**Name ADM NO**

**Class Date**

MATHEMATICS

FORM 3

SEPTEMBER 2022

TIME: 2 ½ HOURS

**OPENER EXAMINATION TERM 3, 2022**

**Kenya Certificate of Secondary Education 2022**

**INSTRUCTIONS TO CANDIDATES**

1. *Write your name and admission number in the spaces provided at the top of this page.*
2. *This paper consists of two sections:* **Section I and Section II.**
3. *Answer* ***al****l questions in* **section I** and any five questions in Section **II.**
4. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
5. *Marks may be given for correct working even if the answer is wrong.*
6. ***KNEC*** *Mathematical tables may be used.*

**For Examiner’s Use Only**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **Total**  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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

 **Grand**

 **Total**

**SECTION 50 Marks**

**Answer all the questions in this section.**

1. Express as a fraction (3 marks)
2. Given that, find two possible values of a. (3 marks)
3. In the figure below AB = AC and angle ABC =. BD is a diameter. Calculate the size of angle BDE. (3 marks)



1. Evaluate (3 marks)
2. A small cone of height 8 cm is cut off from a bigger cone to leave a frustum of height 16 cm. If the volume of the smaller cone is 160 , find the volume of the frustum. (3 marks)
3. A variable M varies directly as H and the square of *r*. Find the percentage change in M if *r* is increased by 25% and H is increased by 12%. (4 marks)
4. Use tables of square roots and reciprocals to find the value of *x*. (4 marks)
5. An arc of a circle is 8.3 cm long. If the radius of the circle is 15.4 cm, find the angle it subtends at the centre of the circle. (2 marks)
6. Find the integral values that satisfy the inequality (3 marks)
7. The 20th term of an arithmetic sequence is 60 and 16th term is 20. Find the first term and the common difference (3 marks)
8. A translation vector maps a point onto . Find the value of *x* and *y*. (3 marks)
9. An angle of 1.8 radians at the centre of the circle subtends an arc of length 23.4 cm. Find,
10. The radius of the circle. (1 mark)
11. The area of the sector enclosed by the arc and the radii. (2 marks)
12. Three interior angles of an irregular polygon are, and. The remaining angles are each. Calculate the sum of the interior angles of the polygon. (3 marks)
13. The figure below is a triangle XYZ. ZY = 13.4cm, XY = 5cm and



(i) Find the area of triangle XYZ. (2 marks)

(ii) Determine the shortest from point X to line ZY. (2 marks)

1. Solve for *x*  in the equation (3 marks)
2. Achieng’ wants to buy a sewing machine on hire purchase. It has a cash price of Sh. 7500. She can pay the cash price or make a down payment of Sh.2250 and 15 monthly instalments of Sh.550 each How much interest does she pay under the instalment plan? (3 marks)

**SECTION II 50 Marks**

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

1. (a) A dome of a building is in the form of a hemisphere from inside. It was whitewashed at a cost Ksh. 49,896. If the cost of the white washing is Ksh. 200 per square metre. Taking , find:
2. Inside surface area. (2 marks)
3. The volume of air inside the dome. (4 marks)

(b) The slant height of a frustum of a cone is 4 cm and the perimeters of the circular ends are 18 cm and 6 cm. Find the curved surface area of the frustum. (4 marks)

1. (a) Find the inverse of the matrix A given that A is (2 marks)

(b) Jane bought 200 bags of sugar and 300 bags of rice for a total of Sh. 850 000. Peter bought 120 bags of rice and 90 bags of sugar for a total cost of Sh. 360 000. If the price of a bag of sugar is Sh. *x* and that of rice is *y,*

1. Form two equations to represent the above information. (2 marks)
2. Use matrix method to find the price of one bag of each item. (3 marks)

 (c) Robert bought 225 bags of sugar and 360 bags of rice. He was given a total discount of Sh. 33 000. If the discount on the price of a bag of rice was 2%, calculate the percentage discount of abag of sugar. (3 marks)

1. The following table shows the rate at which income tax was charged during a certain year.

|  |  |
| --- | --- |
|   Monthly taxable income in Ksh. | Tax rate % |
|  | 10 |
|  | 15 |
|  | 20 |
|  | 25 |
|  | 30 |
|  | 35 |
|  | 40 |

A civil servant earns a basic salary of Ksh.35750 and a monthly house allowance of sh.12500. The civil servant is entitled to a personal relief of sh.1062 per month. Calculate:

1. Taxable income per month (2 marks)
2. Calculate his net monthly tax (5 marks)
3. Apart from the PYAE, the following deduction are also made from his monthly income.

 WCPS at 2% of the basic salary

 Loan repayment Ksh.1325

 NHIF sh.480

Calculate his net monthly earning. (3 marks)

1. Two friends Jane and Tom live 60 km apart. One day Jane left her home at 9.15 a.m. and cycled towards Tom’s house at an average speed of 15 km/h. Tom left his house at 10:45 a.m. on the same day and cycled towards Jane’s at an average speed of 25 km/h.
2. Determine:
3. The distance from Jane’s house to where the two friends met. (4 marks)
4. The time they met. (2 marks)
5. How far Jane was from tom’s house when they met. (2 marks)
6. The two friends took 12 minutes at the meeting point and then cycled to Tom’s house at an average speed of 12 km/hr. Find the time they arrived at Tom’s house. (2 marks)
7. The figure below represents two pulley wheels centres A and B with a rubber band CDEFGHC stretched round them. Radius of the wheel centre A = 16 cm, Ab = 30 cm. CD and GF are tangents to the circles. Angle CAB = .



Using alculate to 2 decimal places

1. Length CD. (2 marks)
2. Arc length DEF. (3 marks)
3. Arc length CHG. (3 marks)
4. Total length of the belt. (2 marks)
5. Meshack and Kelvin contributed Sh. 60,000 and Sh. 90,000 respectively in order to start business. They employed a manager and agreed to pay him Sh.4,500 per month from the profit made each year. They also agreed that 20% of the profit made each year would be put back into the business while the rest would be shared between them in the ratio of their initial contribution. During the first year they made a profit of sh. 365,000. Calculate:-
6. The manager’s annual salary for that year (1 mark)
7. The money put back into business that year. (2 marks)
8. The business net profit for that year. (2 marks)
9. How much each partner received that year. (3 marks)
10. The capital for the following year. (2 marks)
11. The points A and B have coordinates (1, 5) and (9, 7) respectively.
12. Find the equation of the line AB, giving your answer in the form . (3 marks)
13. Find;
14. The equation of the line *l* which is the perpendicular bisector of line AB. Give the answer in the form where a, b and c are integers. (3 marks)
15. The point C has coordinates (3, q). Given that point C lies on line *l,* determine the value of q. (1 mark)
16. The line *l* meets the axis at the point D. Find the length of the line CD. (3 marks)
17. (a) Complete the table below for the equation. (2 marks)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | 0 | 1 | 2 | 3 |
| 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
|  | 12 |  | 6 |  | 0 |  |  |  |
|  |  |  |  |  | 0 |  |  |  |
|  |  |  | 5 |  | 7 |  |  |  |

 (b) Using a suitable scale draw the graph of . (3 marks)

(c) By drawing an appropriate straight line, solve the equation;

1. (3 marks)
2. (2 marks)