FORM FOUR CLUSTER KCSE MODEL 3

MATHEMATICS PAPER 2 QUESTIONS

SECTION 1 (50 Marks)

Answer all the questions in this section in the spaces provided below each question.

1. Use logarithms to evaluate
   3673.0497.4 53.81cos 0 · (4 marks)

2. The internal and external diameter of a metal pipe were given as 1.8 cm and 2 cm respect ively. Calculate the maximum thickness of the pipe. (2 marks)

3. Make Q the subject of the formula. (3 marks)

$$T = P\sqrt{\frac{Q}{Q-1}}$$

4. Without using a calculator or mathematical tables, express $\frac{\cos 30^0}{\tan 45^0 + \sqrt{3}}$ in surd form and simplifyleaving your answer in the form (4 marks)

$$a + b\sqrt{c}$$

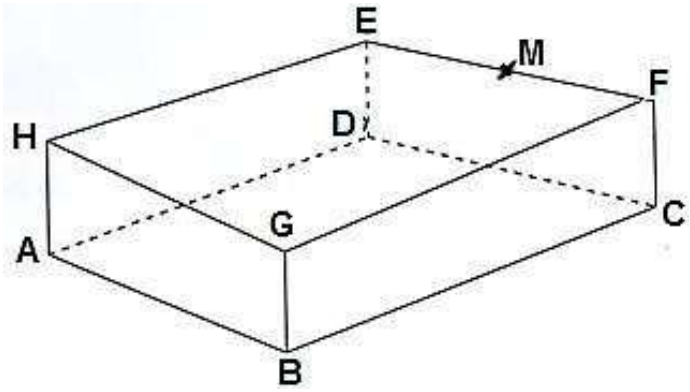
where a, b and c are rational numbers.

5. Find the period and amplitude of a wave whose equation is

$$y = -2\sin\left(\frac{2}{3}x - 40^0\right)$$

xy (2 marks) 3 2 sin2

6.



In the cuboid above AB=6 cm, BC= 8cm and CF=6.8 cm

. M is the mid- point of EF. Find the angle between BM and the plane ABCD. (4 marks)

7. Two special grades of baking flour costing Ksh. 200 and Ksh. 250 per kg respectively are mixed in the ratio 3:5 by weight.

The mixture is then sold at Ksh. 240 per kg. Find the percentage profit on the cost correct to 1 d.p. (2 marks)

8. Solve for x in the equation.

$$Sin(4x-10)-\cos(x+60)=0$$

(2 marks)

9. Find the inverse of the matrix $\mathbf{X}\begin{bmatrix}3 & 1\\ 2 & -1\end{bmatrix}$, hence find the points of intersection of the lines.

$$3x+y=4 \quad and \quad 2x-y=1$$

10. . a) Expand $(2-\frac{1}{4}x)^5$ up to the term in x^3

(4 marks) (1 mark)

b) Using the above expansion evaluate 1.755 to 4.s.f. (2 marks)

11. List all the integral values of x which satisfy the inequalities.

$$\frac{4+x}{-3} > 3x+2 > -13$$

(3 marks)

12. The sum of the fifth and the sixth terms of an AP is 30. If the third term is 5, find the first term. (3 marks)

13. . Find the radius and the centre of a circle whose equation is $3x^2+3y^2+18y-12x-9=0$ (3 marks)

14. Solve the equation log 3(x+3)=2+3 log 3 (3 marks)

15. . Determine the quartile deviation of the data 18,15,21,19,17,22,21 (2 marks)

16. A two digit number is formed from the first four prime numbers.

    a) Draw a table to show all the possible outcomes. (2 marks)

    b) What is the probability that a two digit number formed from the prime numbers is an even number or a number divisible by 7? (2 marks)

SECTION 2 (50 Marks)

Answer all the questions in this section in the spaces provided below each question.

17. . a) Construct triangle PQR such that PQ=7 cm, QR= 6 cm and RP= 5 cm. (2 marks)

    b) On the above figure, construct the locus of a point X which is equidistant from Q and R. (1 mark)

    c) Also construct the locus of M which is equidistant for PR and RQ. Mark with letter M the point where this locus meets PQ. Measure QM. (3 marks)

    d) Construct the locus of Y such that PY = 4 cm, within the triangle PQR. (1 mark)

