Name…….Index No……

121/1
MATHAMATICS
PAPER 1
July/August – 2009
Time: 2 ½ Hours

INTERZONAL

Kenya Certificate of secondary Education

Mathematics
Paper 1
July/August – 2009
Time 2 ½ Hours

SECTION I: (50 MARKS)

Answer all questions in this section

1. Simplify completely (3 marks)

   $^{2}/_{3} \div 1\ ^{2}/_{5} + {}^{3}/_{5} \times {}^{7}/_{12}$ of $({}^{1}/_{3} - {}^{1}/_{7})$

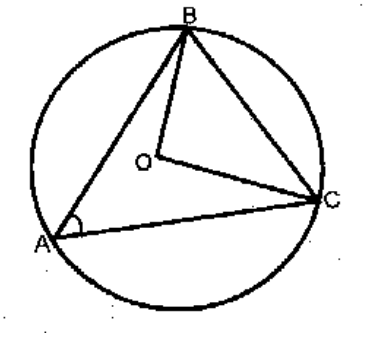
2. A sum of money is divided between three men, x,y and z in the ratio 5:3:1. if y has shs. 700 more than z. calculate how much x has (3 marks)

3. Using logarithms tables evaluate (4 marks)

$$\sqrt{\frac{3.361\times 0.054}{24.5-12.1}}$$

4. Change the recurring decimal $0.7\dot{3}$ and simply completely (2 marks)

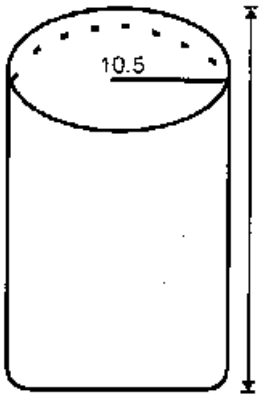
5. In the figure below, O is the centre of the circle and OB bisects angle ABC given that angle BAC $= 40^0$, find angle ABO (3 marks)



6. Solve for m in the equation (3 marks)
$125^{(m+1)} + 5^{3m} = 630$

7. Find the integral values of x of which (3 marks)
$5 \leq 3x + 2$ and
$3x - 14 \leq -2$

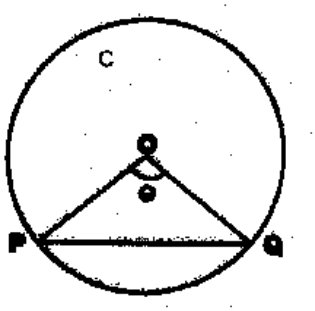
8. The solid shown consists of a cylinder and a hemisphere of equal radius 10.5 cm. If the height of the solid is 30 cm, find its volume (4 marks)
(take pie = 22/7



9. Solve the following equation (3 marks)
Sin (2x – 30) = 3/2 for $\Delta \leq x \leq 180^0$

10. Find the inverse of the matrix $\begin{pmatrix} 1 & 1 \\ 3 & 1 \end{pmatrix}$ Hence determine the point intersection of the lines (4 marks)
y + x = 7
3x + 7 =15

11. In the following figure, O is the centre of the circle, $\Delta = 90^0$ and PQ = 24cm



Find

(a) area of the sector POQ (2 marks)

(b) area of the minor segment PQ (2 marks)

12. Solve the following simultaneous equations (3 marks)

$\text{Log}_2 (4y + x) = 3$

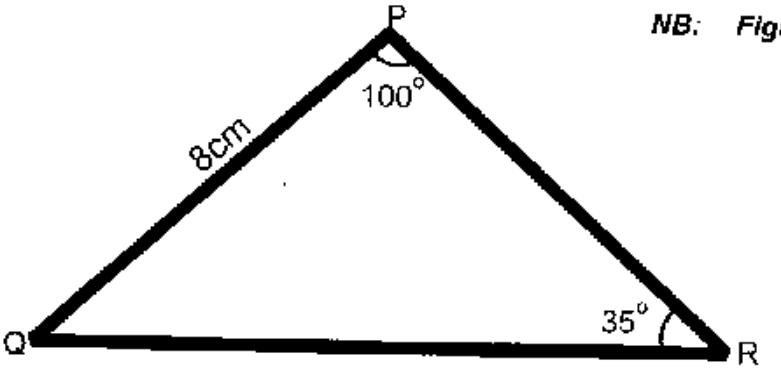
$\text{Log}_3 (4x + y) = 2$

13. Use vectors to show that a triangle with the vertices P(2,3), Q(6,4) and R (10,5) is Isosceles (3 marks)

14. The LCM of 15, 18 and the third number is 1260. Find the square root of the third number (2 marks)

15. Given that m r^2h. Find the percentage change in m if r is decreased by 15% and n is increased by 12% (3 marks)

16. The figure below shows triangle PQR in which PQ = 8 cm, angle QPR = 100^0 and angle PRQ = 35^0. calculate to 2 decimal places the length of QR hence the area of triangle PQR. (3 marks)



NB: Figure not to scale.

