MATHEMATICS PAPER 121/2 K.C.S.E. 1998
QUESTIONS
SECTION 1 (52 MARKS)

Answer the entire question in this section

1. Use logarithms to evaluate

   $55.9 \div (02621 \times 0.01177)^{1/5}$

2. Simplify the expression $\frac{x-1}{x} - \frac{2x+1}{3x}$

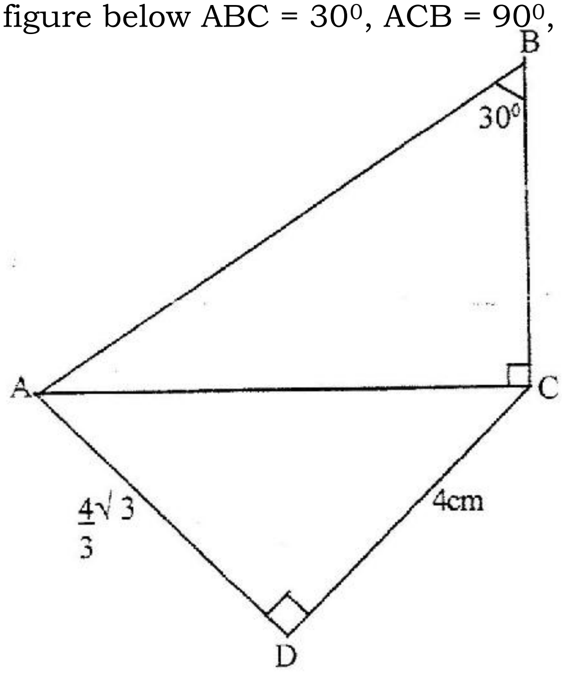
   Hence solve the equation

   $\frac{x-1}{x} - \frac{2x+1}{3x} = \frac{2}{3}$

3. Simplify as far as possible, leaving your answer in the form of surd

   $\frac{1}{\sqrt{4} - 2\sqrt{3}} - \frac{1}{\sqrt{14} + 2\sqrt{3}}$

4. In the figure below ABC = 30^0, ACB = 90^0, AD = $4\sqrt{3}$ and DC = 4cm



$\frac{8}{\sqrt{3}} + \frac{I}{\sqrt{3}}$ if A is lost

   Calculate the length of (a) AC
   (b) BC

5. A plot of land was valued at Kshs 50,000 at the start of 1994. It appreciated by 20% during 1994. Thereafter, every year, it appreciated by 10% of its previous years value.

   a. The value of the land at the start 0f 1995

b. The value of the land at the end 0f 1997

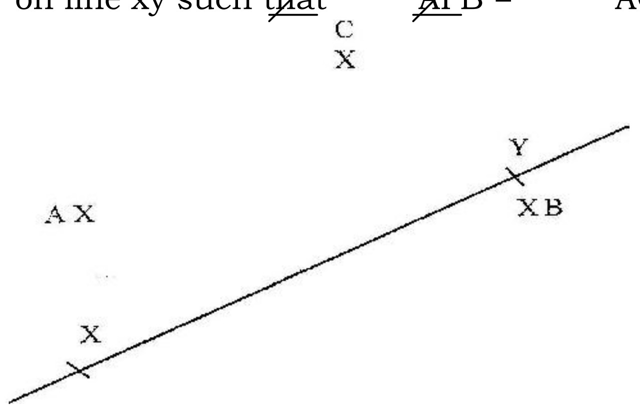
6. During a certain period, the exchange rate were follows
   1 sterling pound = Kshs. 102.0
   1 sterling pound = Kshs. U.S dollar
   1 U.S dollar = Kshs. 60.6

   A school management intended to import textbooks worth Kshs 500,00 from U.K. It changed the money to sterling pounds. Later the management found out that books were cheaper in U.S.A. Hence it changed the sterling pounds to dollars. Unfortunately, a financial crisis arose and the money had to be reconverted to Kenya shillings.
   Calculate the total amount of money the management ended up with

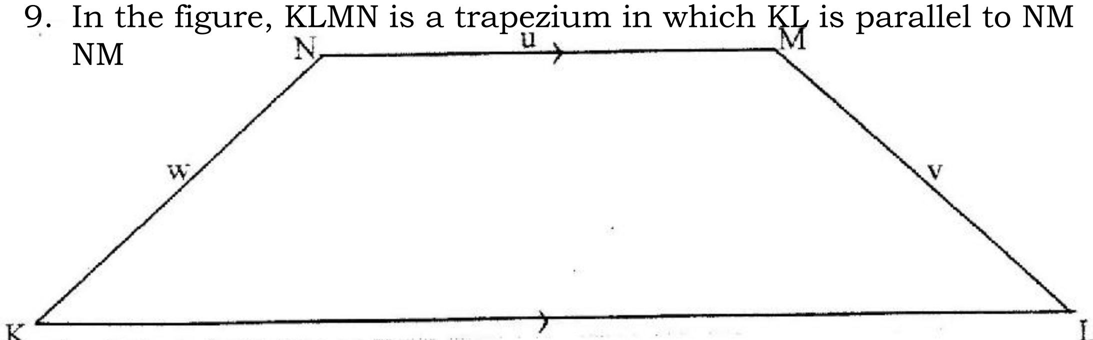
7. A manufacturer sells bottle of fruit juice to a trader at a profit of 40%. The trader sells it for Kshs 84 at a profit of 20%. Find
   (a) The trader's buying price

