

NameAdm. No.

Class

121/2

MATHEMATICS ALT 1

2½ HRS

FORM 3

Trial 6

2018
FORM THREE
Kenya Certificate of Secondary Education

Instructions

- (a) Write your name, class and admission number.
- (b) Answer all the questions in **section I** and **ONLY** Five in **section II**.
- (c) Show all the calculations in the spaces provided
- (d) KNEC mathematical tables and non-programmable calculators may be used.

For Examiners Use

Section 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

Section 11

17	18	19	20	21	22	23	24	Total

Grand total

SECTION I

1. Evaluate using logarithms.

[4 Marks]

$$\frac{\sqrt[3]{0.04689}}{51.64 \times 0.793}$$

2. Find the value of k if the expression $4x^2 - 10x + k + 3$ is a perfect square [2 Marks]

3. A rectangular block has a square base whose sides are exactly 8cm. Its height, measured to the nearest millimeter is 3.2cm. calculate the greatest possible error in calculating its volume [4 Marks]

4. A matrix is given by $T = \begin{pmatrix} 6 & 5 \\ -3 & 5 \end{pmatrix}$. Find T^{-1} [2 Marks]

5. The vectors a, b, c are given as $\underline{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$, $\underline{b} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$ and $\underline{c} = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$. Another vector q is such

that $q = 2a - 3b + 2c$. Calculate $/q /$ correct to 3 decimal places. [3 Marks]

6. Simplify by rationalizing the denominator; [2 Marks]

$$\frac{3}{2\sqrt{3} - \sqrt{2}}$$

7. A scientific calculator is marked at sh. 1560. Under hire purchase it is available for a downpayment of sh. 200 and six monthly instalments of sh. 250 each. Calculate; [2 Marks]

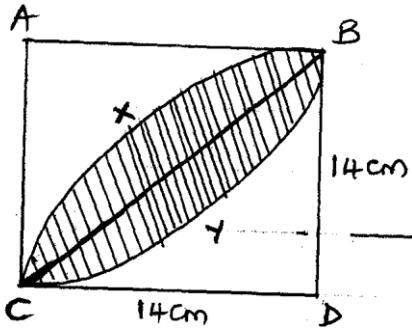
a. The Hire purchase price.

b. The extra amount paid out over the cash price. [1 Mark]

8. Solve the equation; [3 Marks]

$$\log(x + 24) - 2\log 3 = \log(9 - 2x)$$

9. In the figure below, ABCD is a square of side 14cm. CXB and CYB are arcs of circle centre A and D respectively. Calculate the area of the shaded region [3 Marks]

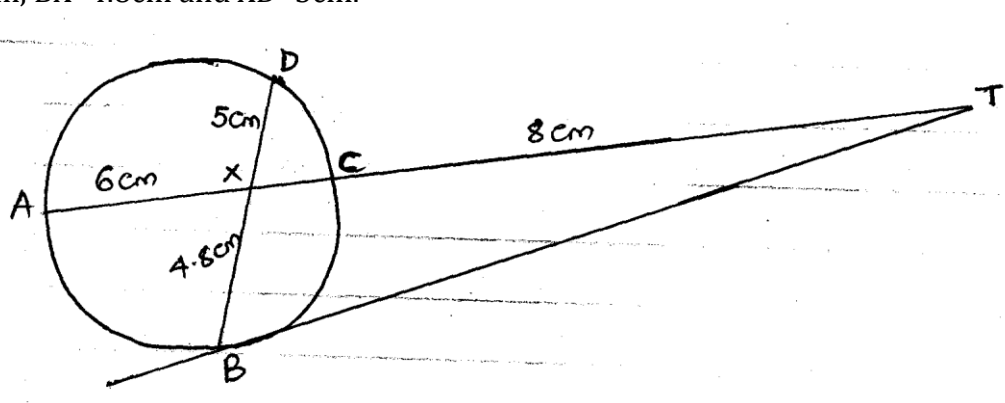


10. Make x the subject of the formula;

[3 Marks]

$$p = \frac{a\sqrt{x^2 + b^2}}{y}$$

11. In the figure below, BT is a tangent to the circle to the circle at B. AXCT and BXD are straight lines. AX=6cm, CT=8cm, BX=4.8cm and XD=5cm.



