MATHEMATICS PAPER 121/2 K.C.S.E 1999
MARKING SCHEME
SECTION 1 (52 Marks)

Answer all the questions in this section

1. Use logarithms to evaluate $\left(\frac{6.79 \times 0.3911}{\text{Log } 5}\right)^{3/4}$

2. Find the range of x if $2 \leq 3 - x < 5$

3. The mass of a mixture A of beans and maize is 72kg. The ratio of beans to maize is 3:5 respectively

   (a) Find the mass of maize in the mixture

   (b) A second mixture of B of beans and maize of mass 98 kg in mixed with A. The final ratio of beans to maize is 8:9 respectively. Find the ratio of beans to maize in B

4. Simplify $\sqrt{2x \times 5^{2x}2^{-x}}$

5. In the month of January, an insurance salesman earned Kshs 6750 which was a commission of 4.5% of the premium paid to the company.

6. Solve for x $(\log_3 x)^2 - \frac{1}{2}\log_3 {}^3/_2$

7. The equation of a line is

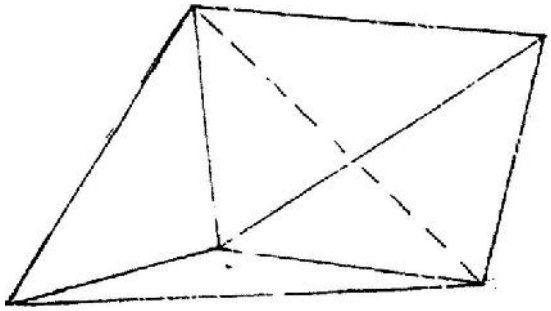
   $-{}^3/_5x + 3y = 6$

   Find the:

   (a) Gradient of the line

   (b) Equation of a line passing through point (1,2) and perpendicular to the given line.

8. The figure below shows a solid made by passing two equal regular tetrahedra.



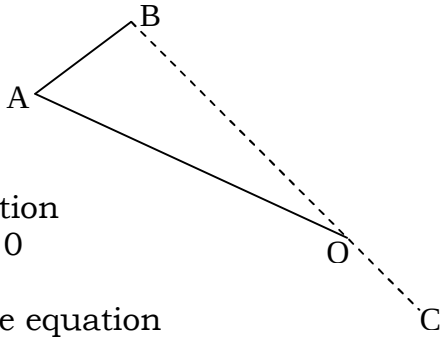
(a) Draw a net solid

(b) IF each face is an equilateral triangle of side 5cm find the surface area of the solid

9. Two towns A and B are 220km apart. A bus left town A at 11. 00am and traveled towards B at 60 km/h. At the same time, a matatu left town B for town A and traveled at 80 km/h. The matatu stopped for a total of 45 minutes on the way before meeting the bus. Calculate the distance covered by the bus before meeting the matatu.

10. Use binomial expression to evaluate $(0.96)^5$ correct to 4 significant figures

11. In the figure below triangle ABO represents a part of a school badge. The badge has as symmetry of order 4 about O. Complete the figures to show the badge.



12. Solve the equation
$8s^2 + 2s - 3 = 0$

Hence solve the equation
$8\sin^2\theta + 2\sin\theta - 3 = 0$ for $0^0 \le \theta \le 180^0$

13. The number of people who attended an agricultural show in one day was 510 men, 1080 women and some children. When the information was represented on a pie chart, the combined angle for the men and children was 2160. find the angle representing the children.

14. The points P. Q and R lie on a straight line. The position vectors of P and R are $2i + 2j + 13k$ and $5i - 3j + 4k$ respectively. Q divides PR internally in the ratio 2:1
Find the
(a) Position vector of Q.

15. A construction firm has tractors T+1 and T_2. Both tractors working together can

complete a piece of work in 6 days while T_1 alone can complete the work in 15 days. After two tractors had worked together for four days, tractor T_1 broke down.
Find the time it takes tractor T_2 to complete the remaining work

16. Find the equation of the tangent to the curve

$Y = (x^2 + 1)(x - 2)$ when $x = 2$

SECTION II (48 Marks)

Answer any six questions from this section

17. A retailer bought 49kg of grade 1 rice at Kshs. 65 per kilogram and 60 kg of grade II rice at Kshs 27.50 per kilogram. He mixed the tow types of rice.

(a) Find the buying price of one kilogram of the mixture

(b) He packed the mixture into 2 kg packets

(i) If he intends to make a 20% profit find the selling price per packet

(ii) He sold 8 packets and then reduced the price by 10% inorder to attract customers. Find the new selling price per packet.

(iii) After selling of the remainder at reduced price, he raised the price so as to realize the original goal of 20% profit overall. Find the selling price per packet of the remaining rice.

18. A tower is on a bearing of 030^0 from a point P and a distance of elevation of the

top is 15^0 and the angle of depression of the foot of the tower is 1^0.

a) Find the height of the tower

b) A point Q is on the same horizon plane as point P. The tower is on a bearing 330^0 from Q and at a distance of 70 m

19. Patients who attend a clinic in one week were grouped by age as shown in the

table below:

