Kings' Academy
School of Science, Technology, Engineering and Technology
DEPARTMENT OF MATHEMATICS

END OF TERM 1 - 2026

FORM FOUR MATHEMATICS PAPER 2

TIME: 2½ HOURS

NAME……..

ADM NO: _____STREAM:…….....

INSTRUCTIONS TO CANDIDATES:

a) Write your name and admission number in the spaces provided above.
b) This paper consists of **TWO** sections. Section A and Section B.
c) Answer **ALL** the questions in section A and only **FIVE** questions from Section B.
d) All answers and working must be written on the question paper in the spaces provided below each question.
e) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
f) Marks may be given for correct working even if the answer is wrong.
g) Non-programmable silent calculators and KNEC mathematical tables may be used except where stated otherwise.
h) Candidates should check the question paper to ascertain that all the papers are printed as indicated and that no questions are missing.

SECTION 1: 50 MARKS (ANSWER ALL QUESTIONS)

1. Make x the subject of the formula. (3mks)

P= $\sqrt{\frac{x+2w}{4x+3R}}$

2. Simplify the following by rationalizing the denominator. (3mks)

$\frac{8}{4-2\sqrt{3}}$

3. A quantity P is partly constant and partly varies inversely as square of t. p =6 when t=6 and p=18 when t=3. Find t when p=11. (3mks)

4. Solve for x in the equation; (3mks)
$\log(5x + 75) - 2\log 3 = \log(2x - 9)$

5. The ages of 32 residents at a home for the elderly people are presented in the following frequency distribution table.

Age(years)	70 – 74	75-79	80-84	85-89	90-94	95-99
No. of residents	5	6	7	8	4	2

Use the table to determine (i) mean for the data

6.Solve for x and y in the simultaneous equation below. (3mks)

$xy + 6 = 0$

$x - 2y = 7$

7 Solve for x by completing the square method (3mks)

$2x^2+x-36= 0$

8. Expand $(1+2x)^7$ up to the term in x^3, hence use the expansion to estimate the value of $(1.02)^7$ correct to four decimal places. (3mks)

9 .Find the value of y for which $\begin{bmatrix} 3 & 4 \\ y & 6 \end{bmatrix}$ is a singular matrix. (2mks)

10.An item that costs sh. 24, 000 cash can be bought on hire purchase. A customer pays sh.6, 000 as deposit and then makes 6 monthly installments of sh.3, 500 each. Calculate the monthly rate of compound interest, giving your answer to 1 d.p. (3mks)

11.Goliath shared sh.360, 000 among his children Weta, Wasike and Weyusia in the ratio 1:3:5 respectively. How much did each receive? (3mks)

12.In the arithmetic series 1+4+7+10+…find the sum of the first 100 terms. (3mks)

13. If $\boldsymbol{a}$ =i+2j+3k , $\boldsymbol{b = 4i - 4j + 5k}$ $\boldsymbol{and\ c =\ i - 5k}$. $find\ \mathbf{3a - 2b + c}$. (3mks)

14) The length and width of a rectangular room are measured as12m by 8m respectively. The height of the room is exactly 5m . Find the percentage error in calculating the volume of the room. (3 marks)

15.In a triangle ABC, AB=7.2 cm, AC=6.8 cm and angle BAC=120^0.

Calculate;

(i) The length of BC to 3s.f (1 marks)

(ii) If a circle passes through the vertices A, B and C. Find the radius of the circle. (2 marks)

16.Use logarithms to evaluate (4 marks)

