SECTION A (50 Marks)

Answer all the questions

1. Using logarithms evaluate

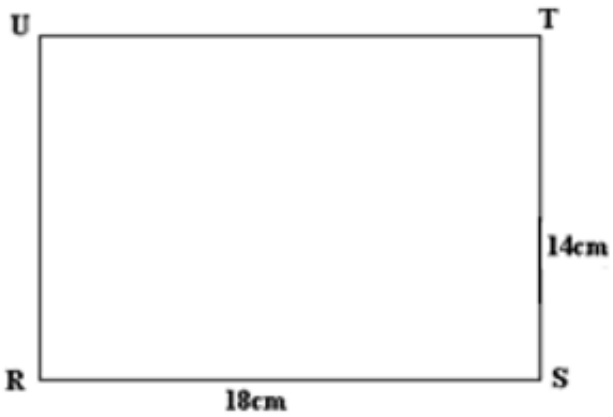
$$\left[\frac{0.9329}{4.329^2 - 3.921^2}\right]^{\frac{1}{3}}$$

2. If $x = -\frac{1}{2}$ and $x = \frac{2}{3}$ are the solutions of a quadratic equation. Write the equation in the form

$ax^2 + bx + c = 0$ where a, b and c are integers

3. A student corrected $2.3\dot{2}$ to 2 s.f as 2.3. Determine the percentage error in the estimation.

4. The figure below represents a scale drawing of a rectangular piece of land, RSTU. RS=18cm and ST=14cm.



An electric post P, is to be erected inside the piece of land. On the scale drawing, shade the possible region in which P would lie such that PU> PT and PS = 14cm.

5. Two points A and B have coordinates (-2, 3) and (1, 3) respectively. A translation maps point A to A'(10,10). a) Find the coordinates of B', the image of B under the translation.

6. Solve the inequality

$$3 - 2x < x \leq \frac{2x+5}{3}$$

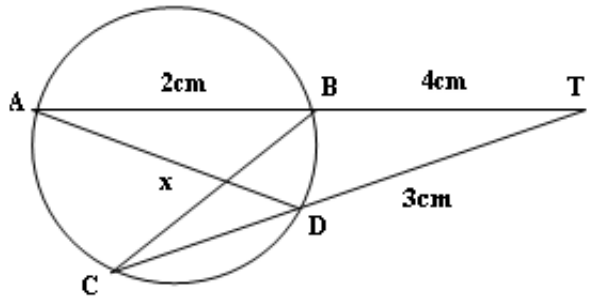
and show the solution on a number line.

7. Without using tables evaluate

$$\frac{Cos\ 30^0}{Tan\ 60^0 - Sin\ 45^0}$$

9. Konango invested Ksh 8000 compounded quarterly at a rate of r% p.a. The value of the money after 2 ¼ years is Kshs 18000. Determine the value of r.

10. The figure below shows a circle with chords AB and CD produced and meeting externally at T. Chords AD and BC intersect internally at x. If BT= 4cm, AB=2cm and DT=3cm



a) Find CT

b) Show that triangles ADT and CBT are similar.

11. If $A=\begin{pmatrix}3 & 5\\ 4 & 7\end{pmatrix}$ and $B=\begin{pmatrix}2 & 3\\ -1 & 5\end{pmatrix}$. Find C if $C=A^{-1}\ B+B^{2}$

12. Make P the subject of the formula $\frac{y}{r}=\frac{a}{pn}+\frac{b}{ap}$

13. A varies as a constant and partly inversely as the cube root of P. When A=8, P=8, when A=7, P= 27. Find the law connecting A and P Hence find A when P=125.