Age x years	$0 \le x < 5$	$5 \le x < 15$	$15 \le x < 25$	$25 \le x < 45$	$45 \le x < 75$
No. of patients	14	41	59	70	15

i. Estimate the mean age

ii. On the grid provided draw a histogram to represent the distribution

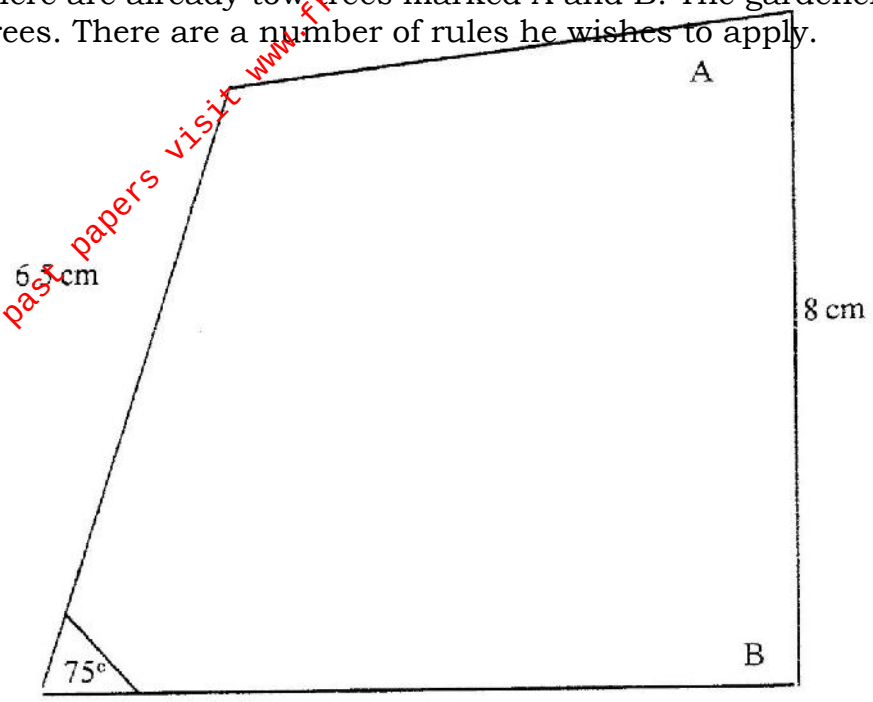
1 cm to represent 5 unit on the horizon axis

2 cm to represent 5 units on the vertical axis

20. The first term of an arithmetic progression is 4 and the last term is 20. The sum of the term is 252. Calculate the number of terms and the common differences of the arithmetic progression

(b) An Experimental culture has an initial population of 50 bacteria. The population increased by 80% every 20 minutes. Determine the time it will take to have a population of 1.2 million bacteria.

21. The diagram below shows a garden drawn to scale of 1: 400. In the garden there are already tow trees marked A and B. The gardener wises to plant more trees. There are a number of rules he wishes to apply.



Rule 1: Each new tree must be an equal distance from both trees A and B.
Rule 2: Each new tree must be atleast 4 m from the edges of the garden.
Rule 3: each new tree is atleast 14 m from tree B.

(a) draw the locus given by each of these rules on the diagram

(b) If the new trees are to be planted 4m apart, show on your diagram the possible planting points for the new trees.

22. (a) complete the table below, giving your values correct to 2 decimal places.

x	0	10	20	30	40	50	60	70
Tan x	0							
2 x + 300	30	50	70	90	110	130	150	170
Sin (2x + 30^0)	0.50			1				

b) On the grid provided, draw the graphs of y = tan x and y = sin (2x + 30^0) for $0^0 \leq x\ 70^0$
Take scale: 2 cm for 100 on the x- axis
4 cm for unit on the y- axis
Use your graph to solve the equation tan x- sin (2x + 30^0) = 0

23. The transformation R given by the matrix

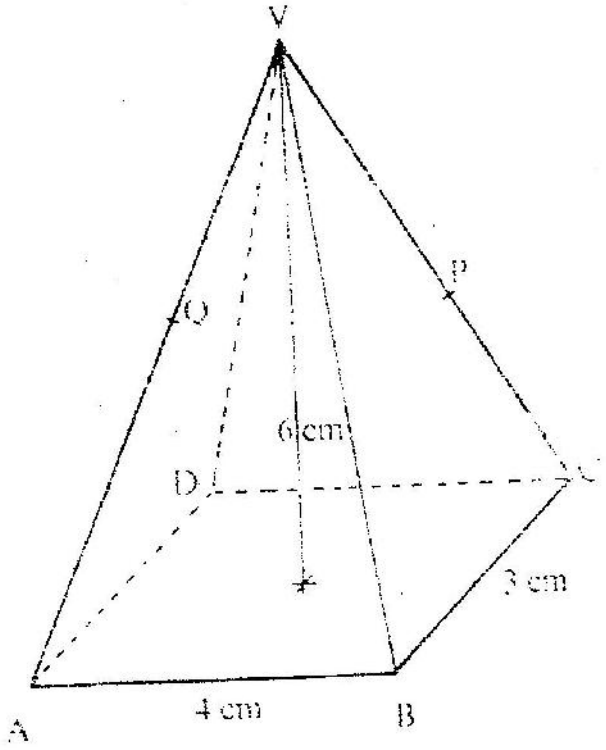
A = $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ maps $\begin{pmatrix} 17 \\ 0 \end{pmatrix}$ to $\begin{pmatrix} 15 \\ 8 \end{pmatrix}$ $\begin{pmatrix} 0 \\ 17 \end{pmatrix}$ to $\begin{pmatrix} -8 \\ 15 \end{pmatrix}$

(a) Determine the matrix A giving a,b,c and d as fractions

(b) Given that A represents a rotation through the origin determine the angle of rotation

(c) S is a rotation though 180^0 about the point (2, 3). Determine the image of (1, 0) under S followed by R.

24. The diagram below shows a right pyramid VABCD with V as the vertex. The base of the pyramid is rectangle ABCD, WITH ab = 4 cm and BC= 3 cm. The height of the pyramid is 6cm.



(a) Calculate the

(i) length of the projection of VA on the base

(ii) Angle between the face VAB and the base

(b) P is the mid- point of VC and Q is the mid – point of VD.
Find the angle between the planes VAB and the plane ABPQ