**NAME…………………………………………………..ADM.NO……………CLASS……… DATE……………….**

**121/2**

**MATHEMATICS**

**FORM 3 PAPER 2**

**JULY, 2017**

**TIME: 2½ HOURS**

**MWAKICAN JOINT EXAMINATION (MJET) - 2017**

**TERM 2**

**Kenya Certificate of Secondary Education**

**FORM 3 MATHEMATICS**

**PAPER 2**

**TIME: 2½ HRS.**

**INSTRUCTION TO CANDIDATE’S:**

1. *Write your* ***name****,* ***admission number, class*** *and* ***date*** *in the spaces provided above.*
2. *This paper consists of* ***two*** *Sections; Section* ***I*** *and Section* ***II****.*
3. *Answer* ***ALL*** *the questions in Section* ***I*** *and any* ***five*** *questions from Section* ***II****.*
4. *All answers and working must be written on the question paper in the spaces provided below each question.*
5. *Show all the steps in your calculation, giving your answer at each stage 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 | 11 | 12 | 13 | 14 | 15 | 16 | TOTAL |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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

**SECTION II**

|  |
| --- |
| GRAND TOTAL |
|  |

**SECTION I (50 MKS)**

Answer **ALL** the questions from this section.

1. Find the sum of the following G.P. (2 Marks)

2 + 10 + 50 + …………… + 1250

1. A quantity P varies jointly as Q and the square of R. What is the percentage change in P if Q is doubled and R halved? (3 mks)
2. Chords QR and ST intersect at U. QR = 5cm, RU = 6cm and TU = 4cm.

T

U

R

S

Q

6cm

4cm

5cm

Find the length SU (3 Marks)

1. Given the matrix m = $\left(\begin{matrix}3&-5\\5&2\end{matrix}\right)$. Find the inverse of m and hence solve the simultaneous equations.

3x – 5y = -9 (4 Marks)

5x + 2y = 16

1. Simplify completely. $\frac{3x^{2}-4xy+y^{2}}{9x^{2}- y^{2}}$ 3mks
2. The diagram below shows a part of a circle centre O with chord AB = 5$\sqrt{3}$cm and angle AOB = 1200. Find the length of the arc ACB. (Take $π$ = 3.142) (3 Marks)

O

B

A

C

1200

1. Rationalize the denominator (3 Marks)

 $\frac{2\sqrt{3}}{\sqrt{3}+\sqrt{2}}$

1. A student’s results in six Mathematics tests were: 24, 28, 32, x, 48 and 50. If the median is 36, find the mean mark. (3 Marks)
2. Given that the dimensions of a rectangle are 20.0cm and 25.0cm. Find the percentage error in calculating the area. (3 Marks)
3. Given the triangle ABC below, AB = 9.2cm AC = 7.9cm and ∠ABC = 480.

**C**

**A**

**B**

**7.9cm**

**9.2cm**

**480**

Calculate to 1dp the angle ACB. (3Marks)

1. Solve for x in the equation. (3 Marks )

Log (5x + 75) – 2 Log 3 = Log (2x – 9)

1. Find the angle θ in degrees from the figure below. (3 Marks)

2x – 3y + 6 = 0

B

O

C

A

θ

1. Make S the subject of the formula. (3 Marks)

$\sqrt{q}$ = r$\sqrt{1-as^{2}}$

1. Jane deposited Ksh. 50,000 in a financial institution in which interest is compounded quarterly. If at the end of the second year she received a toatal of Khs. 79,692.40. Calculate the rate of interest per annum. (4mks)
2. Jane and Martha both drive a distance of 96Km; but Martha’s average speed is 16Km/h slower than Janet’s and consequently she takes 30minutes longer to complete the journey. Calculate Janet’s average speed. (4mks)

1. ABCDE is a regular pentagon. Its sides AB and DC are produced to meet at T. Calculate the size of angle BTC. (3 Marks)

E

A

D

C

B

T

**SECTION II (50mks)**

**Answer only *five* questions in this section in the spaces provided.**

1. The frequency distribution table below represents the number of kilograms of meat sold in butchery.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Mass (kg) | 1 – 5 | 6-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31-35 |
| Frequency | 2 | 3 | 6 | 8 | 3 | 2 | 1 |

