

FORM FOUR CLUSTER KCSE MODEL 6
MATHEMATICS PAPER 2 QUESTIONS

SECTION 1 (50 Marks)

Answer ALL the questions in this section.

1. Simplify without using tables or a calculator;

$$\frac{\log 343 - \log 49}{\frac{1}{2} \log 7}$$

2. Without using tables or calculator, evaluate

$$\frac{1}{(1+\sqrt{2})^2} + \frac{1}{(1-\sqrt{2})^2}$$

3. The first three terms of a geometric progression are the first, fourth and the tenth terms of arithmetic progression. Given that the first term of GP is 6, find the common difference of the arithmetic progression.
4. Make m the subject of the formula

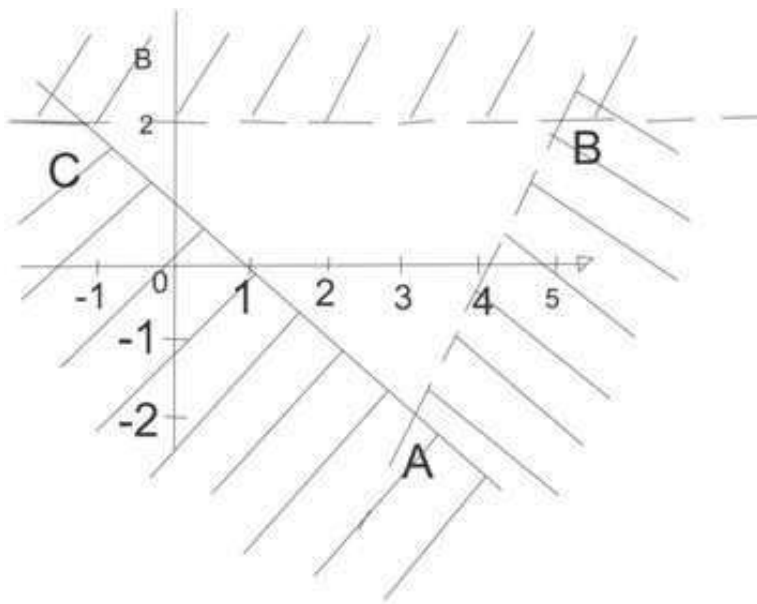
$$k = \frac{m}{f} \sqrt{\frac{p^2 - d^2}{m}}$$

5. Mudete tea worth Kshs. 160 per kg. is mixed with Kericho tea worth Kshs. 240 per kg. in the ratio 3: 1. In what ratio should this mixture be mixed with Nandi tea worth Ksh. 200 per kg to produce a mixture worth Kshs. 47 per kg.
6. The cost of hiring a trailer is partly constant and partly varies with the square of distance covered. When the distance covered was 10km the cost was sh 1600 and when the distance covered was 15km the cost was sh 1725. Determine the cost of hiring the tractor for 20km
7. Solve x if

$$\log_4 x + \frac{1}{2} \log_2 x = 3$$

8. Write down the inequalities that represent the region ABC in the figure below;

A(3,-2), B(5,2) and



9. Determine the quartile deviation of the following data. 5, 1 0, 6, 5, 8, 7, 3, 2, 7, 8, 9, 4
10. The volume of a cuboid is 40.5m³ to one decimal place and the base area is 6.75m² correct to 2 decimal places. Find the absolute error in calculating the height of the cuboid.
11. .

is an acute angle find the value of $\cos \theta$

in the equation;

$$4 \sin^2 \theta - 7 \cos \theta - 2 = 0$$

12. Use the expansion of

$$\left(2 - \frac{1}{2}x\right)^6 \text{ up to } x^4$$

to evaluate

$$(1.95)^6,$$

correct to 4 decimal places.

13.

$\vec{OA} = 2\vec{i} + 3\vec{j} - 4\vec{k}$ and $\vec{OE} = \vec{i} + 3\vec{j} + \vec{k}$ divides a line in the ratio

3:2

Write down the co-

ordinates of D.

14. a) Convert the following to degrees (2mks)

i) 1.7c

ii)

$$\text{ii) } \left(\frac{3}{8}\pi\right)^c$$

b) Solve triangle PQR, given that P = 150, R = 1100, and P = 5cm. (3marks)