    e) Shade the region in which T lies given that

$$QT \geq TR$$

and

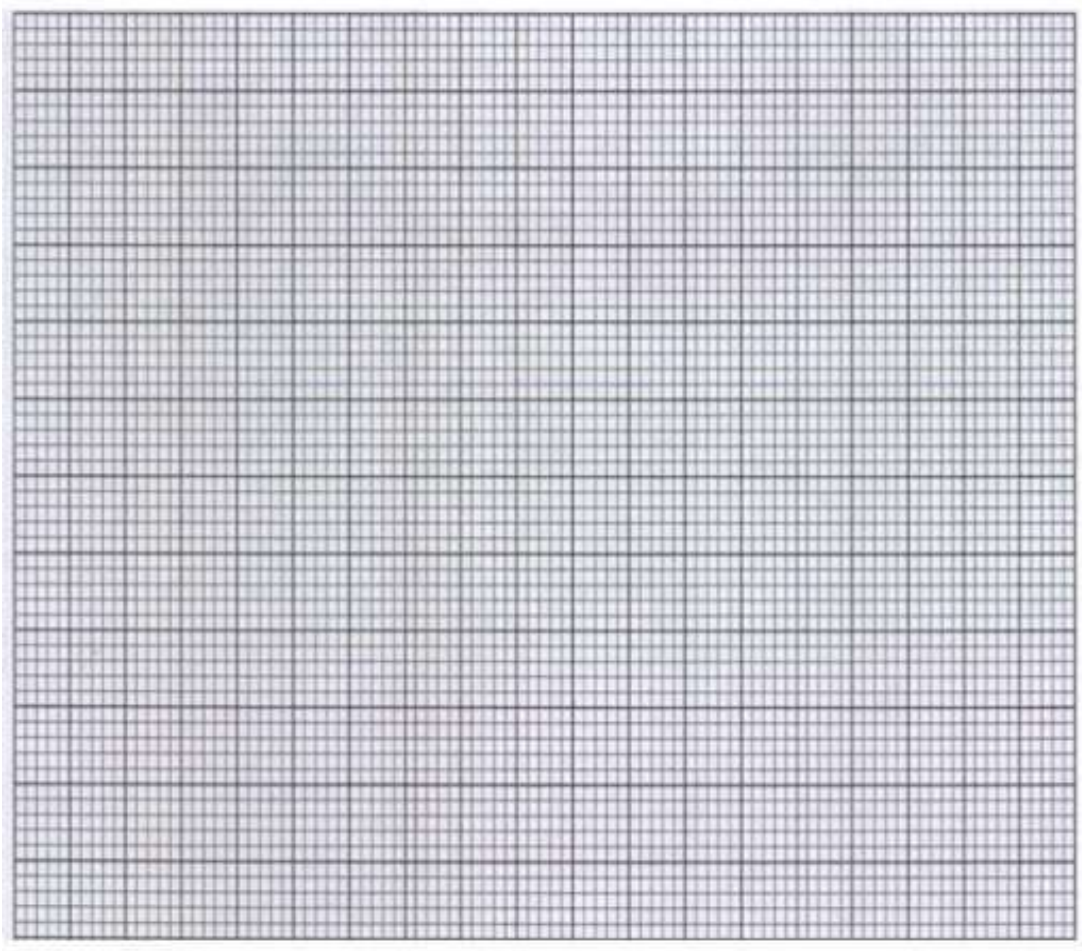
$$<PRT \geq QRT \text{ and } PT \leq 4cm.$$

(3marks

18. The points A1,B1C1 are the images of A(4,1),B(0,-2) and C(-2,4) respectively under a transformation represented by the matrix

$$M = \begin{bmatrix} -1 & 1 \\ 2 & -3 \end{bmatrix}$$

(a)Write down the coordinates of A1,B1 and C1, hence plot triangles ABC and A1,B1 and C1 on the same grid. (4 marks)



b) A11,B11 and C11 are the images of A1, B1 and C1 respectively under another transformation whose matrix is

$$N=\begin{bmatrix}2 & -1\\ 1 & 2\end{bmatrix}$$

. Write down the coordinates of A11,B11 and C11 hence plot A11, B11 and C11 (3 marks)

c) Transformation M followed by N can be represented by a single transformation P, determine the matrix P. (3 marks)

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19. . The table below shows distribution table of wages in a week for a number of employees in a certain factory. Wage 800-899 900-999 1000-1099 1100-1199 1200-1399 1400-1599 No of workers 3 10 23 9 3 2

Wage	800-899	900-999	1000-1099	1100-1199	1200-1399	1400-1599
No of workers	3	10	23	9	3	2

a) State the modal class. (1 mark)

Using Ksh. 1049.50 per week as assumed mean wage, calculate the; i. Mean wage for the group. (4 marks)

ii. Standard deviation. (5 marks)

20. . The cost C, of producing n items varies partly as n and partly as the inverse of n, to produce two items it costs Ksh.50 and to produce six items it carts Ks. 70. Find;

a) The constants of proportionally and hence write the equation connecting C and n. (5 marks)

b) The cost of producing 12 items. (2 marks)

c) The number of items produced at a cost of Ksh, 106. (3 marks)

21. Two towns A and B lies on the same parallel of latitude 600N. If the longitudes of A and B are 420W and 290E respectively.

