**MID TERM SERIES-TERM 1-2023**

**MATHEMATICS PAPER 1 (121/1)**

 **FORM FOUR (4)**

 **TIME: 2 ½ HOURS**

***Instructions to Candidates***

1. *Write your name, admission number and class in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided above.*
3. *This paper consists of* ***two*** *sections****; Section I*** *and* ***Section II.***
4. *Answer* ***all*** *the questions in* ***Section I*** *and any* ***five*** *questions from* ***Section II***
5. ***Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question***
6. *Marks may be given for correct working even if the answer is wrong.*
7. *Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.*
8. ***This paper consists of 14 printed pages.***
9. ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

**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**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  | **Total** |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |  |

**SECTION I (50 Marks)**

*Answer* ***all*** *the questions in this section in the spaces provided below each question*

1. Ibrahim spends a quarter of his monthly salary on school fees, one-ninth on water and electricity bills, two-thirds of the remainder on house up keep and saves the rest. The difference between what he saves and the amount he spends on house up keep is Kshs. 10,350. Calculate Ibrahim’s monthly salary. (3 marks)
2. Lessons in Lake Primary and Kisumu Girls High Schools take 30 minutes and 40 minutes respectively. The two bells ring simultaneously at 7.50 a.m. How many times will they ring together again between 7.50 a.m. and 3 p.m.? (3 marks)
3. Complete the figure below to show a rotational symmetry of order 6 about O. (3 marks)



1. The sum of the interior angles of a regular polygon is 12600. Find the number of sides of the polygon, hence give the name of the polygon. (3 marks)
2. Find the inequalities that satisfy the region labeled **R** in the figure below. (3 marks)



1. Rodi walked from Kisian to Otonglo, a distance of 8 km for 1½ hours. He then took a motorbike to Rabuor that traveled at a speed of 80 km/h and took 15 minutes. From Rabuor, he boarded a car to Kendu Bay, 60 km away and took 45 minutes to arrive in Kendu Bay. Calculate his average velocity for the whole journey. (3 marks)
2. Simplify the expression (3 marks)
3. A saleslady earns a commission of 3% and 5% for sale of goods up to Kshs. 100,000 and above Kshs. 100,000 respectively. In a certain month. Sarah’s total commission was Kshs. 15,100. Calculate the value of goods that Sarah sold that month. (3 marks)
4. The position vectors of points A and B are and respectively. Calculate , leaving your answer in surd form. (4 marks)
5. Nerry paid Kshs. 955,000 for a car at Sammy Traders. This was a discount of 4.5%. Sammy Traders made a profit of 16% from this sale. What is the amount of profit that Sammy Traders realized from this sale? Give your answer to the nearest Kshs. 100. (4 marks)
6. Solve for in the equation

 for (4 marks)

1. The line below shows a diagonal of a rhombus PQRS. Given that QS=5 cm, complete the rhombus. Hence find the PQ. (3 marks)



1. The cost of three toners and four cartridges is Kshs. 36,000. Oyoo bought one more toner and one less cartridge that are similar to the above and paid and paid Kshs. 1,500 more. Calculate the cost of one toner and one cartridge. (3 marks)
2. A measuring cylinder has a diameter of 7 cm. Water fills the cylinder up to a height of 6 cm. A solid sphere is immersed into the cylinder and the height of water in the cylinder increases to 10 cm. calculate the radius of the sphere correct to 4 significant figures. (3 marks)
3. The figure below shows an open cuboid ABCDEFGH. A particle traces a path from A to E through C as indicated by the arrows.



Draw the net of the solid and show the path on it. (3 marks)

1. Without using a calculator or mathematical table, solve for in (2 marks)

**SECTION II (50 marks)**

Answer any ***five*** questions in this section

1. A cylindrical milk urn has diameter 40 cm and height 1.4 metres.
	1. Calculate the capacity of milk in litres in the urn when it is full, to the nearest litre. Use . (2 marks)
	2. The milk is packed into tetrahedron packets of capacity 200 ml. Calculate the number of packets used. (2 marks)
	3. The packets are packed into boxes that contain 24 packets each. How many complete boxes are used to package the milk? (2 marks)
	4. Each box is sold at Kshs. 840, a profit of 12%. Calculate the buying price of each packet. (4 marks)
2. The figure below shows a histogram drawn for marks scored by students in a mathematics contest



* 1. State the modal class. (1 mark)
	2. Draw a frequency distribution table from the histogram. (2 marks)
	3. Use the table in (b) above to calculate the mean mark (3 marks)
	4. On the histogram, draw a vertical line showing where the median mark lies (4 marks)
1. The displacement of a particle after t seconds is given by .

Determine the:

* 1. velocity of the particle when (3 marks)
	2. value of when the particle is instantaneously at rest (3 marks)
	3. displacement when the particle is instantaneously at rest. (2 marks)
	4. acceleration of the particle when seconds (2 marks)
1. The distance between towns A and B is 360km. A minibus left town A at 8.15 a.m. and traveled towards town B at an average speed of 90km/hr. A matatu left town B, hours later on the same day and travelled towards A at average speed of 110km/hr.
2. (i) At what time of the day did the two vehicles meet? (4 marks)

(ii) How far from A did the two vehicles meet? (2 marks)

1. A motorist started from her home at 10.30 a.m. on the same day as the matatu and travelled at an average speed of 100 km/h. She arrived at B at the same time as the minibus. Calculate the distance from A to her house. (4 marks)
2. In the figure below, PQRS is a trapezium. PQ is parallel to SR. The diagonals SQ and PR intersect at T and SR=2PQ. , , and , where and are constants



* 1. Find in terms of and :
1. ; (2 marks)
2. ; (2 marks)
3. . (1 mark)
	1. Determine the values of and (5 marks)
4. The figure below, two circles, centres E and G and radii 5 cm and 12 cm respectively intersect at F and H. EG = 13 cm.



1. Show that . (3 marks)
2. Calculate

(i) the size of obtuse ∠FEH (3 marks)

(ii) the area of the shaded part, correct to 2 decimal places. Use π=3.142 (4 marks)

1. (a) Fill the table below for the function for (2 marks)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

(b) (i) Draw the graph of the function for (3 marks)

 

 (ii) On the same axes, draw line (1 mark)

 (c) Determine the values of *x* at the points of intersection between the curve and line  (2 marks)

 (d) Give the equation of the line of symmetry of the curve (2 marks)

1. In the figure below, ABC is a tangent to the circle at B.



* 1. Given that , and ∠, calculate the sizes of the following angles. Give reasons in each case
1. ∠DGE (2 marks)
2. ∠GFE (3 marks)
3. ∠ DBC (2 marks)
	1. Given that cm and cm, calculate TS (3 marks)