FORM FOUR CLUSTER KCSE MODEL1

MATHEMATICS PAPER 1 QUESTIONS

SECTION I (50 Marks)

Answer all questions in this section in the spaces provided.

1. Evaluate

$$\frac{\frac{1}{4}+\frac{1}{5}\div\frac{1}{2}\ of\ \frac{1}{3}}{\frac{1}{2}\ of\left(\frac{4}{5}\div\frac{3}{4}+\frac{1}{3}\right)}$$

2. A straight line L1 is perpendicular to another line L2 whose equation is 3y+4x=12. If the two lines meet at point P which lies on the x- axis, find ;

   i) The co-ordinates of P. (1mark)

   ii) The equation of L1 in the form y= mx+c. (2marks)

3. Use squares, square roots and reciprocal tables to evaluate to 4 significant figures, the expression

$$(0.0546)^{\frac{1}{2}}+\left(\frac{2}{43.27}\right)^2$$

4. Use the exchange rates below.
   Buying Selling
   1Uk£ 120.25 120.95
   1US dollar 80.00 80.20

   A tourist arrived in Kenya with 4500 US dollars. He converted the dollars to Kenya shillings at the bank, while in Kenya he spent shs 200,000 and converted the balance to UK pounds through a broker who charged him a commission of 7.5%. Calculate, to the nearest pounds, the amount he received.

5. A point X divides line MN below externally in the ratio 7:3. By construction determine the position of point X.

6. Three girls A, B and C shared a packet of 108 sweets. B got twice as much as A while C got one and a half times as much as A. Find the number of sweets received by C.

7. Simplify:- $\dfrac{49x^2-y^2}{7x^2-xy+21xy-3y^2}$

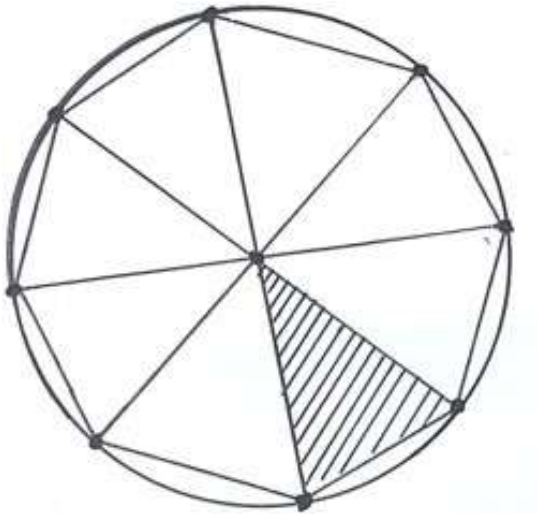
8. A bus left Mombasa for Nairobi, a distance of 500km. If the bus arrived at Nairobi at 6.35pm after a stop-over for 30 minutes at Mtito Andei, travelling at 75km/h. At what time had it left Mombasa.
9. Four bells ring at intervals of 15, 18, 20 and 24 seconds respectively. They ring together at 1105hrs. How many times will they have rang together simultaneously by 1320h?

10. If Sin θ = ½ and θ is an obtuse angle, find without using tables or a calculator the value of

$$\frac{Cos\theta - \tan\theta}{Sin\theta}$$

11. The perimeter of a triangle is 24. Its area is 26.83281573cm^2. If one of the sides is 7cm find the other two sides of the triangle.

12. The figure below has a rotational symmetry of order 5. Complete the diagram by shading the appropriate regions.



13. The time taken by 8 athletes during Laikipia County athletics competition were recorded as follows, in seconds. 54.2, 49.8, 55.6, 52.3, 57.2, 52.3, 58.2 and 50.7. Find the median time.

