NAME:……………………………………………INDEX NO:………………………………...

CANDIDATE’S SIGNATURE:……………

DATE:……………………………………...

**121/2**

**MATHEMATICS**

**JULY, 2019**

**PAPER 2**

**TIME: 2½ HOURS**

**BUURI EAST STANDARDS**

***Kenya Certificate of Secondary Education***

**MATHEMATICS Alt. A**

**2 ½ Hours**

**Instructions to candidates.**

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of the examination in spaces provided above.
3. This paper consists of two sections: Section **I** and **II**.
4. Answer ***all*** the questions in section I and ***only five*** questions from section II.
5. Show ***all*** the steps in your calculations, giving your answer at each stage in the space provided.
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 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 | 11 | 12 | 13 | 14 | 15 | 16 | TOTAL |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

SECTION II

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

 GRAND

 TOTAL

**SECTION I (50 MARKS): Answer all the questions in this section in the spaces provided.**

1. Given that and , find the maximum possible value of;

(3 marks)

1. Simplify (3marks)
2. Make A the subject of the formula . (3marks)
3. The fifth term of an arithmetic progression is 11 and the twenty fifth term is 51. Calculate the first term and the common difference of the progression. (3marks)
4. Solve for *x* in the equation. for . (3marks)

1. The length of a rectangle is cm. its width is 3cm shorter than its length. Given that the area of the rectangle is 22cm, find its length using completing the square method.

(3marks)

1. Given that and find:
2. (2 marks)

1. (2marks)
2. The figure below is a square based right pyramid with vertex V. Point O is the intersection of diagonals AC and BD. VA=VB=VC=VD=12cm and AB=BC=4cm.



1. Name the projection of line VA on plane ABCD. (1mark)
2. Find the angle between line VB and the plane ABCD. (2 marks)
3. Find the value of *x* that satisfies the equation. .(3marks)

1. The table below is part of tax table for monthly income for the year 2006.

|  |  |
| --- | --- |
| Monthly taxable income (ksh) | Tax rate % |
| 0 – 9680 | 10 |
| 9681 – 18800 | 15 |
| 18801 – 27920 | 20 |

In the year 2006, the tax on Jane’s monthly income was Ksh. 1, 916. Calculate Jane’s monthly income. (3marks)

1. Mr. Mwenda wishes to take students from his mixed secondary school for a tour. The total number of students to be taken should not exceed 60. Each girl must contribute ksh. 10,000 and each boy Ksh. 15,000 and the total money contributed should not exceed ksh. 120,000. If this trip is to be successful the number of boys should be greater than the number of girls. Write down all the inequalities to represent this information taking the number of girls and boys to be y and x respectively. (4marks)
2. Evaluate .(3 marks)
3. Below is a triangle PQR. Draw locus L1 of points equidistant from P and Q. Draw L2 locus of points equidistant from line PR and PQ to meet L1 at M. Measure PQ. (3marks)



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

(3marks)

1. a) Expand the Binomial expression up to the term with *x*3. (1mark)

 b) Using the binomial expansion in(a) above estimate the value of (1.75)5.(2marks)

1. Grade A sugar cost ksh.75 per kg and grade B sugar costs ksh. 50 per kg. The two grades are mixed in a ratio such that the blend costs ksh. 70 per kg. Find the ratio. (3marks)

**SECTION II(50 marks). Answer *only five* questions in this section in the spaces provided.**

1. A car hire company hire out cars such that there is a fixed charge and another part which varies with the distance covered. Taking C to stand for total cost, d for distance covered, k for fixed charge and t for charge per kilometer.
2. Express C in terms of k,tand d. (1mark)
3. Given that the total cost is 7000 when the distance is 200km and the total cost is 11000 when distance is 400km.
4. Find the values of k and t. (2marks)
5. Find the equation connecting c,t,k and d. (1mark)
6. Find the cost of hiring a car to area a distance of 500km. (2marks)
7. Due to increase in fuel prices, the company increased the fixed charge by 20% and charge per kilometer by 10%:
8. Find the cost of hiring the car for 500km. (2marks)
9. Find the percentage increase of hiring the car for the 500km. (2marks)
10. ABC is a triangle with vertices A(-7,2), B(-2,1) C(2,8).A΄B΄C ΄is the image of ABC under a transformation .
11. i) Find the co-ordinates of A΄B΄C ΄(2 marks)

ii) On the grid provided draw ABC and A΄B΄C΄. (2marks)



