

Name: Class:

Date: Adm No:

121/1
MATHEMATICS
PAPER 1

TIME: 2 HOURS 30 MINUTES

TERM 3 EXAM 2019

Kenya Certificate of Secondary Education (K.C.S.E.)

FORM FOUR

Mathematics
Paper 1

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, **admission number**, **Signature** and write **date** of examination in the spaces provided
- The paper contains **two** sections. Section I and Section II.
- Answer **ALL** the questions in section I and any **five** questions in section II.
- Answers and working **must** be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non programmable silent electronic calculators and KNEC mathematical table may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTION II

Question	17	18	19	20	21	22	23	24	TOTAL
Marks									

GRAND TOTAL

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SECTION I (50 MARKS)

Answer all the questions from this section

1. Without using a calculator evaluate (3 marks)

$$\frac{-2(-5 + 8) - 9 \div 3 - 5}{-3 \times -5 + -2 \times 4}$$

2. (a) use mathematical tables to find the:

(i) The square of 86.46 (1 mark)

(ii) The reciprocal of 27.56 (1 mark)

(b) Hence or otherwise calculate the value of; (2 marks)

$$\frac{86.46^2}{27.56}$$

3. The sum of the interior angles of an n – sided polygon is 1440° . Find the value of n and hence deduce the name of the polygon. (3 marks)

4. Two containers have base areas of 750cm^2 and 120cm^2 respectively. Calculate the volume of the larger container in litres given that the volume of the smaller container is 400cm^3 . (3 marks)

5. Given that the column vectors $\mathbf{a} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$ and that $\mathbf{P} = 2\mathbf{a} - 4\mathbf{b} + 3\mathbf{c}$. Express \mathbf{P} as a column vector. (3 marks)

6. Solve the following inequalities and represent the range of values of x on a single number line. (3 marks)

$$5 - 3x > -7$$

$$x - 6 \leq 3x - 4$$

7. The cost of a car outside Kenya is US \$ 4800. You intend to buy one such car through an agent who deals with Japanese Yen. The agent will charge 15% commission on the price of the car and further 72 220 Japanese Yens for shipment of the car. How many Kenya shillings will you need to send to the agent to obtain the car given that:

$$1 \text{ US \$} = 117.20 \text{ Japanese Yens}$$

$$1 \text{ US \$} = \text{Kshs } 72.34 \quad (3 \text{ marks})$$

8. Two numbers p and q are such that $p^3 \times q = 189$. Find p and q (3 marks)

9. Evaluate without using mathematical tables. (3 marks)

$$1000 \left(\sqrt{\frac{0.0128}{200}} \right)$$

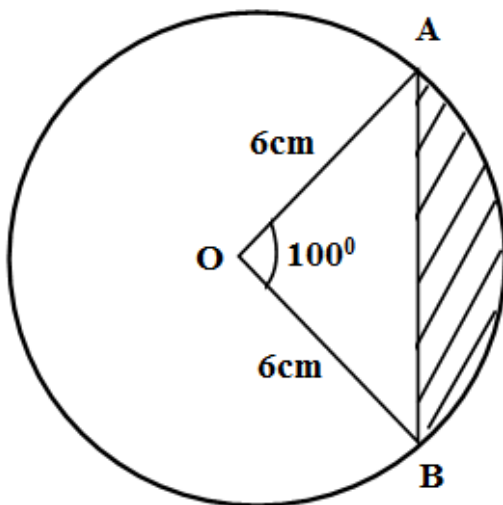
10. Simplify the following expression by reducing it to a single fraction. (3 marks)

$$\frac{2x - 3}{3} - \frac{x - 2}{2} - \frac{1 - x}{4}$$

11. Thirty men working at a rate of 10 hours a day can complete a job in 14 days. Find how long it would take 40 men working at the rate of 7 hours a day to complete the same job.

(3 marks)

12. The figure below shows a circle centre O and radius 6cm. sector OAB subtends an angle of 100° at the centre of the circle as shown.



Calculate to 2 decimal places the area of the shaded region. (Take $\pi = \frac{22}{7}$) (3 marks)

13. Use the prime factors of 1764 and 2744 to evaluate (3 marks)

$$\frac{\sqrt{1764}}{\sqrt[3]{2744}}$$

14. A rectangular block is 50cm long and 15 cm wide. If its mass is 18kg and its density is 2.4g/cm^3 , find its height. (3 marks)

15. A triangle ABC is such that $AB = 12\text{cm}$, and $AC = 17\text{cm}$. If its area is 512cm^2 , find the size of angle BAC (3 marks)

16. (a) Find the greatest common divisor of the terms $9x^3y^2$ and $4xy^4$ (1 mark)

(b) Hence factorize completely the expression $9x^3y^2 - 4xy^4$ (2 marks)

SECTION II (50 MARKS)

Answer FIVE questions ONLY from this section

17. A straight line $y = \frac{2}{3}x - \frac{2}{3}$ meets the x – axis at point T.

(a) Determine the coordinates of T. (2 marks)

