NAME............................................................................. ADM NO................ CLASS…………

121

MATHEMATICS

JULY 2022

TIME: 2 ½ HOURS

**TERM 2 2022 OPENER EXAM FORM 3**

**MATHEMATICS**

**FORM 3**

**INSTRUCTIONS TO THE CANDIDATES**

1. *Write your* ***name*** *and* ***Adm no.*** *in the spaces provided above.*
2. *This paper consists of* ***two*** *sections;* ***Section I*** *and* ***Section II.***
3. *Answer* ***All*** *questions in* ***Section I*** *and only* ***Five*** *questions from* ***section II***
4. ***All*** *answers and working* ***must*** *be written on the question paper in the spaces provided below each question.*
5. *Show all the steps in your calculations giving 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.*

*m) Candidates should answer questions in* ***English.***

**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**

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

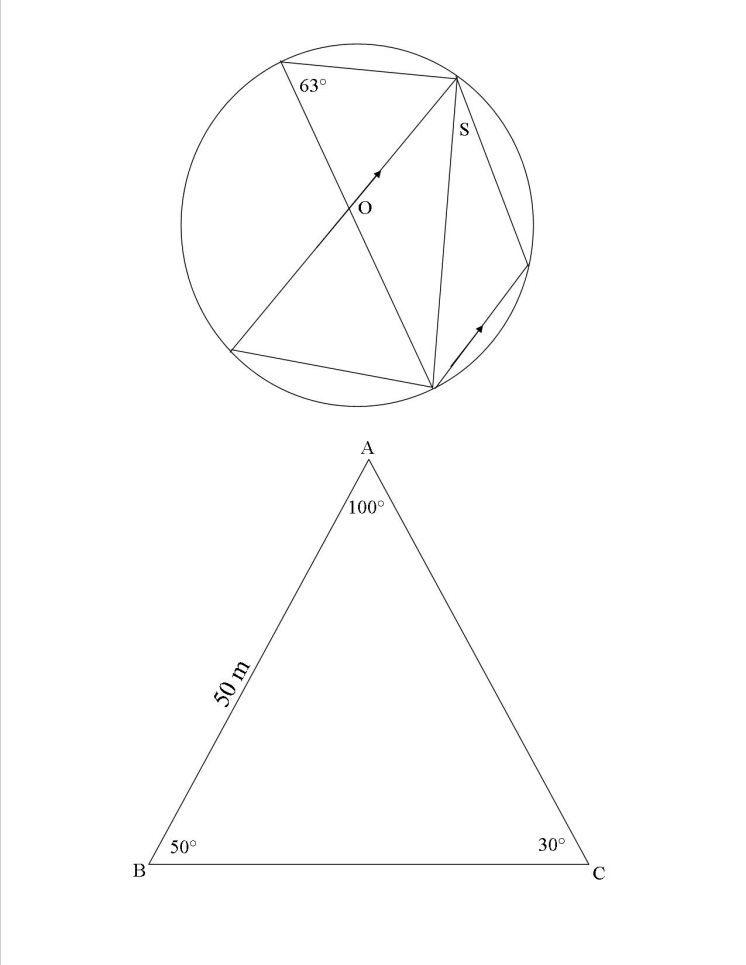
**GRAND**

**TOTAL**

**SECTION I (50 MARKS)**

*Answer* ***ALL*** *the questions in this section in the spaces provided*

1. Use logarithm tables to evaluate (4mks)
2. Express 0. as a fraction. (3mks)
3. Simplify (3mks)
4. The lengths of wires were 30 m, 36 m and 84 m. Pieces of wire of equal length were cut from the three wires. Calculate the least number of pieces obtained. (4mks)
5. The size of an interior angle of regular polygon is 3xo. While its exterior angle is (x – 20)o. Find the number of sides of the polygon. (3mks)
6. Find the percentage error in calculating the volume of the cuboid whose dimensions are 8.2cm by 6.2cm by 5.7cm. (answer to 2 d.p.) (3mks)
7. A man wishes to save sh. 200 000 in 4 years time. Find, to the nearest shilling, the sum of money he has to deposit now at 12% p.a. interest, compounded semi-annually to realize his goal. (3mks)
8. Use completing the square method to solve . Write your answer correct to 4 d.p. (3mks)
9. Solve for x in: (4mks)
10. Determine the equation of a line that passes through (-2,5) and is parallel to the line whose equation is (4mks)
11. In the figure below, if a circle is drawn passing through A, B and C what would be the radius of the circle (4mks)



1. Given that find the value of and hence find the value of . (2mks)
2. An arc of a circle of radius 4 cm is 5 cm long. Calculate the angle subtended by the arc at the center in radians (2mks)
3. The figure below shows a quadrilateral ABCD which is cyclic. Solve for x. (2mks)



1. Simplify (3mks)
2. Given that **OP** = 3**i** – 2**j** and **OQ** = 8**i** – 5**j**. Find |**PQ**| to 3 significant figures. (3mks)

**SECTION II: (50 MARKS)**

*Answer only* ***FIVE*** *questions from this section in the spaces provided*

1. Mr. Kobe is a civil servant who earns a monthly salary of Ksh.21200. He has a house allowance of Ksh.12000 per month, other taxable allowances are commuter Ksh.1100, medical allowance Ksh.2000. He is entitled to a personal relief of Ksh.1240 per month.