a) Find the distance between A and B in nautical miles, along the parallel of latitude.(2 marks)

b) Find the local time at A if the local time at B is 1.00 p.m. (2 marks)

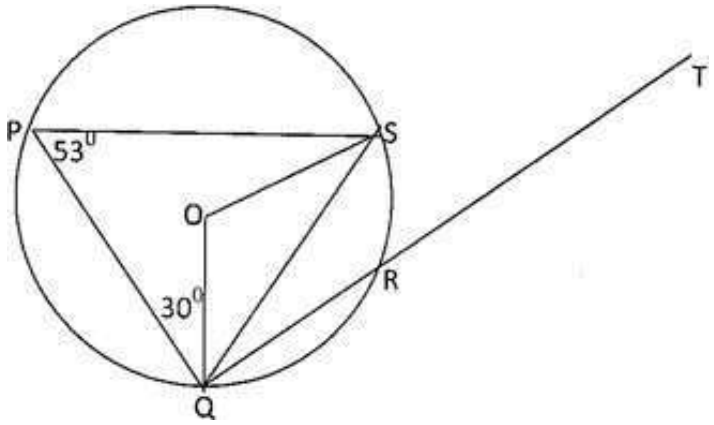
c) Find the distance between A and B in km.

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

(2 marks)

d) If C is another town due south of A and 10010km away, find the coordinates of C.(4marks)

22. . In the figure below O is the centre of the circle, angle SPQ=530 and PQO=300



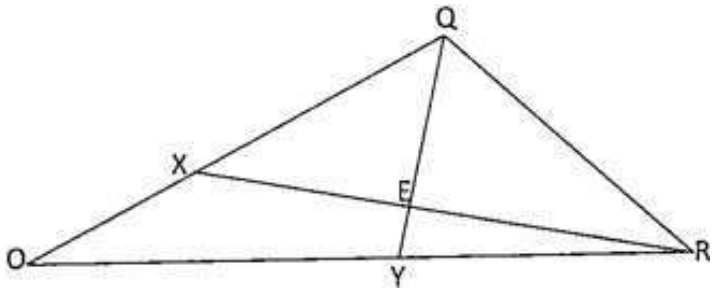
a) Find the sizes of the angles. (2 marks) i. SOQ

ii. PSO (3 marks)

iii. SRT (2 marks)

b) If the radius of the circle is 14 cm find the area of the triangle OQS. (3 marks)

23. In the figure below OQ =q and QR =r. Point X divides OQ in the ratio 1:2 and Y divides OR in the ration 3:4. Lines XR and YQ intersect at E.



a) Express in terms of

~ q and

~ r

XR (1 mark)

ii. YR (1 mark)

b) If XE=mXR and YE=nYQ, express OE in terms of i. ~ r, ~ qand ~ m (2 marks)

ii.

~ r,

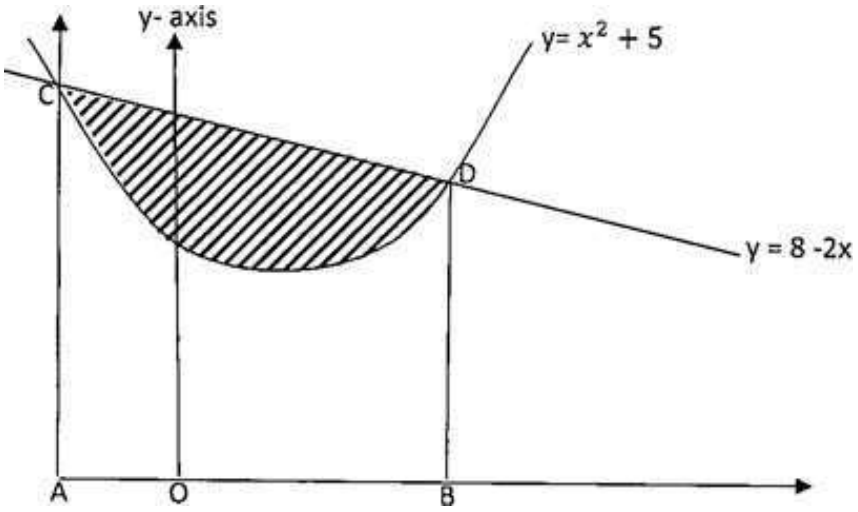
~ q and

~ n (2 marks)

c) Using the result in (b) above, find the value of m and n. (4 marks)

24. The diagram below not drawn to scale shows part of the curve $y = x^2 + 5$ and the line $y = 8 - 2x$

The line intersects the curve at point C and D. Lines AC and BD are parallel to the y axis.



a) Determine the coordinates of C and D. (4 marks)

b) Calculate the exact area bounded by the curve and the x axis between the points C and D. (3 marks)

c) Calculate the areas enclosed by lines CD, CA, BD and the x-axis. (2 marks)

d) Hence determine the area of the shaded region. (1 mark)