15. PQ is the diameter of the circle. Given that

Find the equation of the circle in the

$$\vec{P}(-6, 0) \text{ and } \vec{Q}(0, 8).$$

form

$$x^2 + y^2 + ax + by = c.$$

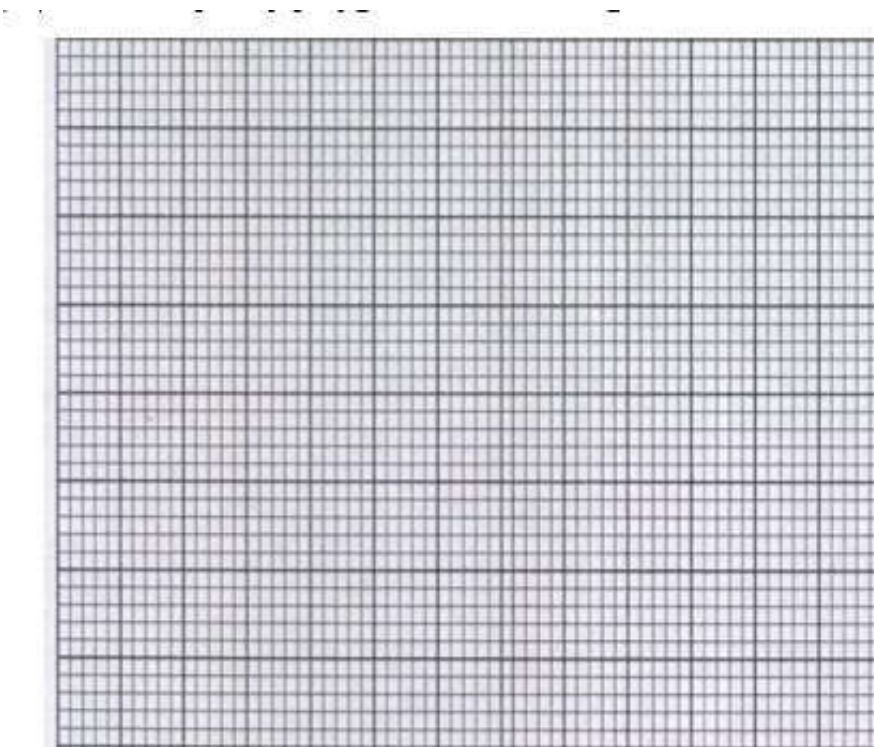
16. A particle whose velocity in air is given by the expression $(4-t)$ m/s moves in a straight line from a fixed point O. Calculate how far the particle will have moved after the third second.

SECTION II (50 Marks)

Answer any FIVE questions from this section

17. A transformation represented by $\begin{pmatrix} 2 & 1 \\ -1 & -2 \end{pmatrix}$ maps $W(-1,1)$ $X(1,1)$, $Y(3,-1)$ and $Z(-2,-1)$ onto $W^1X^1Y^1Z^1$ respectively.

- a) Plot the quadrilateral WXYZ and its image on the grid provided. (4marks)

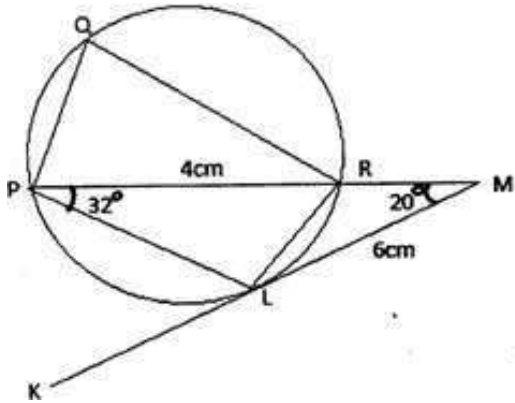


- b) Determine the area of WXYZ and its image $W^1X^1Y^1Z^1$. (2mks)
- c) A transformation represented by $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ maps $W^1X^1Y^1Z^1$ onto $W^{11}X^{11}Y^{11}Z^{11}$, axes. (2marks) on the same
- d) Determine a single matrix which maps $W^{11}X^{11}Y^{11}Z^{11}$ onto WXYZ. (2mks)
18. The length and breadth of a rectangle are given as $(3x-1)$ and $(x-2)$ centimeters respectively. If the length is doubled and the breadth increased by 2cm, the new area is three times that of the original rectangle.
- a) Form an equation in X and solve it. (4marks)

b) Find the dimensions of the original rectangle. (2marks)

c) Express the increase in area as a percentage of the original area. (4marks)

19. In the figure below KLM is a tangent. Angle RPL = 32° and angle PML = 20°



a) Giving reasons calculate the size of;

i) Angle PLR (3marks)

ii) Angle PLK (2marks)

iii) Angle PQR (2marks)

b) If PR=4cm and LM =6cm. Find the length RM. (3marks)

20. a) A certain amount of money was invested at compound interest of 10% compounded every two years for ten years. Given the investor realized a total of 500,000/= at the end of the ten years, find the amount of money invested to the nearest shillings. (3mks)

b) Miss Bahati bought a motorcycle valued at ksh 100,000. The value of the motorcycle depreciated at 7.5% semi annually. How long would it take its value to depreciate to Ksh 50 000 (3marks)

c) A teacher borrowed sh. 1000 000 from Kakamega teachers cooperative (KATECO). The interest on the loan was 1% per month, charged on the outstanding balance. He paid the loan in monthly instalments of sh. 25 000 each. If this amount included both the interest and part payment of the principal sum borrowed, calculate the amount he still owed after 9 months. (4marks)