Find the length of;

a. XC

[2 Marks]

b. BT

[2 Marks]

12. Find the value of x if the matrix $\begin{pmatrix} x & 1 \\ 4 & x - 3 \end{pmatrix}$ is a singular matrix. [3 Marks]

13. The first – term of an arithmetic sequence is -7 and the common difference is 4.
a. List the first 6 terms of the sequence [2 Marks]

b. Determine the sum of the first 30 terms of the sequence [2 Marks]

14. A manufacturer sells a bottle of fruit juice to a trader at a profit of 40%. The trader sells it for sh. 84 at a profit of 20%. Find.

a. The traders buying price. [2 Marks]

b. The cost of manufacture of one bottle. [1 Mark]

15. ABC is a triangle whose base $BC = 35$. The point X on BC is such that $BX=21\text{cm}$, $AX=16\text{cm}$ and angle $AXB=60^\circ$. Calculate;

a. The length of AB

[1 Mark]

b. The length of AC

[1 Mark]

c. The size of angle BAC

[1 Mark]

16. A small cone of height 8cm is cut off from a bigger cone to leave a frustrum of height 16cm. if the volume of the smaller cone is 160cm^3 , find the volume of the frustrum.

[3 Marks]

SECTION II answer ANY 5 questions in this section

(50 marks)

17. The position vectors of A and B with respect to the origin are $\begin{pmatrix} -8 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} 12 \\ 5 \end{pmatrix}$ respectively. Point M is the mid-point of AB and N is the mid-point of OA.

a. Find;

i. The coordinates of N and M [3 Marks]

ii. The magnitude of NM [3 Marks]

b. Express vector \underline{NM} in terms of OB [1 Mark]

c. Point P maps onto P' by a translation $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$.

Given that $OP = OM + 2MN$.

Calculate the coordinates of P'

[3 Marks]

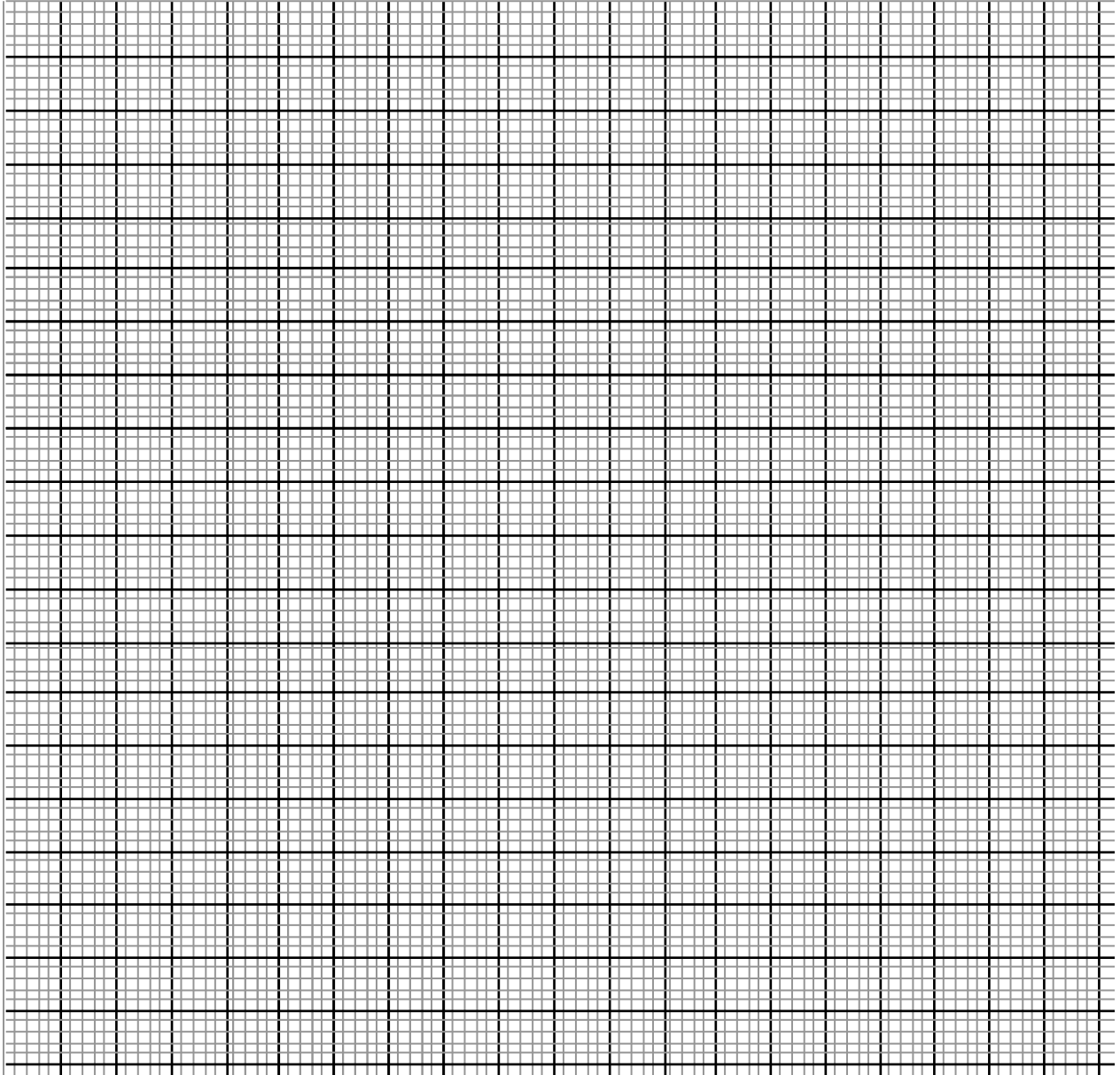
18. Complete the table below for the function $Y = 2x^2 + 4x - 3$