SECTION II : 50 MARKS)

17. Two towns P(60^0N, 25^0) and (60^0N, 155^0E) are both on the same parallel of latitude and also on the same great circle. A pilot can fly from P to Q along the parallel of latitude or along the great circle over the north pole

    (a) Giving your answer to the nearest kilometer, determine which route is shorter and by how much? (5 marks)

    (b) The average speed of the aircraft is 600km/h. Calculate to the nearest minute the time taken by the pilot using either route. (5 marks)

18. Two variables P and Q are connected by the equation.
    $P= aQ^b$ where a and b are constants. The table below gives the values of P

P	1.00	1.35	1.74	2.24	2.88	3.80	4.90	6.30
Q	1.26	1.58	2.00	2.51	3.16	3.98	5.01	6.30

    (a) Write down a linear equation which connects P and Q (2 marks)

    (a) Draw a suitable straight line graph to represent the relation in part (a) Above (5 marks)

    (b) Use your graph to estimate the values of a and b

19. (a) On the squared paper plot the points A(1, 5), B(3,1), C(4,4) and (3,3) join these points carefully to form quadrilateral ABCD (2 marks)

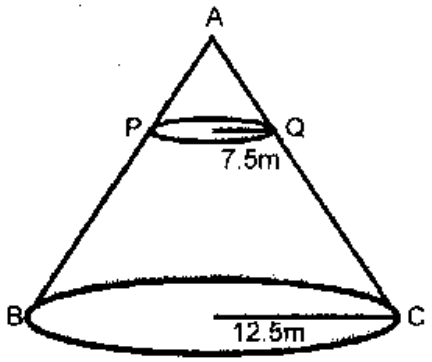
(b) The points A^1 (2,10), B^1(6,2), C^1(8,8) and D^1(6,6) are the images of ABC and D respectively under a certain enlargement. On the same grid draw the image quadrilateral A^1 B^1 C^1D^1 (2 marks)

(c) Use the construction method to locate the centre of enlargement O and state its coordinates (2 marks)

(d) What is the scale factor of this enlargement? (1 mark)

(e) Determine the matrix m of this enlargement (3 marks)

20. P Q C B shows a frustrum of a rift – circular cone. The top conical part APQ is chopped off. The radius of the top and bottom circular parts of the frustrum are 7.5 cm and centres M and O of the top and bottom parts are 10 cm part.
(a) Calculate the slant length QC of the frustrum correct to d.p (1 mark)



(b) calculate the volume of frustrum (5 marks)

(c) If the frustrum is solid metal and is melted down and recast into a solid cylinder having a radius 10.5cm, calculate
(i) the height of cylinder correct to 3 d.p

(ii) The surface area of the cylinder (2 marks)

21. The figure below shows a uniform cross – section of a swimming pool which is 4cm wide. The depth of the pool increases gently from 1.5 m to 3.0 m

(a) How much water in litres, does it hold when full? (3 marks)

(b) calculate the total internal surface area of the pool (5 marks)

(c) Find the angle at which the bottom of the pool inclines to the horizontal (2 marks)

22. In a mathematic examination the percentage marks scores by 120 pupils were recorded as follows:

Marks	1-10	11-20	21-30	31-40	41-50	51-50	61-70	71-80	81-90	91-100
No of pupils	2	5	15	20	26	30	12	4	3	2

Plot an angle on the graph paper provided (3 marks)

Hence use your graph to estimate
(a) The median (1 mark)

(b) the upper and lower quartile (2 marks)

(c) if the pass P mark was 45, what was the percentage of the students who passed the examination? (3 marks)

23. An item is sold by cash 10,800. it can also be bought by hire purchase by paying no deposit and 15 monthly installments of shs 1,200 each
Calculate

(a) the purchase price (3 marks)

(b) the rate of interest paid per months by a customer if the item is sold on hire purchase terms (7 marks)

24. The table below shows how income tax was charged in a certain year

Taxable income per year (Kenya Pounds)	Tax Rate Shs. Per Kenya Pound
1- 3630	2
3631-7260	3
7261 -10890	4
10891 – 14520	5
14521 – 18150	6
18151 – 21780	7
21781 and above	7.5

During that year Mwove earned a basic salary of shs 252000 and a house allowance of Kshs 12 600 per month. He was entitled to a personal tax relief of 960 per month

(a) Calculate

(i) Mwove's taxable income in Kenya pounds per annum (2 marks)

(ii) The net tax he pays per month (6 marks)

(b) Apart from income tax other deductions amounting to Shs 1075 are made from Move's monthly income. Calculate his net monthly pay (2 marks)