14. Solve the simultaneous inequalities given below and list all the integral values of x:-

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

15. Solve for x

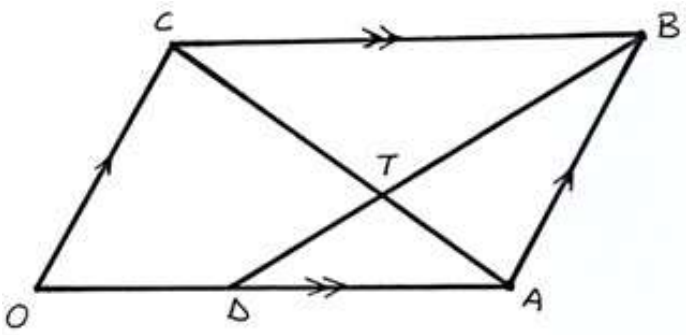
$$\left(\frac{1}{8}\right)^{1-x} = \frac{16^{3x+1}}{2^{x-1}}$$

16. Seven years ago, Kim was ten times as old as his son Ian. In fifteen years time, the sum of their ages will be 77 years. Determine their present ages.

SECTION II (50 Marks)

Answer only five questions in this section

17. The figure below is a parallelogram.



$\vec{OA} = a$ and $\vec{OC} = c$. D is a point on OA such the OD : DA = 1 : 4

a) Express the following in terms of $\underset{\sim}{a}$ and $\underset{\sim}{c}$. (2 marks)

i) $\vec{AC}$

ii) $\vec{BD}$

b) The line CA and BD intersect at T. Given that

$\vec{AT} = h\vec{AC}$ and $\vec{BT} = t\vec{BD}$

where h and t are scalars.
Express (i) $\vec{OT}$ in terms of a, c and h. (2 marks)

(ii) $\vec{OT}$ in terms of a, c and t. (2 marks)

c)i) Find the values of h and t. (3 marks)

(ii)Find the ratio AC: TC (1 mark)

18. Two cylindrical containers are similar. The larger one has internal cross- section area of 45cm^2 and can hold 0.945 litres of a liquid when full. The smaller container has internal cross-section area of 20cm^2

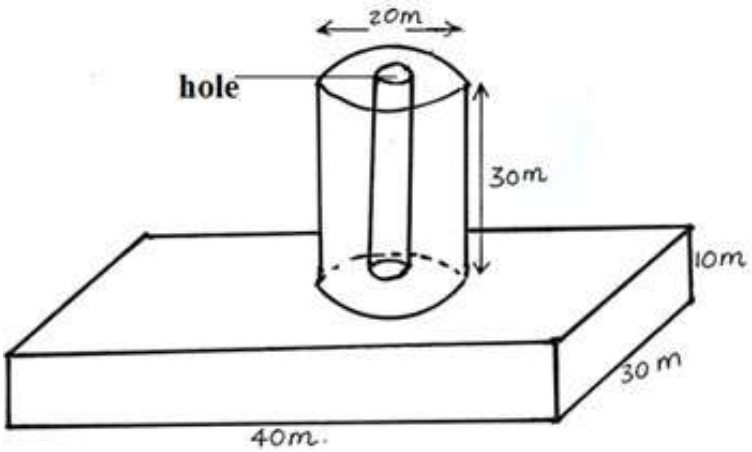
a) Calculate the capacity of the smaller container. (3marks)
b) The larger container is filled with water to a height of 13cm. Water is then drawn from it and emptied into the smaller container until the depths of the water in both containers are equal. Calculate the depth of water in the two containers. (2marks)
c) One fifth of the water in the larger container in part (b) above is further drawn and emptied into the smaller container. Find the difference in the depths of water in the two containers. (5marks)

19. A land buying company decided to buy a piece of land at Ksh 180 000. Before they bought the land, three new members joined the company. As a result each member had to contribute Ksh

3000 less.

a) i) If the initial number of members is x, form an expression to show what each of the original members would have contributed if the three did not join the company. (1 mark)
ii) The amount contributed by each member when the three joined the company. (2 marks)
b) Find the original number of members. (3 marks)
c) How much would each have contributed before the three joined the company? (2 marks)
d) Calculate the percentage decreases in the contribution per member caused by the addition of three new members. (2 marks)

20. The solid below is made up of a hollow cylindrical part and a cuboid.



The hole in the cylindrical part has a diameter of 5.6m $\left(Take\ \pi = \frac{22}{7}\right)$.

a) Determine: i) The volume of the solid. (3marks)
ii) The surface area of the solid. (4marks)
b) The density of the material used to make the cylindrical part is 0.5g/cm^3 while that used to make the cuboid part is 0.65g/cm^3. Determine the mass of the solid in kg. (3marks)