   (b) The cost of manufacture of one bottle

8. In the figure below a line XY and three points. A,B and C are given. On the figure construct
   (a) The perpendicular bisector of AB
   (b) A point P on line xy such that ∠APB = ∠ACB



9. In the figure, KLMN is a trapezium in which KL is parallel to NM and KL = 3 NM



   Given that KN = w, NM = u and ML = v
   Show that 2 u = v= w

10. Given that P = 3 y express the equation $3^{2y-1} + 2 \times 3^{y-1} = 1$ terms of AP
Hence or otherwise find the value of y in the equation $3^{2y-1} + 2 \times 3^{y-1} = 1$

11. A balloon, in the form of a sphere of radius 2 cm, is blown up so that the volume increase by 237.5%. Determine the new volume of balloon in terms of $\prod$

12. Find x if
$-3 \log 5 + \log x^2 = \log \frac{1}{125}$

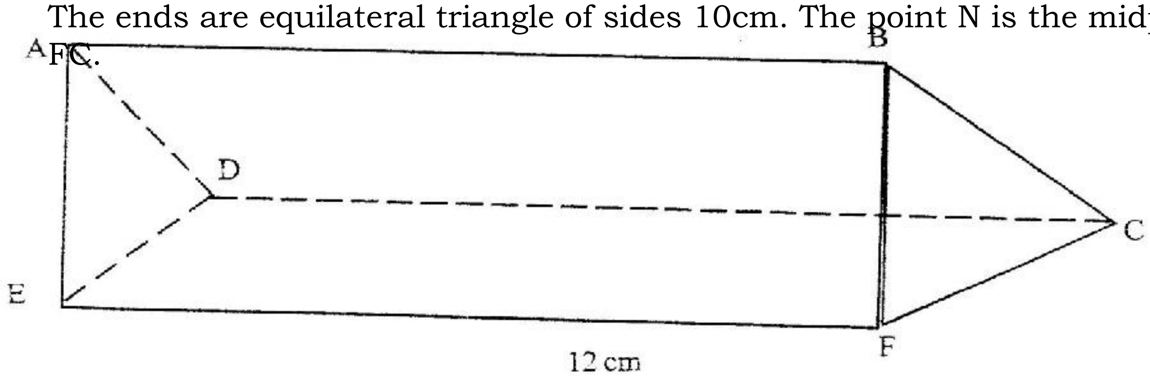
13. (a) Write down the simplest expansion $(1 + x)^6$
(b) Use the expansion up to the fourth term to find the value of $(1.03)^6$ to the nearest one thousandth.

14. A science club is made up of boys and girls. The club has 3 officials. Using a tree diagram or otherwise find the probability that:
(a) The club official are all boys

(b) Two of the officials are girls

15. A river is flowing at uniform speed of 6km/ h. A canoeist who can paddle at 10 km/h through still water wishes to go straight across the river. Find the direction, relative to the bank in which he should steer.

16. The triangular prism shown below has sides AB= DC = EF = 12 cm. The ends are equilateral triangle of sides 10cm. The point N is the midpoint FC.



(a) Find the length of
(i) BN

(ii) EN

(b) Find the angle between the line EB and the plane CDEF

SECTION II (48 marks)

Answer any six questions from this section

17. A cylindrical water tank is a diameter 7 meters and height 2.8 metre

(a) Find the capacity of the water tank in litres

(b) Six members of a family use 15 litres per day. Each day 80 litres are used for cooking and washing and a further 60 litres are wasted. Find the number of complete days a full tank of water would last the family.