Using the income rates below, solve the questions that follow.

|  |  |
| --- | --- |
| Income in Ksh. per month | Rates in Ksh per sh 20 |
| 1 – 8,400  8401 – 18,000  18001 – 30,000  30001 – 36,000  36001 – 48,000  Above 48,000 | 2  3  4  5  6  7 |

Determine;

1. i) His monthly taxable income. (2mks)

ii) Net tax (PAYEE) (5mks)

1. In addition to the PAYEE, the following deductions were made. Ksh.250 for NHIF, Ksh.120 service charges, he repays a loan at sh.4500 and contributes towards savings at sh.1800 every month. Calculate his net salary per month. (3mks)
2. Mr. Korir borrowed Khs 3,600,000 from the bank to buy a residential house. He was required to repay the loan with a simple interest for a period of four years. The repayment amounted to kshs 111 000 per month. Calculate;
3. The interest paid to the bank. (1mk)
4. The rate per annum of the simple interest. (2mks)
5. The value of the house appreciated at the rate of 15% per annum. Calculate the value of the house after 4 years to the nearest hundreds. (3mks)
6. After n years, the value of the house was Kshs 8,327,019. Find the value of n.

(4mks)

1. a) Complete the table below for the equation (2mks)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| X2 | 0 |  | 4 | 9 |  | 25 |  |
| -6x | 0 | -6 |  |  | -24 |  | -36 |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| y | 5 |  |  |  |  |  |  |

b) Draw the graph of y=x2 – 6x + 5 using the values in the table. (3mks)

(c) Use the graph to solve the equations

(i) x2 - 6x + 5 = 0 (1mk)

(ii) x2 – 6x + 7 = 0 (2mks)

(iii) x2 – 6.5x + 5 = 0 (2mks)

1. (a) A matatu travelling at 99km/h passes a checkpoint at 9.00 am. A police patrol car travelling at 132km/h in the same direction passes through the police check point at 9.15 a.m. If the matatu and the police patrol car continue at their uniform speeds, calculate:
   1. the relative speed of the two vehicles (1mk)
   2. the distance between the two vehicles as at 9.15 a.m. (2mks)
   3. the time the police car will overtake the matatu. (3mks)

(b) Two passenger trains A and B which are 240m apart and travelling at 164km/h and 88km/h respectively approach one another on a straight railway line. Train A is 150m long and train B is 100m long. Determine the time in seconds that elapses before the two trains completely pass each other. (4mks)

1. The marks scored in a form three Maths exam were recorded as follows

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 69 | 70 | 72 | 40 | 52 | 60 | 22 | 31 | 78 | 53 | 28 | 67 |
| 63 | 54 | 57 | 48 | 47 | 56 | 55 | 62 | 75 | 38 | 37 | 44 |
| 62 | 64 | 58 | 39 | 45 | 48 | 65 | 50 | 85 | 46 | 47 | 57 |
| 35 | 34 | 58 | 64 | 62 | 37 | 41 | 42 | 36 | 54 | 82 | 48 |
| 53 | 57 | 56 | 72 | 56 | 48 | 44 | 55 | 78 | 59 | 50 | 45 |

1. Starting with a class of 20 – 29, make a frequency distribution table for the above data (2mk)
2. What is the modal class of the test (1mk)
3. Calculate the mean of the data (4mk)
4. Calculate the median mark to 1 d.p. (3mk)
5. The diagram below shows two circles, centre A and B which intersect at points P and Q.

Angle PAQ = 700, angle PBQ = 400 and PA = AQ = 8cm.

**A**

**P**

**B**

**400**

**700**

**Q**

Calculate

1. PQ to correct to 2 decimal places (2mks)
2. PB to correct to 2 decimal places (2mks)
3. Area of the minor segment of the circle whose centre is A to 2 decimal places (2mks)
4. Area of shaded region (4mks)
5. a) Complete the table below for for (2mks)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X0 | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
| y=cos x |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. Draw the graph of . (4mks)
2. Use the graph in (b) above to to solve for the values of x in the following (2mks)
3. Use the graph in (b) above to find the cosine values of the following angles;(2mks)
4. Three ships A, B, and C are approaching a harbor H. Ship A is 16 km from the harbor on a bearing of 0900. Ship B is 14 km from the harbor on a bearing of 1300, and ship C is 26.31 km to the west of B and on a bearing of 2400 from the harbor. Without using scale drawing, calculate, to 2 decimal places, the distance:
   1. between A and B (3mks)
   2. of ship C from the harbor (3mks)
   3. between A and C (4mks)