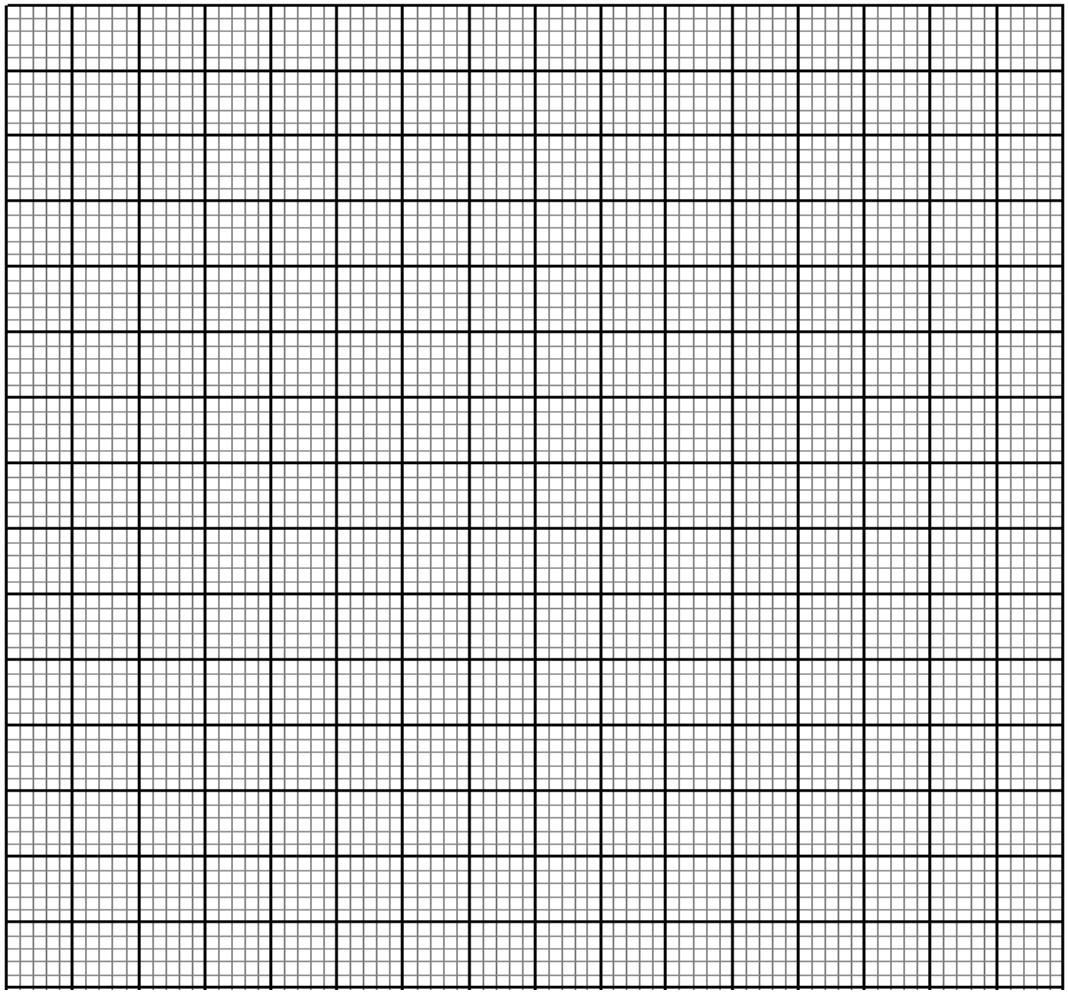
$$\sqrt[5]{\frac{75.4x4.83^2}{0.00521}}$$

SECTION B: ANSWER ANY 5 QUESTIONS IN THIS SECTION.

17a) Complete the table below for the function $y=2x^2+3x-5$. (2mks)

x	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**
$2x^2$					0		
3x	-12	-9			0		
-5	-5	-5	-5	-5	-5	-5	-5
y					-5		

b) On the grid provided draw the graph of $y=2x^2+3x-5$ for $-4\leq x\leq 2$. (3mks)



c) Use your graph to state the roots of

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

ii. $2x^2+0x-8=0$ (3mks)

18.A trader bought 8 cows and 12 goats for a total of ksh.294, 000. If he had bought 1 more cow and 3 more goats he would have spent ksh.337, 500.

