

MBICHI HIGH SCHOOL

END OF TERM 2 2026 EVALUATION

NAME:..... STREAM.....

INDEX. NO..... DATE.....

SCHOOL..... SIGNATURE.....

121/2
MATHEMATICS
PAPER 2
TIME: 2 HOURS

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

INSTRUCTIONS TO CANDIDATES

- a) Write your name, index number and date in the spaces provided at the top of this page.
- b) Write name, admission number and class in the spaces provided above.
- c) This paper contains **TWO** sections: **section I** and **section II**
- d) Answer **ALL** the questions in **Section I** and only **five** questions from **section II**.
- e) **Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.**
- f) Marks may be given for correct working even if the answer is wrong.
- g) **Non-programmable** silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINER'S USE ONLY:

Section I

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

Section II

GRAND TOTAL

17	18	19	20	21	22	23	24	TOTAL

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SECTION I (50 MARKS)

Answer ALL the questions in this section.

1. Use logarithms to evaluate:

$$\sqrt[3]{\frac{45.3 \times 0.00697}{0.534}}$$

(4 marks)

2. a) Expand $\left(1 - \frac{1}{2}x\right)^6$ to fourth term.

(2 marks)

- b) Use the expansion above to evaluate $(0.98)^6$

(2 marks)

3. The price of a new car is shs. 800,000. If it depreciates at a constant rate to shs. 550,000 within 4 years, find the annual rate of depreciation. (3 marks)

4. Find the inverse of $\begin{pmatrix} 1 & 2 \\ 2 & 5 \end{pmatrix}$ and hence solve the simultaneous equations below (3 mks)

$$\begin{aligned}x + 2y &= 21 \\ 2x &= 34 - 5y\end{aligned}$$

5. Without using a calculator or mathematical tables, express $\frac{\sqrt{3}}{1 - \cos 30^\circ}$ in surd form and simplify. (3 marks)
6. The position vector of A and B are $\mathbf{a} = 4\mathbf{i} + 4\mathbf{j} - 6\mathbf{k}$ and $\mathbf{b} = 10\mathbf{i} + 4\mathbf{j} + 12\mathbf{k}$. D is a point on AB such that AD:DB is 2:1. Find the co-ordinates of D. (3 marks)

7. A variable Z varies directly as the square of X and inversely as the square root of Y . Find percentage change in Z if X is increased by 20% and Y decreased by 19%. (3 marks)

8. Pipe A can fill a tank in 2 hours, Pipe B and C can empty the tank in 5 hours and 6 hours respectively. How long would it take:

a) To fill the tank if A and B are left open and C is closed. (2 marks)

b) To fill the tank with all pipes open. (2 marks)

9. Given that $\sin\left(\frac{2}{3}x + 20^\circ\right) - \cos\left(\frac{5}{6}x + 10^\circ\right) = 0$. Without using a mathematical table or a calculator, determine $\tan(x + 20^\circ)$. (3 marks)

10. Make P the subject of the formula $XY^P = Q^{PX}$ (3 marks)

11. The coordinates of the end points of diameter are A(2,4) B(-2,6). Find the equation of a circle in the form $ax^2 + by^2 + cx + dy + e = 0$ (3 marks)

12. A bag contains 10 balls of which 3 are red, 5 are white and 2 green. Another bag contains 12 balls of which 4 are red, 3 are white and 5 are green. A bag is chosen at random and a ball picked at random. Find the probability the ball so chosen is red. (3 marks)

13. The first, the second and sixth terms of an increasing arithmetic progression are the three consecutive terms of a geometric progression. If the first term of the arithmetic progression is 2, find:

a) Common difference of the arithmetic progression (2 marks)

b) Common ratio of the geometric progression.

(1 mark)

14. The distance S metres moved by a particle along a straight line is given by $S = 7 + 8t^2 - 2t^3$. Find the velocity at $t = 2$ seconds. (2 marks)

15. The length and breadth of a rectangular floor garden were measured and found to be 4.1m and 2.2m respectively. Find the percentage error in its area. (3 marks)

16. A train moving at an average speed of 72km/h takes 15 seconds to completely cross a bridge that is 80 metres long

(a) Express 72km/h in metres per second (1mk)

(b) Find the length of the train in metres (2mks)

SECTION II (50 MARKS)

Answer any FIVE questions in this section.

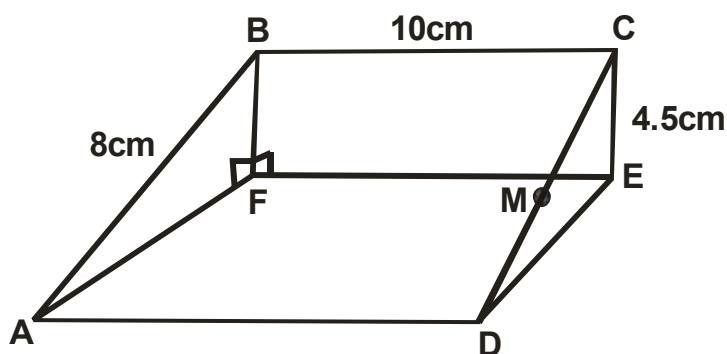
17. A steel manufacturing factory had a sample of 53 iron rods of various lengths. The lengths of the rods were measured and recorded in the table below:

Length (cm)	8-10	11-13	14-16	17-19	20-22	23-25	26-28
No. of rods	4	7	11	15	8	5	3

- a) State the frequency of the modal class. (1 mark)
- b) Using 18 as an assumed mean, calculate:
- i) Actual mean (5 marks)

- ii) Variance (3 marks)

- iii) Standard deviation (1 mark)



18. The above diagram represents a wooden prism. ABCD is a rectangle. Points E and F are directly below C and B respectively. M is the midpoint of CD. $AB = 8\text{cm}$, $BC = 10\text{cm}$ and $CE = 4.5\text{cm}$.