21. a) Complete the table below for the equation

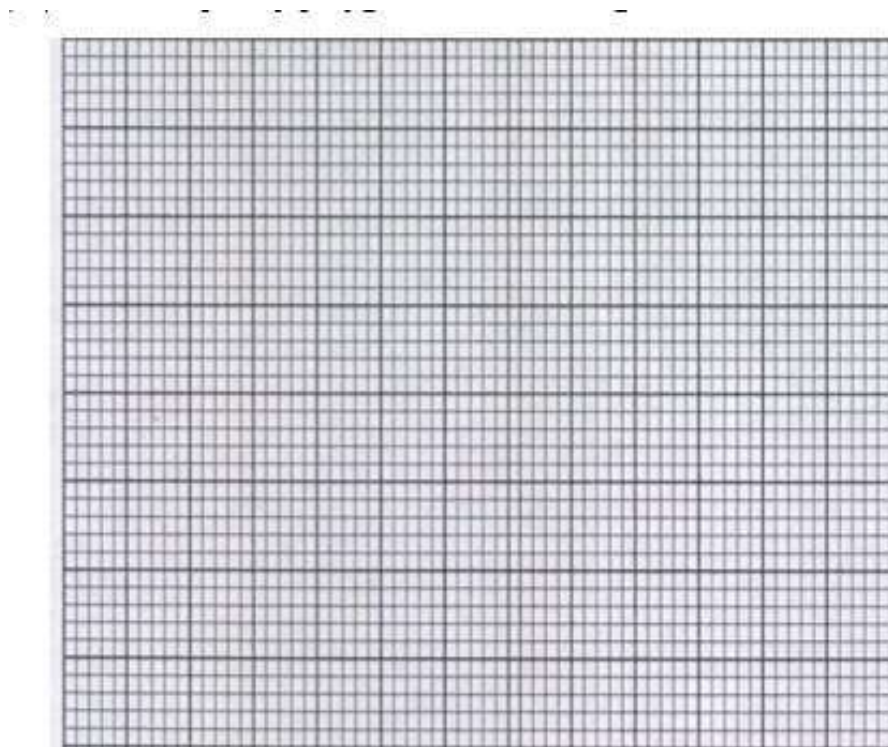
$$y = x^3 - 3x^2 - 9x + 2 \text{ for values of } x \text{ between the}$$

range $-3 \leq x \leq 5$. (2mks)

x	-3	-2	-1	0	1	2	3	4	5
x^3		-8		0			27		
$-3x^2$			-3		-3				
$-9x$	27								-75
2	2	2	2	2	2	2	2	2	2
y			7		-9				7

Using a scale of 1cm to represent 0.5 units on the horizontal axis, and 1cm to represent 2 units on the vertical axis draw the graph of (3mks)

$$y = x^3 - 3x^2 - 9x + 2$$



b) Use your graph to solve (2mks)

i) $x^3 - 3x^2 - 9x + 2 = 0$

ii) $x^3 - 3x^2 - 6x + 8 = 0$

(3marks)

22. An aircraft leaves town R $(20^\circ\text{S}, 15^\circ\text{E})$ and moves directly northwards to town S $(50^\circ\text{N}, 15^\circ\text{E})$. It then moved an average speed of 300 knots for 8hrs westwards to town T

Determine;

- a) The distance R S in nautical miles. (3marks)
- b) The position of town T. (3marks)
- c) The local time at T if local time at S is 1512h. (2marks)
- d) The distance moved from R to T in km. (Take 1nm = 1.853km) (2marks)

23. The probability of finding a police road block on the Buyangu - Butere road is

probability that a motorist will bribe at this road block is

$\frac{2}{5}$ is . The and of bribing el $\frac{3}{10}$ here

probability of the motorist causing an accident after the bribery is

$\frac{1}{6}$ The

causing an accident is

$\frac{5}{7}$. Otherwise the probability of

$\frac{1}{8}$

- a) Draw the probability tree to represent this information.(3marks)
- b) Calculate the probability that the motorist bribes and escapes an accident. (4marks)
- c) Calculate the probability that the motorist is killed in an accident. (3marks)
24. a) Construct triangle RST in which RS = 10cm, ST =9.5cm and angle TRS = 60° marks)
- b) On the same side of RS as T:
- i) Determine the locus of a point P such angle RPS = 60°
(3marks)
- ii) Construct the locus of A such that RA > 4cm (2marks)
- iii) Determine the region F such that angle $RTF \geq \text{angle STF}$
(2marks)