a. Form two equations to represent the above information. (2mks)

b. Use matrix method to determine the cost of a cow and that of a goat. (3mks)

c. The trader sold the animals he had bought making a profit of 40% per cow and 45% per goat.

i. Calculate the total amount of money he received. (3mks)

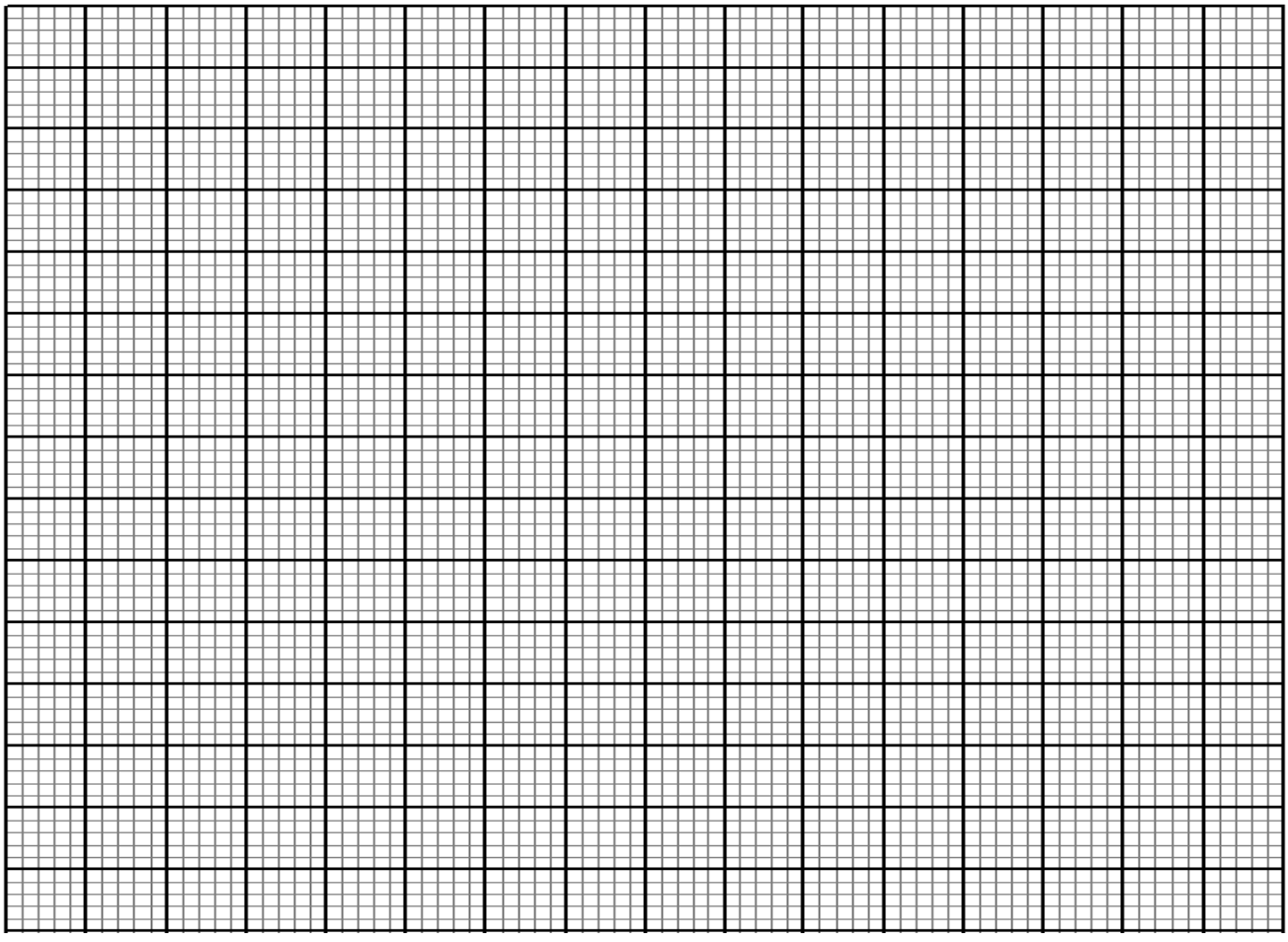
ii. Determine his profit in Kenyan shillings. (2mks)

19. Six weeks after planting the height of bean plants were measured correct to the nearest centimeter. The frequency distribution is given in the table below.

