

Mathematics

Paper 1

11th March, 2024

2 hours

DEPARTMENTAL QUESTION PAPER

SET THREE

S.4 MATHEMATICS

Paper One

2 hours

STUDENT'S NAME: _____

STREAM : _____

Signature: _____

THIS PAGE IS FOR EXAMINER'S USE ONLY

Do not write in the boxes on this page. The examiner will use them to keep a record of your marks.

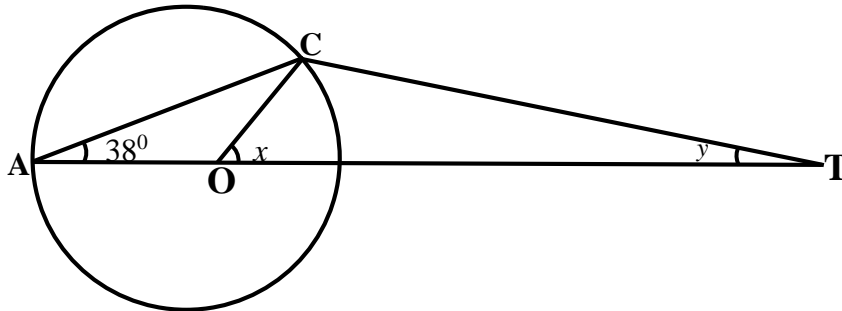
Qn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	TOTAL
Marks scored															

INSTRUCTIONS

1. Answer all the items in both sections.
2. Each item in section A carries 4 scores and each question in section B carries 15 scores.
3. Pay attention to the number of scores available for each item.
4. Show all the working and explanation on the answer sheets provided.

SECTION A: (40 SCORES)

1. Make x the subject of the formula $T = \sqrt{\frac{xn}{xb-m}}$ (04 scores)
2. Without using mathematical tables or a calculator, evaluate; $\left(\frac{1}{343}\right)^{-\frac{1}{3}} \div \left(\frac{1}{125}\right)^{-\frac{2}{3}}$ (04 scores)
3. The sum of two numbers is 8 and their difference is 2, find the difference between the squares of the numbers. (04 scores)
4. Given that O is the centre of the circle and TC is a tangent to the circle at C. Angle $OAC = 38^\circ$. Determine the size of angle x and y . (04 scores)



5. The school welfare master bought 10kg of rice and 5kg of meat at shs. 90,000 for the teachers meal. Later he decreased each of the above quantities by 2kg thus decreasing his expenditure by shs. 28,000. Use matrix method to find the cost of rice and meat per kilogramme. (04 scores)
6. The father is four times as old as his son. In seven year's time, the father will be thrice as the son. Find the present age of the son. (04 scores)
7. Without using mathematical tables or a calculator, evaluate $\log_5 625 - \log_5 125 + \log_5 25$ (04 scores)
8. A plane figure whose area is 12.6cm^2 is mapped onto a figure whose area is 75.6cm^2 by a transformation given by the matrix, $T = \begin{pmatrix} p-1 & -2 \\ p & p \end{pmatrix}$ (04 scores)
9. Twenty four men take 14 days to dig 8 Hectares of land. How many more men would be required to dig 10 hectares of land in 12 days? (04 scores)
10. Two bottles are similar, the smaller bottle is 20cm high and has a volume of 300 cc. If the larger bottle is 40cm high, determine its volume. (04 scores)

SECTION B: (40 SCORES)

11. The function f is such that $f(x) = 1 + 3x$, find
 - (a) (i) $f(5)$
 - (ii) $f^{-1}(x)$
 - (iii) $f^{-1}(4)$
 (08 scores)

- (b) Given that $h(x) = ax^2 + 2x$ and $h(3) = 24$.
Find the value of
(i) a
(ii) $h(-3)$
- (c) hence find the expression for $hf(x)$ and $hf(1)$ (07 scores)

12. (a) Draw the graph of $y = 2x^2 + 5x - 3$ for $-4 \leq x \leq 1$. (Use scales 1cm to 1 unit and 2cm to 1 unit on the y-axis and x-axis respectively).

- (b) Use the graph to solve the equations,

(i) $2x^2 + 5x - 3 = 0$

(ii) $x^2 + 6x + 8 = 0$

(15 scores)

13. Below are the marks obtained by 40 students in a mathematics test.

43	70	50	35	64	62	50	53
46	62	65	83	59	54	58	64
55	54	32	59	48	54	35	48
40	58	64	40	71	74	55	70
72	48	75	45	55	40	57	53

- (a) Starting with 30 as the lower class limit of the first class, and using equal intervals of 5 marks, form a frequency distribution table for the data.
- (b) Plot the ogive and use it to estimate the
(i) Median mark
(ii) Upper quartile
- (c) Calculate the mean mark using a working of 57. (15 scores)

14. (a) Given that $\begin{pmatrix} -1 & 3 \\ -1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 \\ 8 \end{pmatrix}$, find the values of x and y .

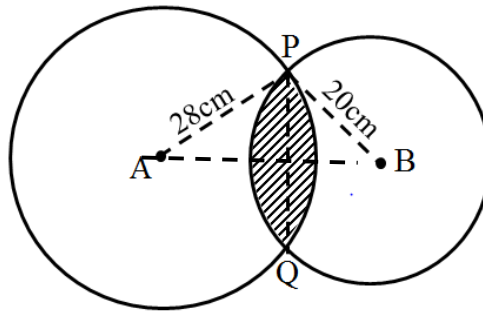
- (b) A school bought sports wears of different sizes for different colours.
The order of sizes were: small, medium and large.
The colours were yellow, blue, green and red.

Yellow	20 small	40 medium	30 large
Blue	50 medium	10 small	20 large
Green	40 large	35 medium	5 small
Red	32 medium	35 large	8 small

If the cost was Shs. 9,000, Shs 10,000 and Shs. 12,000 for small, medium and large sizes respectively, write down a;

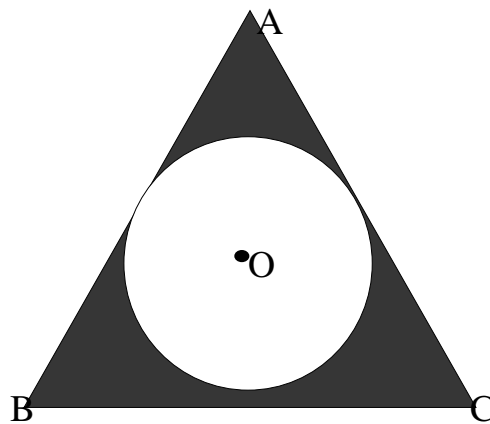
- (i) 4×3 matrix for the purchases.
- (ii) 3×1 matrix for the cost
- (iii) Use matrix multiplications to determine the amount spent on buying sportswear for each colour.

15. (a) Given that A and B are centres of the circles, lines PA and PB are tangents to the circles respectively. $PQ = 30\text{cm}$ while AB is a perpendicular bisector of PQ ;



Find the area of the shaded part which is common to the two circles.
(Take $\pi = 3.142$)

- (b) The diagram below shows an inscribed circle, centre O of an equilateral triangle ABC with a radius of 5cm .



Calculate the areal of the shaded region. (Use $\pi = 3.14$)

(15 scores)

END