

Name Adm . No

Class

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M A T H E M A T I C S A L T 1

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T r i a l 6

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F O R M T H R E E
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 8 cm. Its height, measured to the nearest millimeter is 3.2 cm. 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 $a = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$, $b = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$ and $c = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$. 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 down payment of sh. 200 and six monthly instalments of sh. 250 each. Calculate;

a. The Hire purchase price.

[2 Marks]

b. The extra amount paid out over the cash price.

[1 Mark]

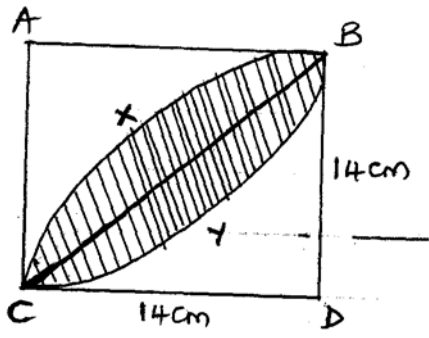
8. Solve the equation;

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

[3 Marks]

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

[3 Marks]

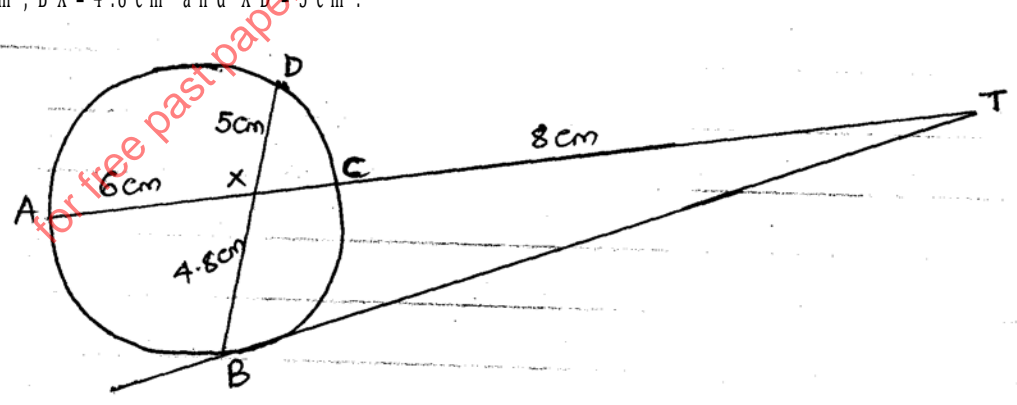


10. Make x the subject of the formula;

[3 Marks]

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

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



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 $BX = 21$ cm, $AX = 16$ 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 8 cm is cut off from a bigger cone to leave a frustrum of height 16 cm. if the volume of the smaller cone is 160 cm^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 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]

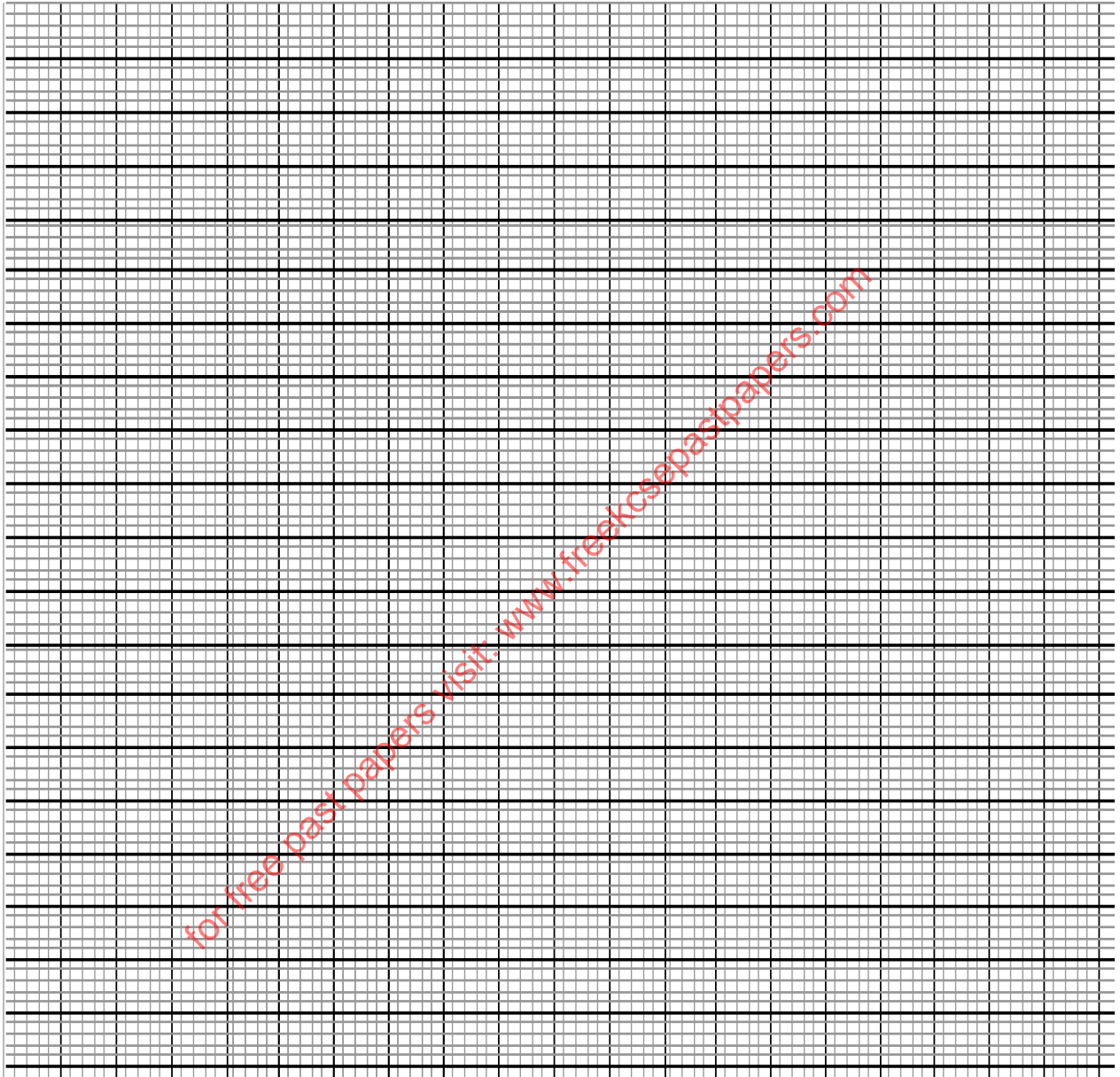
18. Complete the table below for the function $Y = 2x^2 + 4x - 3$

a. [2 Marks]

x	-4	-3	-2	-1	0	1	2
---	----	----	----	----	---	---	---

$2x^2$	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]

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22. The table below shows income tax rates.

Taxable income
in k£ per month
1 - 325

Rate in shs. per k£

2

3 2 6 - 6 5 0	3
6 5 1 - 9 7 5	4
9 7 6 - 1 3 0 0	5
1 3 0 1 - 1 6 2 5	6
Over 1 6 2 6	7

W aketi 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. W aketi's taxable income in k£ per month. [2 M arks]

ii. Gross tax. [3 M arks]

iii. Net Tax [2 M arks]

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 M arks]

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 M arks]

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

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