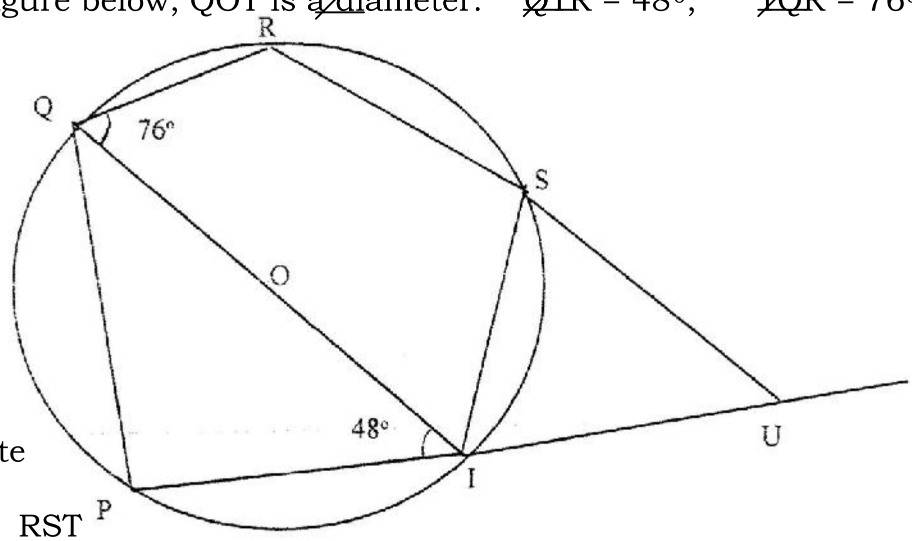
18. (a) Complete the table below for the value of y = 2 sin x + cos x.

x	0^0	30^0	45^0	60^0	90^0	120^0	135^0	150^0	180^0	225^0	270^0	315^0	360^0
2 sin x	0		1.4	1.7	2	1.7	1.4	1	0		-2	-1.4	0
Cos x	1		0.7	0.5	0	-0.5	-0.7	-0.9	-1		0	0.7	1
y	1		2.1	2.2	2	1.2	0.7	0.1	-1		-2	-0.7	1

(b) Using the grid provided draw the graph of y= 2 sin x + cos x for 0^0. Take 1 cm represent 30^0 on the x- axis and 2 cm to represent 1 unit on the axis.

(c) Use the graph to find the range of x that satisfy the inequalities 2 sin x cos x > 0.5

19. In the figure below, QOT is a diameter. $\angle$QTR = 48^0, $\angle$TQR = 76^0 and $\angle$SRT = 37^0



Calculate

(a) $\angle$ RST

(b) $\angle$ SUT

(c) Obtuse $\angle$ RUT

(d) $\angle$ PST

20. (a) Find the value of x at which the curve y= x- $2x^2$ – 3 crosses the x-axis

(b) $\int(x^2 - 2x - 3)dx$

(c) Find the area bounded by the curve $y = x^2 - 2x - 3$, the axis and the lines $x= 2$ and $x = 4$

21. Two variables R and V are known to satisfy a relation $R = kV^n$, where k and n are constants. The table below shows data collected from an experiment involving the two variables R and V.

V	3	4	5	6	7	8
R	27	48	75	108	147	192

(a) Complete the table of log V and R given below, by giving the value to 2 decimal places.

Log V	0.48	0.60	0.70	0.78	0.85	0.90
Log R	1.43	1.88	2.03	1.80	2.28	

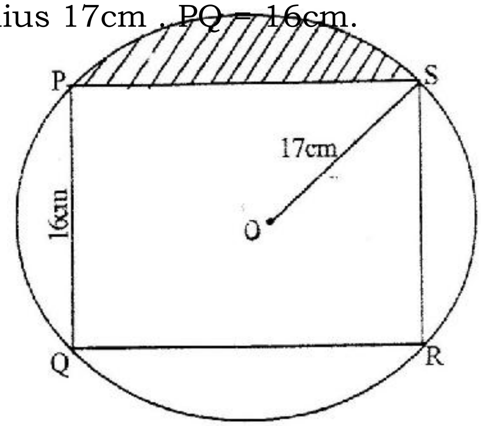
(b) On the grid provided draw a suitable straight line graph to represent the relation $R= kV^n$

(c) (i) the gradient of the line
(ii) a relationship connecting R and V.

22. Two aeroplane P and Q leaves an airport at the same time. P lies on a bearing of 240^0 at 900 km/ h while Q flies due east at 750 km/ h.

(a) Using a scale of 1 cm to represents 100km, make a scale drawing to show the position of the aeroplane after 40 minutes.
(b) Use the scale drawing to find the distance between the two aeroplane after 40 minutes.
(c) Determine the bearing
  (i) P from Q
  (ii) Q from P

23. The figure below represents a rectangle PQRS inscribed in a circle centre 0 and radius 17cm , PQ = 16cm.



Calculate

(d) The length PS of the rectangle

(e) The angle POS

(f) The area of the shaded region

24. A draper is required to supply two types of shirts A and type B.
The total number of shirts must not be more than 400. He has to supply more type A than of type B however the number of types A shirts must be more than 300 and the number of type B shirts not be less than 80.
Let x be the number of type A shirts and y be the number of types B shirts.

(a) Write down in terms of x and y all the linear inequalities representing the information above.

(b) On the grid provided, draw the inequalities and shade the unwanted regions

Type A: Kshs 600 per shirt

Type B: Kshs 400 per shirt

(i) Use the graph to determine the number of shirts of each type that should be made to maximize the profit.

(ii) Calculate the maximum possible profit.