**NAME ………………………………………………………INDEX NO…………………………… SCHOOL………………………………………………………SIGNATURE………………………**

**1212/2**

**MATHEMATICS ALT-A**

**PAPER 2**

**MARCH 2019**

**2 ½ HOURS**

**BURAMU JOINT EVALUATION EXAMS 2019**

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

**INSTRUCTIONS TO DANDIDATES**

1. Write your name, index number and class in the spaces provided.

2. Sign and write date of the of the examination in the spaces provided.

3. The paper contains two sections: Section I and II

4. Answer ALL questions in section I and **STRICTLY FIVE** questions from section II.

5. All working and answers must be written on the question paper in the spaces provided below each question.

6. Show all the steps in your calculations, giving you’re your answers at each stage in the spaces below each question.

7. Marks may be awarded for correct working even if the answer is wrong.

8. Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

**FOR EXAMINER’S USE ONLY**

**SECTION 1**

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

**GRAND TOTAL**

**SECTION II**

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

***This paper consists of 16 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing.***

**SECTION 1 (50 MARKS):**

 **ANSWER ALL QUESTIONS IN THE SECTION.**

1. Solve for x in the following equation ( 3mks )

log10 (10x + 5) – log10 (x - 4) = 2

1. Form the quadratic equation whose roots are x = -$ \frac{5}{3}$ and x = 1 (2 mks)
2. W varies directly as the cube of x and inversely as y. Find W in terms of x and y given that W = 80 when x = 2 and y = 5. (2 mks)
3. A cold water tap can fill a bath in 10 minutes while a hot water tap can fill it in 8 minutes. The drainage pipe can empty it in 5 minutes. The cold water and hot water taps are opened for 4 minutes. After four minutes all the three taps are opened. Find how long it takes to fill the bath. (3 mks)
4. Object A of area 10cm2 is mapped onto its image B of area 60cm2 by a transformation whose matrix is given by p = $\left(\begin{matrix}x&4\\3&x+3\end{matrix}\right)$. Find the possible values of x (3 mks)
5. Make P the subject of the formula in **L =** $\frac{2}{3}\sqrt{\frac{x^{2}- PT }{y}}$ (3 mks)
6. (a) Expand the expression $\left(1+ \frac{1}{2}x\right)^{5}$in ascending order powers of x, leaving the coefficients as

fractions in their simplest form. (2 mks)

(b) Use the first three terms of the expansion in (a) above to estimate the value of $\left(1.05\right)^{5}$ (2 mks)

1. By rounding each number to the nearest tens, approximate the value of $\frac{2454 × 396}{66}$

Hence, calculate the percentage error arising from this approximation to 4 significant figures. (3 mks)

1. Express in surd form and simplify as far as possible in the form of **a + b**$\sqrt{c}$ , hence write down the values of **a, b and c. (4 mks)**

$\frac{1+Cos 30^{0}}{1-Sin 60^{0}}$

1. Solve for x and y given that : (4mks )

 2x- y =3

 x2= xy-4

1. The second and fifth terms of a geometric progression are 16 and 2 respectively. Determine the common ratio and the first term. (3 mks)

12. The cost of maize flour and millet flour is Kshs 44 and Kshs 56 respectively. Calculate the ratio in which they were mixed if a profit of 20% was made by selling the mixture at Kshs. 54. (3mks)

1. On the triangle PQR, draw a circle touching QR, and PR and PQ produced. (3 mks)

Q

P

R

1. Two containers have base area of 750cm2 and 120cm2 respectively. Calculate the volume of the larger container in litres given that the volume of the smaller container is 400cm3. (3 mks)

 15. Solve the equation: Sin for 0° ≤θ≤ 180°. (3 marks)

1. Find the radius and the coordinate of the centre of the circle whose equation is

2x2 + 2y2 – 3x + 2y + $\frac{1}{2}$ = 0 (4 mks)

**SECTION II (50 MARKS):**

**ANSWER FIVE QUESTIONS IN THIS SECTION.**

1. A bag contains 5 red, 4 white and 3 blue beads. Two beads are selected at random.
2. Draw a tree diagram and list the probability space. (3 mks)

1. Find the probability that

(i) The last bead selected is red. (2 mks)

(ii) The beads selected were of the same colour (2 mks)

(iii) At least one of the selected beads is blue (3 mks)

1. The figure below shows a circle centre O in which line QOT is a diameter. Angle QTP = 460,

angle TQR = 750 and angle SRT = 380, PTU and RSU are straight lines.