a. [2 Marks]

x	-4	-3	-2	-1	0	1	2
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$2x^2$	32			1	0		
$4x$							
-3			-3			-3	
y			-3				

- b. On the grid provided, draw the graph of the function $y = 2x^2 + 4x - 3$ for $-4 \leq x \leq 2$ and use your graph to determine the roots of the quadratic equation $2x^2 + 4x - 3 = 0$ to 1 decimal place. [3 Marks]



- c. Use your graph to solve the roots of the quadratic equations.

i. $2x^2 + x - 5 = 0$

[2 Marks]

ii. $2x^2 + 3x - 2 = 0$

[2 Marks]

19. The table below shows the masses to the nearest kilograms of 65 animals in a farm.

Mass in Kg	26-30	31-35	36-40	41-45	46-50	51-55
Frequency	9	13	20	15	6	2

Use the table to find.

a) Modal and median class [2 Marks]

b) Mean of the data [3 Marks]

c) The median mass [3 Marks]

d) The percentage of animals with a mass between 36kg and 45kg. [2 Marks]

20.

- a. A matrix T is given by $T = \begin{pmatrix} 4 & 5 \\ 6 & 4 \end{pmatrix}$
Find T^{-1}

[2 Marks]

- b. Truphena bought 20 bags of maize and 25 bags of beans at a total cost of sh. 77,000. If she had bought 30 bags of maize and 20 bags of beans, she would have spent sh. 7,000 more.

- i. Form a matrix equation from this information. [1 Mark]

- ii. Determine the cost of a bag of maize and a bag of beans. [3 Marks]

- c. She sold all the maize and beans at a profit of 10% on a bag of maize and $12\frac{1}{2}\%$ on a bag of beans. Calculate the total percentage profit. [4 Marks]

21. At the beginning of the year 2000, Kanyora bought two houses, one in Thika and the other in Nakuru each at 1,240,000. The value of the house in thika appreciated at a rate of 12% p.a.

- a. Calculate the value of the house in Thika after 9 years to the nearest shilling.

[2 Marks]

b. After n years, the value of the house in Thika was 2,741,245 while the value of the house in Nakuru was 2,917,231.
i. Find n [4 Marks]

ii. Find the annual rate of appreciation of the house in Nakuru. [4 Marks]

22. The table below shows income tax rates.

Taxable income
in k£ per month

1 – 325

Rate in shs. per k£

2

326 – 650	3
651 – 975	4
976 – 1300	5
1301 – 1625	6
Over 1626	7

Waketi earns a basic salary of 20,500. He has a house allowance of sh. 6,000 per month, medical allowance of sh. 4,000 per month and transport allowance of sh. 3,000 per month. He claims a tax relief of sh. 1,056 per month.

a. Calculate

i. Waketi's taxable income in k£ per month. [2 Marks]

ii. Gross tax. [3 Marks]

iii. Net Tax [2 Marks]

b. His net income per month has the following deductions

Health insurance fund – sh. 150

Loan interest – sh. 200

Service charge – sh. 200

Sacco loan – sh. 2,500

Calculate his net income per month. [3 Marks]

23. P varies directly as the square of Q and inversely as R.

a. If Q increases by 5% and R decreases by 10%, find the percentage change in P

[5 Marks]

- b. Given that $P=2$ when $R=5$ and $Q=4$, find the positive value of Q when $P=4.5\text{cm}$ and $R=5\text{cm}$.
[5 Marks]

24.
a. The first term of an arithmetic progression is 2. The sum of the first 8 terms of the AP is 240.
i. Find the common difference of the AP. [2 Marks]

- ii. Given that the sum of the first n terms of the AP is 1,560. Find n [2 Marks]

b. The 3rd, 5th and 8th terms of another AP from the first three terms of a G.P. If the common difference of the AP is 3.

Find.

i. The first term of G.P [4 Marks]

ii. The sum of the first 9 terms of the G.P to 4 s.f. [2 Marks]