1. i) Find the coordinates of A″B″C″ the image of the triangle A΄B΄C΄D΄ under the

transformation matrix. . (2marks)

ii) On the same grid draw A″B″C″. (1 mark)

1. i) Find the single matrix that maps A″B″C″ onto ABC. (2 marks)

ii) Describe the transformation fully. (1mark)

1. An airplane leaves town A(400N,1550W) and flys to town B(400N,250E) using the shortest route and at a speed of 450 knot (Take and radius of the earth R=6370km.)
2. Calculate the distance between A and B covered by the airplane in nautical miles.

(2marks)

1. Calculate the time taken by the aeroplane to fly from A to B. (2 marks)
2. From B the plane flies westwards along the latitude to a town C(400N, 130W). Calculate the distance BC in kilometres. (3marks)

1. From town C, The plane took off at 3:10 p.m towards townD(100N, 130W) at the same speed. At what time did the plane land at D?( 3marks)
2. Purity bought a camera on hire purchase terms by paying a deposit of Ksh.7, 200 and cleared balance in 24 equal monthly installment each of ksh.1, 250.
3. Find the hire purchase price of the camera. (3marks)

1. The hire purchase price of the camera is 24%higher than the cash price. Find the cash price of the camera. (2marks)

1. Eunice took a loan from a financial institution and bought the camera with cash. She repaid the end of the two years. Find the total interest paid by Eunice. (3marks)
2. A car is worth Ksh.800,000 when new. It depreciates by 20% every year. How much will it cost after five years. (2marks)

1. The table below shows marks obtained by 50 students in a maths quiz.

 32 64 68 55 52 68 37 46 65 26

 45 87 44 88 39 54 21 44 76 23

 65 42 82 87 75 44 47 48 52 32

 23 76 74 91 28 33 27 48 56 66

 45 56 98 21 34 31 83 65 77 76

* 1. Starting from 21 and using equal class intervals of 10 make a frequency distribution table. (2marks)
	2. On the grid provided, draw the cumulative frequenting curve for the data. (4marks)



* 1. Using the graph in(b) above estimate :
1. The upper quartile. (1mark)
2. The lower quartile. (1mark)
3. Hence find the quartile deviation. (2marks)
4. In a carton there are 8 red pens, 5 blue pens and 2 green pens. Two pens are picked at random from the carton without replacement.
5. Draw a probability three diagram to represent this information. (2marks)

1. Use the tree diagram to find the probability that:
2. The first pen picked is red. (1mark)
3. The first pen picked is blue or green. (2marks)
4. The two pens picked are blue. (2marks)
5. At least one of the pens picked is green. (3marks)
6. The diagram below shows a circle centre O. PQ is the tangent to the circle at C. Angle DCQ= 460 and angle BAC=270.



 Find giving reasons the size of each of the following angles.

1. Angle OAD. (2 marks)
2. Angle DBO. (2 marks)
3. Angle ACD. (2 marks)
4. Angle BDA. (2 marks)
5. Reflex angle BOC. (2 marks)

1. Complete the table below for the following function (2 marks)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |  |  |  |  |  |

1. On the grid provided draw the graph of for (Use 2cm to represent 1 unit on the x- axis and 1 cm to represent 5 units on the y-axis).

 (3marks)



1. Use the graph to solve the equation (2 marks)
2. By drawing a suitable line, use the graph in (b) to solve the equation.(3 marks)

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