P

T

U

R

Q

S

O

750

460

Determine the following, giving reasons in each case:

(a) angle RST (2 mks)

(b) angle SUT (2 mks)

(c) angle PST (2 mks)

(d) obtuse angle ROT (2 mks)

(e) angle SQT (2 mks)

1. In the figure below, VABCD is a right pyramid on a rectangular base. Point O is vertically below the vertex V. AB = 12cm, BC = 5cm and VA = VB = VC = VD = 18cm.

 V

 18 CM

 C

 D

 5 CM

 O

 12 CM

 A

 B

Calculate

1. The height VO (3 mks)
2. The angle between
3. V C and the plane ABCD (3 mks)
4. The planes VAB and ABCD (2 mks)
5. The planes VAD and VBC (2 mks)

20. In the figure below, **OA** = $p$ and **OC** =$q$. Vector **AB** = $\frac{3}{4 }$ OC. Express in terms of $ p$ and $q$ the vectors:-

 A B

 ***p***  X

 O $q$ C

(a) (i) $AC $ (1 mark)

 (ii) **OB**  (1 mark)

 (iii) **BC** (1 mark)

(b) Vector **AC** intersects with vector **OB** at x such that **AX** = *t* **AC** and **OX** = *h* **OB**. By expressing **OX** in two ways in terms of t and h, find:-

(i) Scalars *t* and *h*. (5 mks)

(ii) The ratio **OX: BX** (2 mks)

1. For a sample of 100 bulbs, the time taken for each bulb to burn was recorded. The table below shows the result of the measurements.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (in hours) | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 |
| Number of bulbs | 6 | 10 | 9 | 5 | 7 | 11 | 15 | 13 | 8 | 7 | 5 | 4 |

1. Using an assumed mean of 42, calculate

 (i) The actual mean of distribution (4 mks)

(ii) The standard deviation of the distribution (3mks)

1. Calculate the quartile deviation (3mks)
2. Complete the table below for the functions y = 3sin 3 θ and y = 2 Cos (θ + 400) (2 mks)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| θ0 | 00 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |
| 3 Sin 3θ | 0 | 1.50 |  | 3.00 |  |  | 0.00 |  |  | -3.0 |
| 2 Cos (θ + 400) | 1.53 | 1.29 |  |  | 0.35 |  |  | -0.69 |  | -1.29 |

(a) On the grid provided, draw the graphs of Y = 3 Sin 3 θ and y = 2 Cos (θ + 400) on the same axis.

Take 1 cm to represent 100 on the x-axis and 4 cm to represent 2 unit on the y – axis. (5 mks)



(b) From the graph find the roots of the equation.

 $\frac{3}{4}$ Sin 3θ = $\frac{1}{2}$ Cos (θ + 400) (2 mks)

(c ) State period of the wave y= 3sin3x (1mk)

1. OABC is a parallelogram with vertices O (0, 0), A (2, 0), B (3, 2) and C (1, 2) OIAIBICI is the image of OABC under the transformation matrix.

 -3 0

 $\begin{matrix}&\\0&-3\end{matrix}$

(a) (i) Find the co-ordinates of OIAIBIC (2 mks)

(ii) On the grid provided draw OABC and OIAIBIC (2 mks)



1. (i) Find the coordinates of OIIAIIBIICII, the image of OIAIBICI under transformation matrix. (2 marks)
2. 0
3. -3

(ii) On the grid draw OIIA IIB IIC II  (1 mk)

(c) Find a single matrix that maps OIIAIIBIICII onto OAB (3 mks)

24. Use the taxation rates table below to answer the questions that follow.

|  |  |
| --- | --- |
| Taxable income in K£ p.a | Rate % per K£ |
| 1 – 45004501 – 75007501 – 1050010501 – 1350013501 – 16500Over 16500 | 101520253040 |

A civil servant is entitled to a monthly personal relief of Ksh. 3000 and her tax (PAYE) is ksh.9000 per month. She is deducted NHIF ksh.350 per month. WCPS ksh.800 and co-op shares ksh.1200 per month. Calculate:

1. The civil servants’ total deduction per month. (1**mark**)
2. Total tax per month. (1**mark**)
3. The civil servant’s annual gross salary (6**marks**)
4. The civil servants’ basic salary if her monthly house allowance and medical allowances are ksh.10000 and ksh.2000 respectively. (2 **marks**)

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