(b) A second line L_2 is perpendicular to line L_1 at T. Find the equation of line L_2 in the form $ax + by = c$ where a, b and c are constants. (3 marks)

(c) A third line L_3 passes through $(-4,1)$ and is parallel to L_1 . Find;

(i) The equation of line L_3 in the form $y = mx + c$ (2 marks)

(ii) The coordinates of point S at which L_3 intersects L_2 . (3 marks)

18. A particle moves in a straight line so that its velocity is given by $V = \frac{1}{2}t^2 - 3t + 7$

where t is time in seconds. Find:

(a) The velocity after 8 seconds. (2 marks)

(b) The acceleration when $t = 0$ (2 marks)

(c) The minimum velocity attained. (2 marks)

(d) The distance travelled in the first 2 seconds. (4 marks)

19. The points $A^I B^I C^I$ are the images of $A(4, 1)$, $B(0, 2)$ and $C(-2, 4)$ respectively under a transformation represented by the matrix $M = \begin{pmatrix} 1 & 1 \\ 1 & 3 \end{pmatrix}$.

(a) Write down the coordinates of $A^I B^I C^I$ (3 marks)

(b) $A^{II} B^{II} C^{II}$ are the images of $A^I B^I C^I$ under another transformation whose matrix is

$N = \begin{pmatrix} 2 & -1 \\ 1 & 2 \end{pmatrix}$. Write down the co-ordinates of $A^{II} B^{II} C^{II}$ (3 marks)

(c) Transformation M followed by N can be replaced by a single transformation P. determine the matrix for P. (2 marks)

(d) Hence determine the inverse of matrix P. (2 marks)

20. The distance between two towns A and B is 460 km. a minibus left town A at 8.45 am and travelled towards B at an average speed of 65km/hr. A matatu left B at 10.55 am on the same day and travelled towards A at an average speed of 80km/hr.

(a) How far from town B did they meet? (4 marks)

(b) At what time did the two vehicles meet? (2 marks)

(c) A motorist started from his home at 9.15am on the same day and travelled to B at an average speed of 120km/hr. he arrived at the same time as the minibus. Calculate the distance from B to his home. (4 marks)

21. A paper cup is made in the shape of a frustum of a cone with an open top of diameter 10.5cm and a sealed bottom of diameter 7cm. it has a depth of 12cm, calculate:

(a) The total surface area of the cup. (6 marks)

(b) The capacity of the cup to the nearest deciliter. (4 marks)

22. The table below shows the marks scored by form four students in a mathematics test in Bidii secondary school.

Marks (%)	40 – 44	45 – 49	50 – 54	55 – 59	60 – 64	65 – 69	70 – 74
No of students	3	30	29	33	13	1	1

(a) State the modal class. (1 mark)

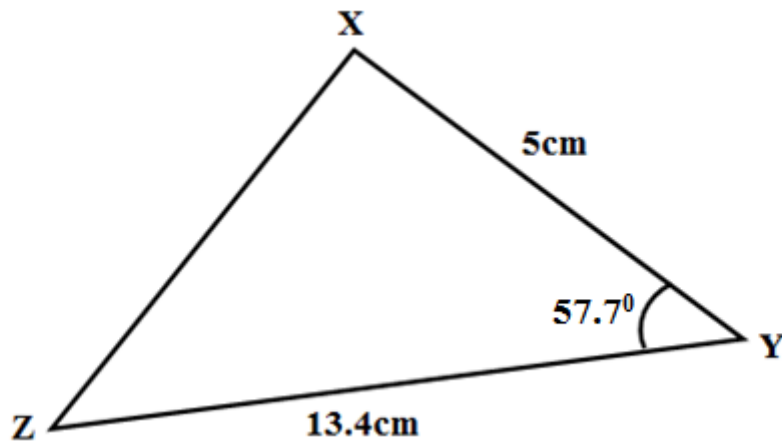
(b) Using an assumed mean of 57, calculate:

(i) The mean (3 marks)

(ii) The standard deviation. (3 marks)

(c) Find the mark scored by the 50th student. (3 marks)

23. The figure below shows triangle XYZ in which line XY = 5cm, line YZ = 13.4cm and the size of angle XYZ = 57.7°



(a) Calculate the length of line XZ (4 marks)

(b) Calculate the size of angle XZY (4 marks)

(c) Calculate the size of angle YXZ to 4 significant figures (2 marks)

24. Four towns P, Q, R and S are such that town P is 200 km West of Q. Town R is at a distance of 80km on a bearing of 049° from P. Town S is due East of R and due North Of Q.

(a) Using a scale of 1cm to represent 20km, make an accurate scale drawing to show the relative positions of the towns. (4 marks)

(b) Find:

- (i) Determine the bearing of S from P (1mark)
- (ii) Determine the distance of Q from S (2 marks)
- (iii) Determine the bearing of Q from R (1 mark)
- (iv) Determine the distance of R from S (2 marks)