligned} \text{Deductions} &= 2000 + 2500 + 5400 - M1 \\ &= 9900 \end{aligned}$$

$$\begin{aligned} \text{Net salary} &= 20661 - 9900 - M1 \\ &= \text{Ksh } 10761 - A1 \end{aligned}$$

22. At the Kenya medical research institute, a new drug is being tried. A sample of eighty sick rats is being used. Sixty of these rats are given drugs and the rest are not. A half of those given drugs are put on a high calorie diet while three quarters of those who are not given drugs were put on the same diet. For the ones who are treated and put on a high calorie diet the probability of dying is 0.2 and 0.3 if not put on a high calorie diet. For the ones who are not treated and put on a high calorie diet the probability of dying is 0.5 and 0.7 if not put on a high calorie diet.

a. Draw a tree diagram to represent the above information.

(2marks)



B2 | B1 store
B1 v pr
w

b. Calculate the probability that a rat picked at random

- i. Is given drugs, put on a high calorie diet and will die (1mark)

$$P(THD) = \frac{60}{80} \times \frac{30}{60} \times 0.2 = \frac{3}{40} \quad \checkmark B1$$

- ii. Is given drugs and will die.

(2marks)

$$P(THD \cup TH'D) = \frac{3}{40} + \left(\frac{60}{80} \times \frac{30}{60} \times 0.3 \right) \quad \checkmark m1$$

$$= \frac{3}{40} + \frac{9}{80} = \frac{3}{16} \quad \checkmark A1$$

- iii. Will die

(3marks)

$$P(THD \cup TH'D \cup T'HD \cup T'H'D) = m1$$

$$\frac{6}{8} \times \frac{3}{6} \times 0.2 + \frac{6}{8} \times \frac{3}{6} \times 0.3 + \frac{2}{8} \times \frac{15}{20} \times 0.5 + \frac{2}{8} \times \frac{5}{20} \times 0.7 \quad \checkmark$$

$$= \frac{13}{40} \quad \checkmark A1$$

- iv. Is not given drugs and will not die

(2marks)

$$P(T'H'D') \cup P(T'HD')$$

$$= \left(\frac{2}{8} \times \frac{5}{20} \times 0.3 \right) + \left(\frac{2}{8} \times \frac{15}{20} \times 0.5 \right) = m1$$

$$= \frac{9}{80} \quad \checkmark A1$$

23. The cost of a minibus was Sh.1, 950,000. It depreciated in value by 5 % per year for the first two years and by 15 % per year for the subsequent years

a) Calculate the value of the minibus after 5 years.

(4marks)

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

$$= 1,950,000 \left(1 - \frac{5}{100}\right)^2$$

$$= 1,852,800$$

$$1,852,500 \quad \checkmark \quad A$$

$$A = 1,852,500 \left(1 - \frac{15}{100}\right)^3$$

$$= 1,137,666.563 \quad \checkmark \quad A$$

b) After 5 years the minibus was sold through a dealer at 25% more than its value to Mr. Chi.

i.) Calculate Mr. Chi's buying price.

(2marks)

$$\frac{125}{100} \times 1,137,666.563 = 1,422,083.204$$

ii) . If the dealer's sale price was to be taken as its value after depreciation, calculate the average monthly rate of depreciation for the 5 years.

(4marks)

$$1,422,083.204 = 1,950,000 \left(1 - \frac{r}{100}\right)^5 \quad \checkmark \quad m$$

$$\frac{1,422,083.204}{1,950,000} = \left(1 - \frac{r}{100}\right)^5 \quad \checkmark \quad m$$

$$0.9388 = 1 - \frac{r}{100}$$

$$\frac{r}{100} = 0.0612 \quad \checkmark \quad m$$

$$r = 6.12\% \quad \checkmark \quad A$$

24. Three quantities P, Q and R are such that P varies directly as the square of Q and inversely as the square root of R.

a) Given that $P=20$ when $Q=5$ and $R=9$, find P when $Q=7$ and $R=25$. (4 marks)

$$P \propto \frac{Q^2}{\sqrt{R}}$$

$$P = \frac{KQ^2}{\sqrt{R}} \quad \checkmark \quad B1$$

$$20 = \frac{K \cdot 25}{3}$$

$$60 = K \cdot 25$$

$$K = \frac{60}{25}$$

$$K = 2.4 \quad \checkmark \quad B1$$

$$P = \frac{2.4 \times 49}{5} \quad \checkmark \quad M1$$

$$= 23.52. \quad \checkmark \quad A1$$

b) If Q increased by 20% and R decreases by 36%,

i) Write an expression for the new value of P. (2 marks)

$$P \propto \left(\frac{120}{100}\right)^2 Q^2$$

$$\frac{\sqrt{64}}{\sqrt{100}} \sqrt{R}$$

$$P = \frac{1.44 Q^2}{0.8 \sqrt{R}} \quad \checkmark \quad M1$$

$$P = \frac{1.8 Q^2}{\sqrt{R}}$$

$$P = \frac{1.8 K Q^2}{\sqrt{R}} \quad \checkmark \quad A1$$

ii) find the percentage change in P. (4 marks)

$$\% = \left(\frac{P_1 - P}{P} \right) \times 100$$

$$= \left(\frac{\frac{1.8 K Q^2}{\sqrt{R}} - \frac{K Q^2}{\sqrt{R}}}{\frac{K Q^2}{\sqrt{R}}} \right) \times 100 \quad \checkmark \quad M1$$

$$\% = \frac{K Q^2}{\sqrt{R}} (1.8 - 1) \quad \checkmark \quad M1$$

$$\frac{K Q^2}{\sqrt{R}}$$

$$\% = 0.8 \times 100 \quad \checkmark \quad M1$$

$$= \underline{\underline{80\%}} \quad \checkmark \quad A1$$