**Name………………………………ADM NO……………………………………**

**Date………………………………………………..**

 **FORM 3 MIDTERM - TERM 2**

**121/1- MATHEMATICS**

**NOV. 2021- TIME 1HR 15 MIN**

 **Instructions to candidates**

1. *Write* ***your name*** *in the spaces provided above*
2. *Write the date of examination in the spaces provided above.*
3. *This paper contains* ***TWO****sections;* ***Section*** *I and* ***Section II****.*
4. *Answer* ***ALL*** *the questions in* ***section I*** *and only* ***2*** *questions from* ***Section II***
5. ***Show all steps in your calculations, giving your answers at each step 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. ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***
9. ***Candidates should answer the questions in English.***

**For Examiner’s Use Only**

**Section I**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **Total**  |
|  |  |  |  |  |  |  |  |  |  |  |

**Section 1I** **Grand Total**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **11** | **12** | **13** | **14** | **TOTAL** |
|  |  |  |  |  |

**SECTION I**

1. Simplify. leaving the answer in the + ,where a, b, and c are integers. (2marks)
2. Solve the equationlog10 (6x – 2) – 1= log 10 (x-3) (2marks)
3. The table below shows income tax rates in a certain year

|  |  |
| --- | --- |
| Monthly income in Ksh | Tax rates in each shilling % |
| 0 – 10164 | 10 |
| 10165 – 19740 | 15 |
| 19741- 29316 | 20 |
| 29317- 38892 | 25 |
| 38893 – and above | 30 |

In that year, Mawira earned a salary of 41,100 per month. Calculate Mawira’s income tax per month given that a monthly tax relief of Ksh 1162 was allowed. (3mks)

1. Determine the inverse,T-1  of the matrix T =( ( 1MKS)

Hence find the coordinates to the point at which two lines X + 2y=7 andX-Y=1 Using matrix method (3MKS)

1. A car park area in a shopping mall measures 54m by 72m is by number of whole number equal squares tiles with the largest possible dimension. Calculate the least possible number of square tiles required. (2MKS)

6) Use logarithm tables to evaluate the following

 (4mks)

7) Find the value of X (3MKS)

8) Find the value between and satisfying the equation8 (3 MKS)

1. Make x the subject of the equation = (3MKS)

10) The 20th term of an A.P is 60 and the 16th term is 20.Find the first term and the common difference of the sequence. (2MKS)

b) Find the sum of the first 9 terms of the G.P 8 +24+ 72+…… (2MKS)

SECTION B

 **ANSWER TWO QUESTIONS FROM THIS SECTION**

1. ) Wheels have radii of 20cm and 30cm.Their centers are 70cm apart.A belt passes tightly round the wheels as shown below.

 A

E

C

 B

 O

 G

 F

 E

a) Calculate the length AB and FE. (3MKS)

b) Find angles AOC and BCO (3MKS)

c) Calculate the total length of the belt ABGEFH (4MKS)

12).The figure below shows triangle OAB, in which BD: DA= 1; 2 and, OE; ED = 3;2 C is the midpoint of OB

 B D A

 E

 C

 O

Given that OA = and OB = express the following vectors in terms

1. AB (1 MK)
2. OD (1 MK)
3. AE (3 MKS)

iv) Show that points A,E and C lie on a straight line. (3MKS)

Hence determine the ratio of CE;EA (2MKS)

13) A Quantity P varies partly as the square of M and partly as N. When P = 3.8 m = 2 and n =-3 .When P = -0.2, M=3 and n=2.Find:

(I) The equation that connects P, M and N (3 MKS)

(II)The value of P when m =10 and n=4 (2MKS)

1. Express M in terms of P and N (2MKS)
2. If p and n are each increased by 10%, find the percentage increase in m 2correct to 2 decimal places (3MKS)

14) a) complete the table below for the function 2x2– 3x -4 for -4(2MKS)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X | -2 | -1 | 0 | 1 | 2 | 3 |
| 2x2 |  | 2 | 0 | 2 | 8 |  |
| -3x-4 | 2 |  | -4 |  |  | -13 |
| Y |  |  | -4 |  |  | 5 |

b) On the grid below, draw the graph of y= 2x2 – 3x – 4= o for -2

C) Use your graph to estimate the roots of Y=2x2 – 3x – 4=0 (3mks)

d) Use your graph to solve = 4x2 – 7x=12 (3MKS)