**Name :………………………………………………Adm.no ………....................................**

**School :……………………… Class…………………………….**

**Candidate’s sign……………………………..… Date :…………………..**

**121/1**

**MATHEMATICS**

**TIME: 2 ½ HOURS**

**FORM 3**

**OCTOBER 2017**

**MALIET –JOINT EXAM**

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

**INSTRUCTIONS TO CANDIDATES:**

* Write **your name** and **Admission Number** in the spaces provided above
* This paper contains **two sections;** Section **I** and section **II.**
* Answer **all** the questions in section **I** and **II** in the spaces provided.
* All workings and answers **must** be written on the question paper in the spaces provided below each question.
* Marks may be given for correct working even if the answer is wrong.
* Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise
* Show all the steps in your calculations, giving your answers at each stage in the spaces below each question

**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**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question** | 17 | 18 | 19 | 20 | 21 | 22 | 24 | **TOTAL** |
| **Marks** |  |  |  |  |  |  |  |  |

*This paper consists of 11 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

***SECTION I***

1. Using logarithm tables only, evaluate

  (4 marks)

1. If $x: y = 4:7$ and $y :£ = 5:3$ find the ratio $x:y: £$ ***(2marks)***
2. Find the equation of a line perpendicular to $2x +4y = 8$, which crosses the line at (3,2)*.*  ***(3 marks)***
3. Simplify,  ***(3marks)***
4. An American tourist arrived in Kenya with 1000 US $ and converted the whole amount into Kenyan shillings. He spent sh. 40,000 and changed the balance to sterling pound before leaving for United Kingdom. A Kenya bank buys and sells foreign currencies as shown.

 Buying (in$ Kshs$) Selling (in$ Kshs$)

 1 US dollar 84.2083 84.3806

 1 Sterling Pound 134.7941 135.1294

 Calculate the amount he received to the nearest sterling pound. ***(4 marks)***

1. Make q the subject of the formula:

  (3 marks)

1. A point P(4,6) is mapped onto a point $P^{1}$ (8,-4) under translation. If $Q^{1}$ (5,3) is the image of a point Q under the same transmission, find the co-ordinate of Q. (3marks)
2. Find the value of $\left(x\right)$ that satisfies the equation:

$log\_{3}\left(x+24\right)-2=log\_{3}\left(9-2x\right).$ (3marks)

1. In the figure below, **BT** is a targent to the circle at **B**. **AXCT** and **BXD** are straight lines. **AX**

 6cm **CT** = 8cm, **BX** =4.8cm and **XD** =5cm.



**6cm**

**8cm**

**5cm**

**4.8**

**B**

**C**

**A**

***x***

**T**

**D**

Find the length of **BT**. (3mrks)

1. The length and width of a rectangular window pane measured to the nearest millimeter are 8.6cm and 5.3 respectively.

 Find to four significant figures, the percentage error in the area of the window pane. (answer to 4 significant figures) (3mks)

1. A two-digit number is such that the sum of the ones digit and the tens digit is 10. If the digits are reversed, the number exceeds the original number by 54. Find the number

(3 Marks)

1. Rationalize the denominator leaving your answer in the form $a+b√c$ where a,b and c are constants. $\frac{5-2\sqrt{3}}{2+3\sqrt{3}}$ (3mks)
2. Given that Cos A =, without using mathematical table or calculator find:
3. Sin A (2mk)
4. Tan (90-A) (1mk)
5. The exterior angle of a regular polygon is $\left(x-50\right)^{°}$ and the interior angle is $\left(2x+20\right)^{0}$.find the number of sides of the polygon. (3mks)
6. Find the integral values of *x* which satisfy the following inequalities;

*2x + 3 > 5x – 3 > -8* (3mks)

1. A bus starts off from Kitale at 9. a.m and travels towards Kakamega which is 290km away at a speed of 60km/hr. At 9.50 a.m, a matatu leaves Kakamega and travels towards Kitale at a speed of 60Km/h. How far from Kitale will the two vehicles meet? ( 4mks)

**Section II**

1. x, y and z are three quantities such that x varies directly as the square of y and inversely as the square root of z.
2. Given x = 20 when y =5 and c = 9, find x when y = 7 and c = 25. (5 marks)
3. If y increases by 10% and z decreases by 19%, find the percentage change in x. (5 marks)
4. An arithmetic progression (AP) has the first term a and the common difference d.