Height (x)	0-4	4-8	9-12	14-16	17-20	21-24	25-28
Frequency	14	17	26	17	12	9	5

(a) Determine the cumulative frequency of the table (1 mark)

(b) Draw on the grid provided the cumulative frequency curve for the data (4 marks)



(i) Use your curve to estimate the median height (1 mark)

(c) Use the graph to determine number of seedlings with height of 10 cm and above (1 mark)

(d) Determine the standard deviation for the data (3 marks)

20.The figure below represents a model of a solid structure in the shape of a frustum of acone with a hemispherical top. The diameter of the hemispherical part is equal to the diameter of the top of the frustum. The frustum has a base diameter of 21 cm and a height of 45 cm. (Use $\pi = 3.142$)

Calculate correct to 2 decimal places

(i) The height of the cone from which the frustum was cut (2 marks)

(ii) The slant height of the frustum. (2 marks)

(iii) The total surface area of the solid. (4 marks)

21) The income tax rates of a certain year were as shown below:

Monthly taxable income in Ksh	Tax rate in %
0-9680	10

9681-18800	15
8801-27920	20
27921- 37040	25
37041 and above	30

In that year, Zakayo monthly earnings were as follows; basic salary Ksh. 46,250, house allowance Ksh.15 000, and medical allowance of Ksh 3,500**.** He is entitled to a monthly tax relief of Ksh. 1056.

a) Calculate Zakayo's taxable income (2 marks)

b) Calculate his P.A.Y.E (5 marks)

c) A part from P.A.Y.E, other deductions is education insurance policy Ksh. 1500 and Ksh 2500 as cooperative shares. Find his net income at end of the month. (3 marks)

22 (a)Write down the first three terms of the sequence whose n^{th} term is $5n - 2$. (1 mark)

(b)The 3^{rd} term of a geometric sequence is 18 and the 6^{th} term is 486. Find the 1^{st} term and the common ratio. (3 marks)

(c) The first and the last term of an AP with 34 terms are 8 and -190 respectively. Find the sum of the first 34 terms. (3 marks)

(b) The 2^{nd}, 4^{th} and 7^{th} term of an AP are the first 3 consecutive terms of a GP. Find the common ratio if the first term is 2. (3 marks)

23. The diagram below shows a triangle **OPQ** in which **M** and **N** are points on **OQ** and **PQ** respectively such that 3**OM** = 2**OQ** and 4**PN** = **PQ**. Lines **PM** and **ON** meets at **X**.

(a) Given that **OP** =**p** and **OQ** = **q,** express in term of **P** and **q** the vectors;

(i) **PQ**. (1 mark)

(ii) **PM**. (1 marks)

(iii) **ON**. (2 marks)

(b) You are further given that **OX** = k**ON** and **PX** = h**PM**, where k and h are constants.

(i) Express **OX** in terms of **p** and **q** in two different ways (2 marks)

(ii) Find the value of **h** and **k**. (3 marks)

(iii) Find the ratio **PX**: **XM**. (1 mark)

24.In the figure below PQR is a tangent to the circle at point Q <SQR = 54^0, <VTQ = 41^0 <UST = 22^0 and <SUT = 40^0.

Giving reasons, find the value of

(i) <PQV (2 mks)

(ii) <UVT (2 mks)

(iii) <PQT (2 mks)

(iv) <SUV (2 mks)

(v) <QXS (2 mks)