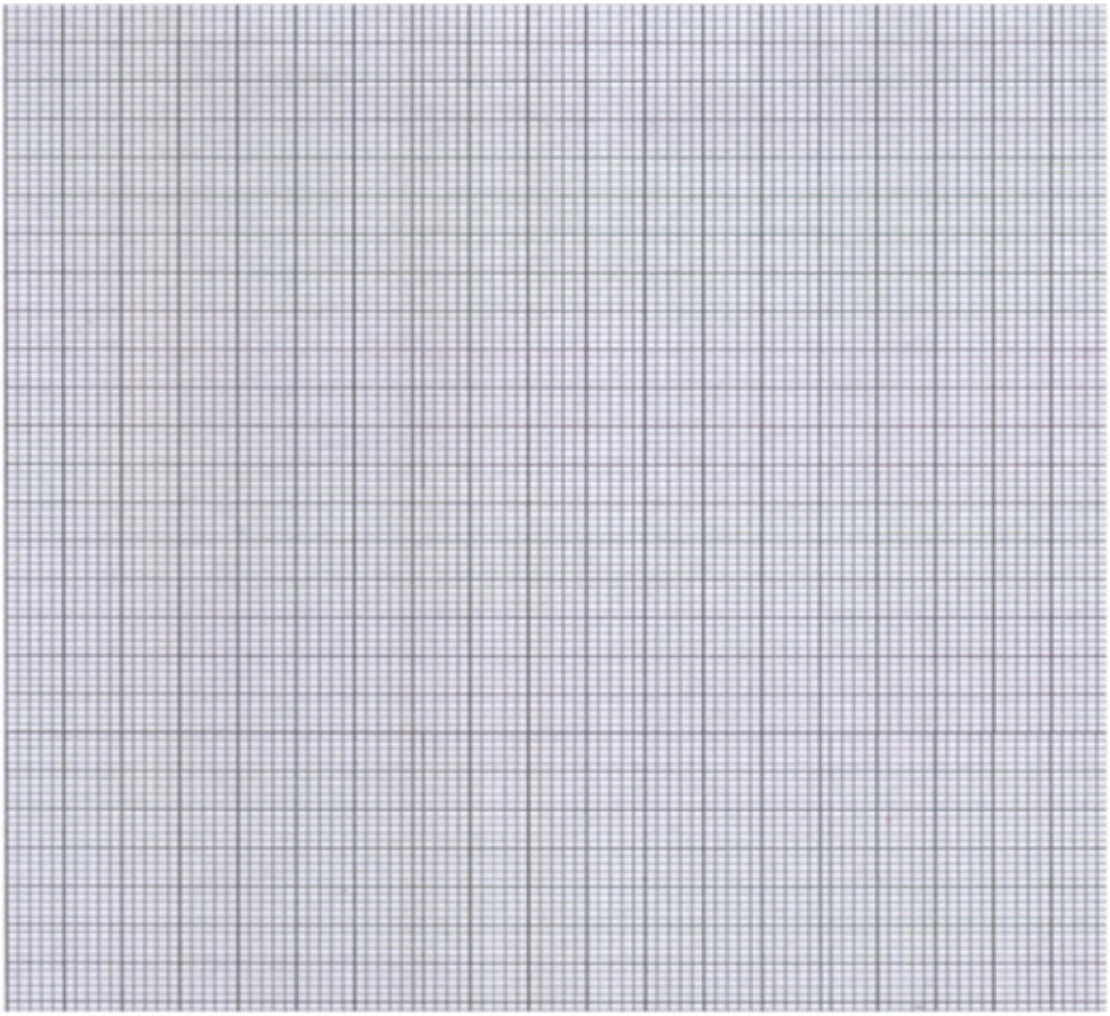
14. a) Expand $\left(2x-\frac{1}{x^{2}}\right)^{3}$ upto the fourth term.

b) Use your expansion to give the coefficient of x^{-4}

15. The table below shows values of x and y for the function $y=2\sin 3x^{0}$ in the range $0^{0}\le x\le 150^{0}$.

x^0	0	15	30	45	60	75	90	105	120	135	150
y	0	1.4	2	1.4	0	-1.4	-2	-1.4	0	1.4	2

a) On the grid provided, Draw the graph of $y=2\sin 3x^{0}$.



b) From the graph determine the period.

SECTION B (50 Marks)

ANSWER ONLY FIVE QUESTIONS

17. The table below shows income tax rates for all income earned.

Monthly income in Kenya shillings (Kshs)	Tax rate percentage % in each shilling
Upto 9680	10
From 9681 to 18800	15
From 18801 to 27920	20
From 27921 to 37040	25
From 37041 and above	30

Owenga pays a monthly tax of Kshs 4600. His monthly relief is Ksh 1200. He gets medical allowance of Ksh 3500 monthly. He is housed by the employer and pays a nominal rent of Ksh.960 per month.

