**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ INDEX NO: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SCHOOL: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ SIGNATURE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

FORM THREE

MATHEMATICS

PAPER 2

TIME: 2½ HOURS

**INSTRUCTIONS TO CANDIDATES**

1. Write your name and index number in the spaces provided above.
2. This paper consists of **TWO** sections. Section A and Section B.
3. Answer **ALL** the questions in section A and only **FIVE** questions from Section B.
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 your answers at each stage in the spaces below each question.
6. Marks may be given for correct working even if the answer is wrong.
7. Non-programmable silent calculators and KNEC mathematical tables may be used except where stated otherwise.
8. Candidates should check the question paper to ascertain that all the papers are printed as indicated and that no questions are missing.

**FOR EXAMINER’S ONLY**

**SECTION A**

**Section 1**

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

**Section 11**

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

|  |
| --- |
| Grand total |
|  |

1. Make x the subject of the formula. (3mks)

P= $\sqrt{\frac{x+2w}{4x+3R}}$

1. Simplify the following by rationalizing the denominator. (3mks)

$\frac{8}{4-2\sqrt{3}}$

1. A quantity P is partly constant and partly varies inversely as square of t. p =6 when t=6 and p=18 when t=3. Find t when p=11. (3mks)
2. Solve for x in the equation; (3mks)

Log8(x+6) – log8(x-3) =$ \frac{2}{3}$

1. In the figure below QT is a tangent to a circle at Q. PXRT and QXS are straight lines. PX =6cm, RT=8cm, Qx=4.8cm and Xs= 5cm.



Find the length of;

1. XR (2mks)
2. QT (2mks)
3. Solve for x and y in the simultaneous equation below. (3mks)

xy + 6= 0

x - 2y= 7

1. Solve for x. (3mks)

2x2+x-36= 0

1. Expand (1+2x)7 up to the term in x3, hence use the expansion to estimate the value of (1.02)7 correct to four decimal places. (3mks)
2. Find the value of y for which $\left[\begin{matrix}3&4\\y&6\end{matrix}\right]$ is a singular matrix. (3mks)
3. a) Find the inverse of the matrix $\left[\begin{matrix}4&3\\3&5\end{matrix}\right]$ . (1mk)

b) Hence solve the simultaneous equation using the matrix method. (3mks)

 4x+3y =6

 3x+5y =5

1. An item that costs sh. 24, 000 cash can be bought on hire purchase. A customer pays sh.6, 000 as deposit and then makes 6 monthly installments of sh.3, 500 each. Calculate the monthly rate of compound interest, giving your answer to 1 d.p. (3mks)
2. Barasa shared sh.360, 000 among his children Simiyu, Wasike and Nekesa I the ratio 1:3:5 respectively. How much did each receive? (3mks)
3. In the arithmetic series 1+4+7+10+…find the sum of the first 100 terms. (3mks)
4. If $a$= $\begin{matrix}1\\2\\3\end{matrix} ,b\begin{matrix}4\\ -4\\5\end{matrix} and c= \begin{matrix}1\\0\\-5\end{matrix} . find 3a-2b+c.$ (3mks)
5. Make x the subject (3mks)

1. The figure below shows a triangle xyz in which x=13.4cm, z=5cm and ˂xyz= 57.70. Find length y. (3mks)



**SECTION B: ANSWER 5 QUESTIONS ONLY IN THIS SECTION**.

1. a) Complete the table below for the function y=2x2+3x-5

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | **-4** | **-3** | **-2** | **-1** | **0** | **1** | **2** |
| 2x2 |  |  |  |  | 0 |  |  |
| 3x | -12 | 18 |  |  |  |  |  |
| -5 | -5 |  |  | -3 |  |  | 6 |
| y |  |  |  |  |  |  |  |

b) On the grid provided draw the graph of y=2x2+3x-5 for -4≤x≤2. (4mks)



c) Use your graph to state the roots of

1. 2x2+3x-5=0 (1mk)
2. 2x2+6x-2=0 (3mks)
3. A trader bought 8 cows and 12 goats for a total of ksh.294, 000. If he had bought 1 more cow and 3 more goats he would have spend ksh.337, 500.
4. Form two equations to represent the above information. (2mks)
5. Use matrix method to determine the cost of a cow and that of a goat. (3mks)
6. The trader sold the animals he had bought making a profit of 40% per cow and 45% per goat.
7. Calculate the total amount of money he received. (3mks)
8. Determine his profit in Kenyan shillings. (2mks)

20. The bearing of towns P and Q on a horizontal ground from a tower are 050 and 142 respectively. The angle of elevation of the top of the lower from town P is 34 . Given that P is 200m from the top of the tower and Q is 120m from the base of the tower

 Determine a) The height of the tower (3mks)

 b) The angle of elevation of the top of the lower from Q (3mks)

c) The distance between the two towns P and Q (4mks)

21.A group of young men decided to raise ksh.480, 000 to start a business. Before actual payment was made four members pulled out and each of the remaining had to pay an additional ksh.20,000 write an expression in terms of p for;

1. i. Original contribution of each member. (1mk)

ii. Contribution after withdrawal of four members. (1mk)

1. Form an equation in p and hence determine the number of initial members. (5mks)
2. Three men Kamau, James and Hassan shared shs.480, 000 such that Kamau: James is 3:2 and James:Hassan is 4:2. Find how much each got. (3mks)
3. The relationship between two variables S and T is given by the equation S=KTn where K and n are constant

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| T  | 2 | 3 | 4 | 5 | 6 | 7 |
| S | 12.8 | 28.8 | 51.2 | 80.8 | 115.2 | 156.8 |

1. Write down the linear equation relating to S and T (1mk)
2. Complete the table above for the linear equation relating to S and T(to one decimal place) (2mks)
3. Draw a suitable straight line graph to represent the data (3mks)
4. Use your graph to determine the value of K and n (2mks)
5. Find the value of S when T =3.5 (2mks)

17. a) The current price of a vehicle is shs 500,000. If the vehicle depreciates at a rate of 15% p.a . Find the number of years it will take for its value to fall to shs 180,000. (4mks)

b) The cash price of a cooker is shs 9,000. A customer bought the cooker by paying 15 monthly installments of shs 950 each. Calculate:

a) the carrying charge (3mks)

b) the rate of interest (3mks)

1. The table below shows the income tax rates in a certain year.

|  |  |
| --- | --- |
| **Total income in k£ per annum** | **Rate in shs per pound** |
| 1 – 3,900 | 2 |
| 3,901 – 7,800 | 3 |
| 7,801 – 11,700 | 4 |
| 11,701 – 15,600 | 5 |
| 15,601 – 19,500 | 7 |
| Over 19,500 | 7.5 |

Mrs Musau earned a basic salary of ksh 18,600 per month and allowances amounting to ksh.7, 800 per month. She claimed a personal relief of ksh 1,080 per month. Calculate;

1. Total taxable income in k£ p.a. (2mks)
2. i. The tax payable in ksh per month without relief. (4mks)

ii. The tax payable in ksh per month after relief. (2mks)

1. Mrs Musau’s net monthly income. (2mks)