- a) The size of angle CDE. (2 marks)

b) Calculate:

i) Length of AC. (2 marks)

ii) The angle CAE makes with the plane ADEF. (2 marks)

c) Find the:

i) Length of MB. (2 marks)

ii) Angle CBM. (2 marks)

19. An aeroplane flies from a point P(60°N , 45°W) to a point Q(60°N , 135°E). Given that the radius of the earth is 6370km,

a) Calculate the shortest distance between P and Q:

i) in kilometres (km)

(3 marks)

ii) in nautical miles (nm)

(1 mark)

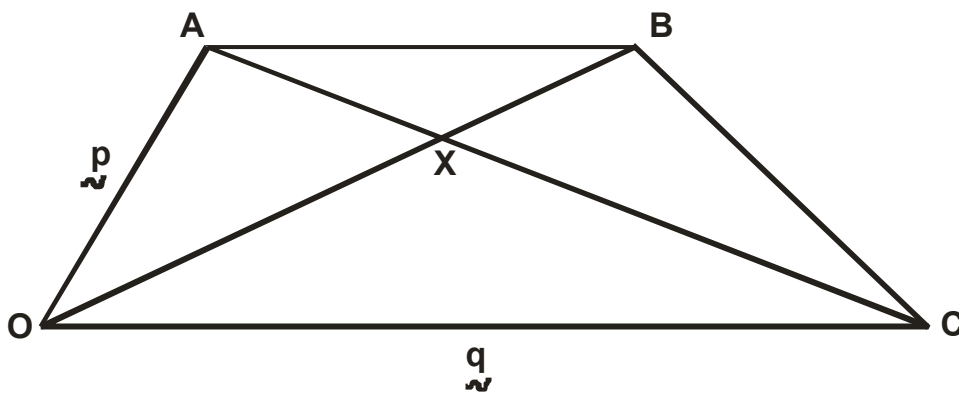
b) If the plane flew at a speed of 600 knots, how long did it take to move from P to Q.?

(2 marks)

c) The plane left P at 10.00a.m on Monday. At what time did it arrive at Q if it travelled along a parallel latitude at the same speed.

(4 marks)

20. In the figure below $\vec{OA} = \mathbf{p}$ and $\vec{OC} = \mathbf{q}$. Vector $\vec{AB} = \frac{3}{4}\vec{OC}$. Express in terms of unit vectors $\mathbf{p}$ and $\mathbf{q}$ the vectors.



a)

i) AC (1 mark)

ii) OB (1 mark)

iii) BC (1 mark)

b) Vector AC intersects with vector OB at X such that $AX = tAC$ and $OX = hOB$. By expressing OX in two ways in terms of t and h,

Find:

i) Scalars t and h (5marks)

ii) the ratio OB: BX (2 marks)

21. Two fair dice one a regular tetrahedron (4 faces) and the other a cube are thrown. The scores are added together. Complete the table below to show all possible outcomes. (2 marks)

		CUBE					
		1	2	3	4	5	6
TETRAHEDRON	1						
	2						
	3						
	4						

- a) Find the probability that:
- i) The sum is 6. (1 mark)
- ii) The sum is an odd number. (1 mark)
- iii) The sum is 6 or 9. (2 marks)
- b) If a player wins a game by throwing a sum of 6 or 9, draw a tree diagram and use it to find probability that he wins at least once when the dice are thrown twice. (4 marks)

22. i) Find the y- intercept of the curve $y = x^3 - 3x + 2$ (1 mark)

ii) Find the coordinates of the stationary points of the curve $y = x^3 - 3x + 2$ (3 marks)

iii) For each stationary point in a (ii) above, determine whether it is a maximum or a minimum turning point. (4 marks)

iv) Sketch the graph of $y = x^3 - 3x + 2$ (2 marks)

23. A number of people working at a factory decided to raise 72000 to buy a plot of land. Each person was to contribute the same amount. Before contributions five people retired from working at the factory and thus did not contribute. The same target of 72000 was still to be met by the remaining.

a) If n stands for the number of people working in the factory originally, show that the increase in the

contribution per person was shs. $\frac{360000}{n(n-5)}$ (3 marks)

b) If the increase in contribution per person was sh.1200, find the number of people originally working at the factory. (4 marks)

c) Calculate the percentage increase in the contributions per person caused by retirement, giving your answer to one decimal place. (3 marks)

24. a) Complete the table below for the functions $y = 3\sin x$ and $y = 4\cos(2x - 10)$ (2 marks)

x	0	15	30	45	60	75	90	105	120	135	150	165
$3\sin x$	0	0.78						2.90			1.50	
$4\cos(2x-10)$	3.94		2.57			3.06				-0.69		3.06

- b) Using a scale of 1cm to rep 1 unit on the vertical axis and 1cm to rep 150 on the horizontal axis, draw both curves on the same axes. (5 marks)
- c) Use your curves to solve $3\sin x - 4\cos(2x - 10) = 0$ (2 marks)
- d) State the phase angle of the curve $y = 4\cos(2x - 10)$ (1 mark)