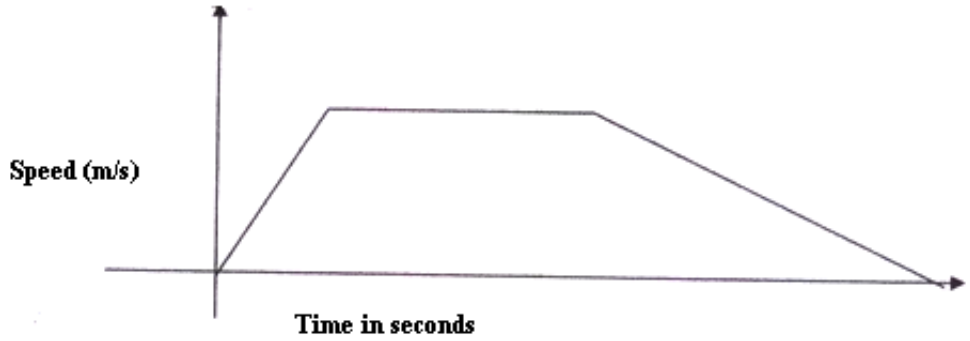
Determine

a) His gross tax per annum.

b) His taxable income in Kshs. per month.

c) His basic salary per month in Kshs.

18. The diagram below shows the speed- time for a train travelling between two stations. The train starts from rest and accelerates uniformly for 150 seconds. It then travels at a constant speed for 300 seconds and finally decelerates uniformly for 200 seconds.



Given that the distance between the two stations is 10450m, calculate the;

a) Maximum speed , Km/h, the train attained;

b) Acceleration;

c) Distance the train travelled during the last 100 seconds;

d) Time the train takes to travel the first half of the journey.

19. The probability that it rains on a given day is $\frac{3}{5}$. If it rains the probability of a student going to school by bus is $\frac{7}{10}$ otherwise he walks. If it does not rain, the probability of walking to school is $\frac{9}{10}$. When he walks to school the probability of getting late is $\frac{9}{10}$. When he goes by bus the probability of getting late is $\frac{1}{5}$.

a) Draw a tree diagram to represent the information.

b) Find the probability that i) A student goes to school by bus.

ii) A student is late for school.

iii) A student walks to school and arrives in time.

20. a) Two towns A and B lie on the same latitude in the southern hemisphere. When it is 8.00a.m at A, it is 10.00a.m at B same day. If the longitude of A is 40^0E find the longitude of B.

b) A plane leaves A going to B and takes 5 hours to arrive at B travelling along a parallel of latitude at 400km/hr. Find

i) the maximum time the plane could have taken to travel from A to B.

ii) the radius of the circle of latitude on which towns A and B are situated.

iii) The latitude of the two towns

(Take R=6370km and $\pi = \frac{22}{7}$)

21. A water vendor has a tank of capacity 18,900 litres. The tank is being filled with water from two pipes A and B which are closed immediately when the tank is full. Water flows at the rate of 150000cm3/ minute through pipe B.

a) If the tank is empty and the two pipes are opened at the same time, calculate the time it takes to fill the tank.

b) On a certain day the vendor opened the two pipes A and B to fill the empty tank. After 25 minutes he opened the outlet tap to supply water to his customers at an average rate of 20 litres per minute.

i) Calculate the time it took to fill the tank on that day.

ii) The vendor supplied a total of 542 jerricans, each containing 25 litres of water, on that day. If the water that remained in the tank was 6 300 litres, calculate, in litres, the amount of water that was wasted.

22. The table below shows the marks scored by students in a chemistry exam.

Marks	30 - 34	35 -39	40 - 44	45 - 49	50 -54	55 -59	60 - 64
No. of students	3	6	5	12	8	9	7

a) Calculate the interquartile range

b) Using an assumed mean of 47;

i) Determine the variance of the distribution.

ii) Hence determine the standard deviation.

23. The product of the first three terms of a geometric progression is 64. If the first term is a, and the common ratio is r.

a) Express r in terms of a.

b) Given that the sum of the three terms is 14

i) Find the values of a and r and hence write down two possible sequences each up to the 4th term

24. a) Draw a graph of $y = x^2 + 1$ for $0 \le x \le 4$

b) Estimate the area bounded by the y-axis and the line x=4 using trapezium rule with 8 trapezia.

c) Determine the actual area by integration.

d) Calculate the error in the area obtained by applying the trapezoidal rule.