21. In a town, a hospital is 140km on a bearing of N 650E from a supermarket and a police post is 200 km on a bearing of S320E from the hospital. A school is 90km on a bearing of 1900 from the supermarket. Using a scale of 1cm to represent 20km;

a) Draw a diagram to show the relative positions of the hospital, supermarket, police post and the school. (3 marks)

b) Using your diagram, find; i) The distance between the school and the hospital. (1 mark)

ii) The bearing of the school from the police post. (1 mark)

iii) The distance from the supermarket to the police post. (1 mark)

c) i) Find how far the police post is South of the hospital. (3 marks)

ii) The bearing of the school from the hospital. (1 mark)

22. A truck left Maralal and travelled towards Nairobi at average speed of 80km/h. 1 ¼ hours later a Nissan matatu left Maralal and travelled towards Nairobi at a speed of 120 km/h. The distance between Nairobi and Maralal is 500km. Determine:

a) The distance covered by the truck from Nairobi when the matatu took off. (2marks)

b) The distance covered by the matatu to catch up with the truck. (3marks)

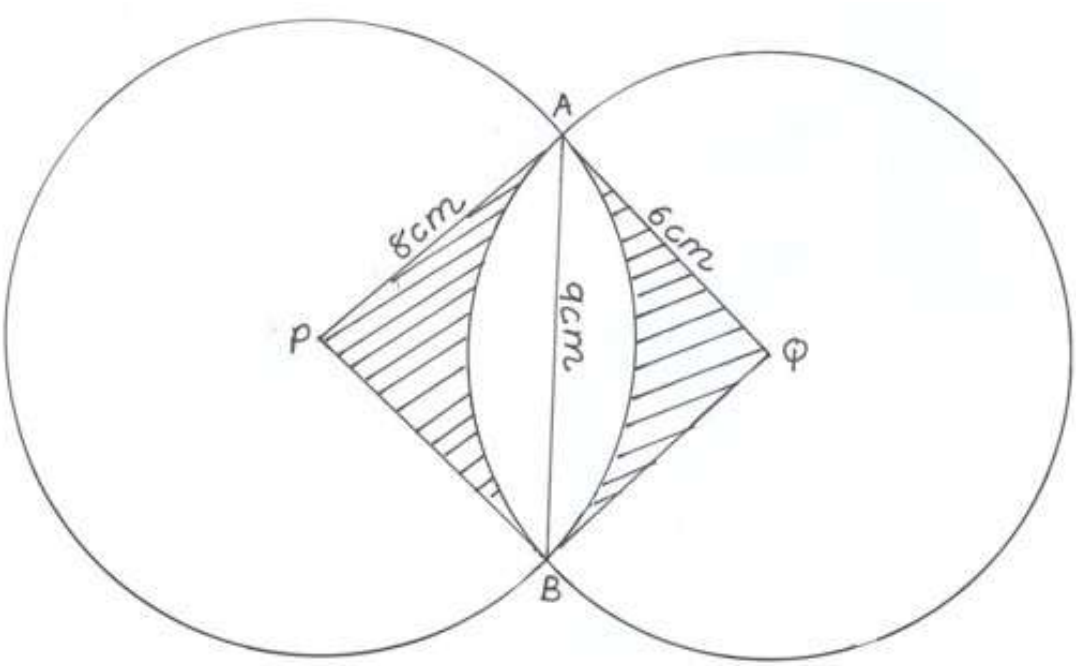
c) The matatu developed a mechanical problem after travelling for 350km, which took 30 minutes to repair. At what speed should the matatu move in order to arrive at Nairobi at the expected time? (5marks)

23. a) Find the equation of the normal to the curve $y=4x^2+4x-3$ at $x=-3$ (3 marks)

b) Sketch the curve of the function $y=4x^2+4x-3$ (4marks)

c) Using four trapezia, estimate the area enclosed by the curve $y=4x^2+4x-3$ and the x-axis. (3marks)

24. The figure below shows two intersecting circles radii 8cm and 6cm respectively. Their common chord AB =9cm and P and Q are their centres as shown.



a) Calculate the size of angles,

i) Angle APB (2marks)

ii) Angle AQB (2marks)

b) Calculate; i. Area of sector APB. (2marks)

ii. Area of sector AQB (2 marks)

iii. The area of the shaded region. (2 marks)