 (a) Write down the third, ninth and twenty fifth terms of the AP in terms of a and d. (1mk)

 (b) The AP above is increasing and the third, ninth and twenty fifth terms form the first three consecutive terms of a Geometric Progression (G.P) The sum of the seventh and twice the sixth terms of the AP is 78. Calculate:-

(i) The first term and common difference of the AP. (5mks)

(ii) The sum of the first nine terms of the AP. (2mks)

(iii) The difference between the fourth and the seventh terms of an increasing AP. (2mks)

1. A youth group decided to raise Ksh.480, 000 to buy a piece of land costing Kshs.80, 000 per hectare. Before the actual payment was made four of the members pulled out and each of those remaining had to pay an additional Kshs.20, 000.
2. If the original number of the group members was x, write down;
3. An expression on each how much each was to contribute originally. (1mark)
4. An expression on how the remaining members were to contribute after the four pulled out. (1mark)
5. Determine the numbers who actually contributed towards the purchase of the land. (5marks)
6. Calculate the ration of the supposed original contribution to the new contribution. (1mark).
7. If the land was subdivided equally, find the size of the land each member got. (2marks)
8. The table below shows monthly income tax rates.

|  |  |
| --- | --- |
| Income; K£. p.m.  | Rate of tax Sh. Per £.  |
| 1 - 342 | 2 |
| 343 - 684 | 3 |
| 685 - 1026 | 4 |
| 1027 - 1368 | 5 |
| 1369 - 1710 | 6 |
| Over 1710 | 7 |

A civil servant earns a salary of Sh.42000 and is provided with a house at a nominal rent of Sh.1500 per month.

*(a)* Taxable pay is the employee’s salary plus 15% of salary less nominal rent. Calculate the civil servant’s taxable income in K£. p.m***. (2 marks)***

*(b)* If the employee is entitled to a personal relief of Sh.900 p.m., what is his PAYE? ***(5 marks)***

*(c)* The following deductions are made from his gross monthly pay;

 NHIF – Sh.630, WCPS – Sh.540, Union dues – Sh.330, SACCO loan recovery – Sh.7000 and Co-operative shares – Sh.2500. Calculate his net monthly pay. ***(3 marks)***

1. a) A straight line L1 passes through the points (-2,4) and (3,0). Find the equation of line L1 in the form  (3mks)

b)Another line L2 passes through the points (5,6) and (3,0). Find the acute angle between lines L1 and L2 at the point of intersection. (4mks)

1. Find the equation of a line perpendicular to L1 and passing through (2,1) in the form

y=mx+c (3mks)

1. A motorist is to follow the route ABCD .B IS 250km FROM A on a bearing $N75°E $from A.C is on a bearing of $S75°E$ from A and 275km from B.D is 300km on a bearing of $S80°E$ from B.using a scale 1cm to represent 50km;
2. Show the relative position of ABCD. (4marks)
3. Determine;
4. The distance of A from C (2marks)
5. The bearing of B from C. (1mark)
6. The distance of A from D. (2marks)
7. The compass bearing of C from D. (1mark).
8. a) Plot the graphs of the equations y=2x + 3 and y=-x +3. (4mks)
9. Use your graph to find the coordinates of the point of intersection of the two lines. (2mks)
10. Hence, state the solutions to the equations y=2x + 3 and y=-x +3. (2mks)
11. Find the angle made by the line y=2x+3 and the x-axis. (2mks
12. (a) Find the inverse of the matrix (2 mks)

 $\left[\begin{matrix}2&5\\4&3\end{matrix}\right]$

 (b) A transport company has two types of vehicles for hire: Lorries and buses. The vehicles are hired per day. The cost of hiring two lorries and five buses is Sh. 156,000 and that of hiring 4 lorries and three buses is Sh. 137,000.

 (i) Form two equations to represent the above information. (2 marks)

 (ii) Use matrix method to determine the cost of hiring a lorry and that of hiring a bus. (3 marks)

 (c) Find the value of x given that $\left[\begin{matrix}2x-1&1\\x^{2}&1\end{matrix}\right]$ is a singular matrix (3 mks)