1. State the modal class. (1 Mark)
2. Calculate the mean mass (5 Marks)
3. Calculate the median mass (4 Marks)
4. A boat at point A is 200m to the South of point B. The boat sails from A to another point C. Point C is 200m on a bearing of 3100 from A. Points A, B and C are on the same horizontal plane.
5. Calculate the bearing and distance of C from B. (4 Marks)
6. D is the point on the path of boat nearest to B. Calculate the distance DB. (2 Marks)
7. A vertical tower stands at point B. The angle of depression of point A from the top of the tower is 600. Calculate the angle of elevation of the top of the tower from D. (4 Marks)
8. Nairobi and Eldoret are each 250 km from Nakuru. At 8.15 a.m, a lorry leaves Nakuru for Nairobi. At 9.30 a.m, a car leaves Eldoret for Nairobi through Nakuru at 100km/h. Both vehicles arrived at Nairobi at the same time.
9. Calculate their time of arrival in Nairobi. (2 Marks)

1. Find the car’s speed relative to that of the lorry. (4 Marks)
2. How far apart are the vehicles at 12.15 p.m. (4 Marks)
3. The first term of an Arithmetic Progression (A.P.) with six terms is p and its common difference is c. Another A.P. with five terms has also its first term as p and a common difference of d. the last terms of the two Arithmetic Progressions are equal.
4. Express d in terms of c. (3 marks)
5. Given that the 4th term of the second A.P. exceeds the 4th term of the first one by 1 ½ , find the value of c and d. (3 marks)
6. Calculate the value of p if the sum of the terms of the first A.P. is 10 more than the terms of the second A.P. (4 marks)
7. In the figure below,AC =12cm, AD =15cm and B is point AC.$<BAC =<ADC=30^{o}$

 D

 30o

 15cm

 30o

 A B C

12 CM

Calculate correct to one decimal place.

1. The length of CD. 3mks
2. The length of AB. 3mks
3. The area of triangle BCD. 2mks
4. The size of $<BDC$ 2mks
5. James’ earning are as follows:-Basic salary Sh. 38,000 p.m,House allowance Sh. 14,000 p.m

Travelling allowance Sh. 8,500 p.m ,Medical allowance Sh. 3,300

The table for the taxable income is as shown below.

|  |  |
| --- | --- |
| Income tax in K£ p.a | Tax in Sh. per pound |
| 1 6001120011001 24001300013600142001Over 48000 | 60012000180002400030000360004200048000 | 2345678910 |

1. Calculate James’ taxable income in K$£$ p.a. (2 Marks)
2. Calculate James’s P.A.YE if he is entitled to a tax relief of Sh. 18000 p.a. (4 Marks)
3. James is also deducted the following per month:-NHIF Sh. 320 ,Pension scheme Sh. 1000

Co-operative shares Sh. 2000 ,Loan repayment Sh. 5000, Interest on loan Sh. 500

(i) Calculate James’ total deduction per month in KSh. (2 Marks)

(ii) Calculate his net salary per month (2 Marks

1. A slaughter house bought a number of goats at Sh. 2000 each and a number of bulls at Sh. 15000 each. They paid a total of Sh. 190,000. If they bought twice as many goats and three bulls less, they would have saved Sh. 5000.
2. Find the number of each type of animals bought. (5 Marks)
3. The slaughter house sold all the animals at a profit of 25% per goat and 30% per bull. Determine the total profit they made. (5 Marks)
4. (a) Draw the graph of y = 2x2 – 3x – 5 for the range -2≤ x ≤ 3. (5 Marks)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X | -2 | -1 | 0 | 1 | 2 | 3 |
| 2X2 |  |  |  |  |  |  |
| -3X |  |  |  |  |  |  |
| -5 |  |  |  |  |  |  |
| Y |  |  |  |  |  |  |



(b) Use the graph above to solve the equation

 (i) 2x2 – 3x – 5 = 0 (1 Mark)

 (ii) 2x2 – x – 3 = 0 (1 Mark)