

**KINGS ACADEMY**

**SCHOOL OF SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS**

**END OF TERM 3 2026 FORM THREE EXAMINATION**

**MATHEMATICS PAPER**

**TIME: 2½ HOURS**

**INSTRUCTIONS TO CANDIDATES:**

a) Write your name and admission number in the spaces provided below.

**NAME**.....

**ADM NO:** ..... **STREAM:** .....

- 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.

**FOR EXAMINER'S ONLY**

**SECTION A**

**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 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. . By construction locate the circle center, hence draw common tangents from point x.  
(4mks)

• X

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  $1+4+7+10+\dots$  find the sum of the first 100 terms. (3mks)

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

14) The length and width of a rectangular room are measured as 12m 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°.

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)

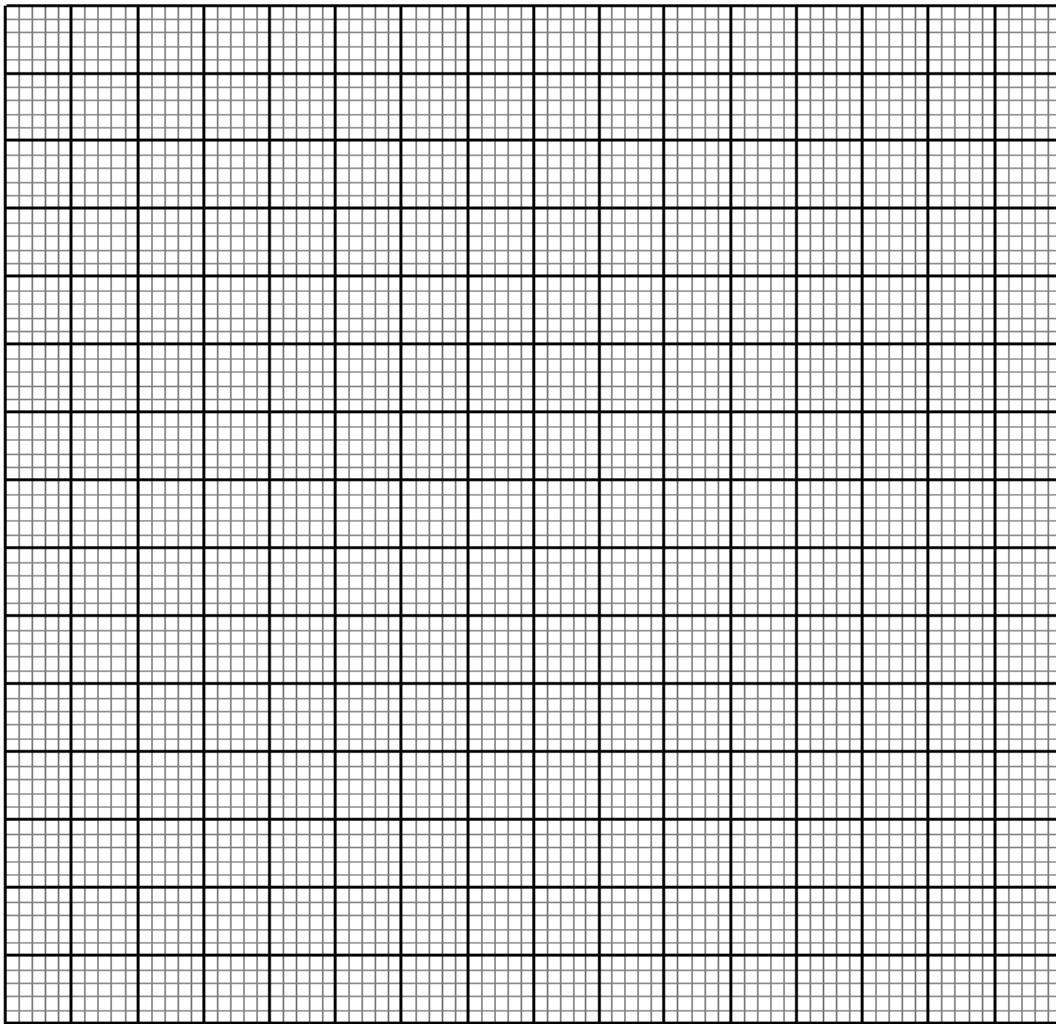
$$\sqrt[5]{\frac{75.4 \times 4.83^2}{0.00521}}$$

