**NAME: …………………………………………INDEX NO…………………**

**CANDIDATE SIGNATURE…………………. .DATE……………………..**

121/2

MATHEMATICS ALT A.

PAPER 2

2 ½ HOURS

**END OF TERM TWO FORM FOUR 2019**

**Kenya Certificate of Secondary Education**

**INSTRUCTIONS TO CANDIDATES**

1. *Write your name and index number in the spaces provided above.*
2. *Sign and write the date of examination in the spaces provided*
3. *This paper consists of two sections:* ***Section I and Section II.***
4. *Answer all the questions in Section I and only five from section II*
5. *All answers and working must be written on the question paper in the spaces provided below each question.*
6. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
7. *Marks may be given 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.*
9. *Candidates should check the question paper to ascertain that all the 24 questions are printed.*

**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**

**THIS PAPER CONSIST OF 15 PRINTED PAGES**

***SECTION I (50MARKS)***

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

1. Use logarithm, correct to 4 decimal places to evaluate

 (4marks)

2. Make **V** the subject of the formula

Mgh - (3marks)

3. In the figure below **PQ** is parallel to **RS**. **PS** and **Q**R intersect at **A.** Given that **PQ**=9cm,

**RS**=3cm and **AS**=4cm, calculate the length of **PS .**(3marks)

S

Q

A

P

R

4. During the 1998 Safari rally, our local driver Patrick Njiru covered 550km in 2hours.Find the

percentage error in his speed. (3marks)

5. Without using tables or calculator evaluate

 (3marks)

6. The area of a sector of a circle of radius 15cm is 270cm2 .If the area of the sector subtends

an angle Ø at the centre of the circle, calculate: Use π= 22/7

a) The size of angle Ø in radians (2marks)

b) The length of the arc subtended by the angle Ø (1mark)

7. Two taps **P** and **Q** can fill a cistern in 6 minutes and 4 minutes respectively. Another tap **R**

can drain the same cistern in 8 minutes. Tap **Q** and **R** are opened for 2 minutes and then tap **P**

is opened. Find the time taken to fill the cistern. (3marks

8. If find the values of **a, b, c** and **d** where they are rational numbers.

(3marks)

9**.**Given that **OA** = 3**i** + 2**j** - 4**k** and **OB** = 4**i** + 5**j** - 2**k.** P divides AB externally in the ratio 3: -2.

Determine the position vector of P in terms of **i, j** and **k**. (3 marks)

10. A two digit number is such that the product of its tens and ones is 56.When the digits are

reversed the number formed exceeds the original number by 9. Find the number. (3marks)

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11. The equation of a circle is x2 – 8x + y2 + 12y + 16 = 0

Determine the coordinates of the centre of the circle and its radius. (3 Marks)

12. Solve for θ in the equation. 6 Cos2θ - Sinθ - 4 = 0 in the range 00 ≤ θ ≤ 1800

(3 Marks)

13a) Expand and simplify the expression (1+2x)6 (2 marks)

b) Use the first four terms of the expression in (a) above to find the approximate value of (1.02)6

(2marks)

14. The mass of a cylinder varies jointly as the square of the radius and its height. If the radius is

increased by 20% and the height is decreased by 10%, find the percentage change in mass.

(3marks)

15. Evaluate  (3marks)

16. Find y given that is a singular matrix (3marks)

***SECTION II (50marks)***

**Answer only five question from this section in the spaces provided**

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

|  |  |
| --- | --- |
| Total income in  k£per annum | Rate in shs  per pound |
| 1-3900  3901-7800  7801-11,700  11701-15600  15601-19500  Over 19500 | 2  3  4  5  7  7.5 |

Mrs.Masau earned a basic salary of ksh18600 per month and allowances amounting to ksh 7800 per month. She claimed a personal relief of ksh 1080 per month.

***Calculate:***

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

ii)the tax payable in ksh per month after relief (2marks)

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

18.a)Complete the table below for y= (2marks)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| Y= | -16 |  | 6 |  | -4 |  |  | 26 |

b) On the grid provided, draw the graph of y= for -4≤x≤3. Use 2cm to

represent 1 unit on the **x** axis and 1cm to represent 5units on the **y** axis (3marks)



c) i) Use the equation to solve the equation =0 (2marks)

ii) By drawing a suitable straight line on the graph, solve the equation

 =0 (3marks)

19. In a second year class of a certain college, are boys and the rest are girls.of the boys

and  of the girls are right handed ,the rest are left handed. The probability that a right

handed students will answer a question correctly is  and the corresponding probability

for a left handed students is  irrespective of the sex.

(a) Draw a tree diagram to represent the above information (2marks)

(b) Determine:

i)The probability that a student chosen at random from the class is left hand (2 marks)

ii) The student is a girl and answers the questions incorrectly (2mark)

iii)The probability that a question is answered correctly (4marks)

20. The table below shows marks obtained by 60 form four students in an English test.

|  |  |
| --- | --- |
| Marks | No. of students |
| 40-44  45-49  50-54  55-59  60-64  65-69  70-74 | 5  10  20  15  5  3  2 |

(a) State the modal class (1mark)

(b) Using an assumed mean of 52,

Calculate:

(i) The actual mean (3marks)

(ii) The standard deviation (3marks)

(c) Estimate the median mark (3marks)

21.The table below shows data collected from an experiment involving two variables **P** and **T**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| P | 6.0 | 5.3 | 4.5 | 3.9 | 3.1 | 2.4 | 1.4 |
| T | 1.33 | 0.48 | 0.40 | 0.28 | 0.23 | 0.18 | 0.14 |
|  |  |  |  |  |  |  |  |

The variables are believed to satisfy an equation of the form **p**=  where **k** and **m** are constants.

1. For each of the value of **T** in the table above,write down the value of  (2mark)
2. (i) Using the scale 2cm to represent 1 unit on both axes draw a suitable straight line graph on the grid provided. (3marks)



ii) Use the graph to estimate the value of **k** and **m** (3marks)

iii) Write down the equation connecting **P** and T (2mark)

22. a)A plane flew due East to a town **Q** from a town **P**(600N,160W). The plane covered a

distance of 5400nm.

***Find;***

i)Find the position of **Q**  (4marks)

ii) The time at **P** when the time at **Q**is 0140hrs on a Wednesday. (3marks)

b)Another plane flew **P** to **Q** through the North Pole at a speed of 667km, determine the

time taken by the plane (take π=, R=6370 km) (3marks)

23.

P

S

Q

R

T

O

In the figure above, OPQ is a triangle in which OS = OP and PR: RQ = 2:1

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Line OR and SQ meet at T.

1. Given that OP = p and OQ = q, express the following vectors in terms of p and q.

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(i) PQ (1 Mark)

~

(ii) OR (2 Marks)

~

(iii) SQ (1 Mark)

~

1. You are further given that ST = mSQ and OT = nOR. Determine the values of m and n. (6 marks)

24. a) The first term of a geometric Progression is 4.If the common ration is 2, find the greatest number of Terms that will give a sum less than 40. (4marks)

b) the 2nd,4th and 7th terms of an Arithmetic progression are the first 3 consecutive terms of a Geometric progression ,if the common difference of the Arithmetic progression is 2,find

i)the common ratio (3marks)

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ii) the sum of the first eight terms of the Geometric progression. (3marks)