**SECTION B: ANSWER ANY 5 QUESTIONS IN THIS SECTION.**

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

<b>x</b>	<b>-4</b>	<b>-3</b>	<b>-2</b>	<b>-1</b>	<b>0</b>	<b>1</b>	<b>2</b>
$2x^2$					0		
$3x$	-12	-9			0		
-5	-5	-5	-5	-5	-5	-5	-5
<b>y</b>					-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)

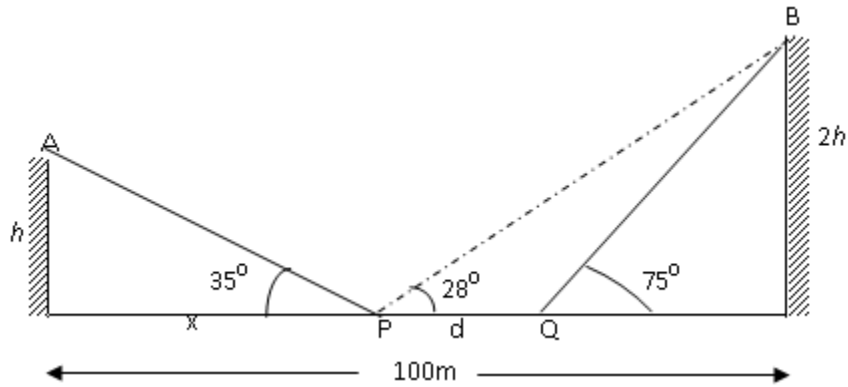
b. Use matrix method to determine the cost of a cow and that of a goat. (3mks)

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. Two vertical columns A and B of height  $h$  and  $2h$  respectively stand on level ground and are 100m apart. Two points P and Q are  $d$  metres apart, the elevation of the top of A and B from point P are  $35^\circ$  and  $28^\circ$  respectively and the elevation of top of B from point Q is  $75^\circ$



(a) (i) Express  $\tan 35$  in terms of  $h$  and  $X$  (1mks)

(ii) Express  $\tan 28$  in terms of  $2h$  and  $X$  (1mks)

(iii) By making  $h$  subject of the formula in (i) & (ii) above calculate the value of  $X$  (2mks)

(iv) Hence calculate the vertical heights of the two columns in metres (3marks)

(b) The distance PQ in metres (3 marks)

20. The figure below represents a model of a solid structure in the shape of a frustum of a cone 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
18801-27920	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  $n^{\text{th}}$  term is  $5n - 2$ . (1 mark)

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

(d) The 2<sup>nd</sup>, 4<sup>th</sup> and 7<sup>th</sup> 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  $3OM = 2OQ$  and  $4PN = PQ$ . Lines **PM** and **ON** meets at **X**.

- (a) Given that  $\mathbf{OP} = \mathbf{p}$  and  $\mathbf{OQ} = \mathbf{q}$ , express in term of  $\mathbf{P}$  and  $\mathbf{q}$  the vectors;
- (i)  $\mathbf{PQ}$ . (1 mark)
- (ii)  $\mathbf{PM}$ . (1 marks)
- (iii)  $\mathbf{ON}$ . (2 marks)
- (b) You are further given that  $\mathbf{OX} = k\mathbf{ON}$  and  $\mathbf{PX} = h\mathbf{PM}$ , where  $k$  and  $h$  are constants.
- (i) Express  $\mathbf{OX}$  in terms of  $\mathbf{p}$  and  $\mathbf{q}$  in two different ways (2 marks)
- (ii) Find the value of  $h$  and  $k$ . (3 marks)
- (iii) Find the ratio  $\mathbf{PX} : \mathbf{XM}$ . (1 mark)

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

Giving reasons, find the value of

(i)  $\angle PQV$  (2 mks)

(ii)  $\angle UVT$  (2 mks)

(iii)  $\angle PQT$  (2 mks)

(iv)  $\angle SUV$  (2 mks)

(v)  $\angle QXS$  (2 mks)