**Name ……………………………………………………………………………………Adm. No. ………………………**

**Class …………………………………….**

**121/2**

**MATHEMATICS ALT 1**

**JULY/AUGUST 2016**

**2½ HRS**

**FORM 3**

**MWAKICAN(MJET) END OF TERM II EXAM**

***Instructions***

*(a) Write your name, class and admission number.*

*(b) Answer all the questions in* ***section I*** *and* ***ONL****Y Five in* ***section II.***

*(c) Show all the calculations in the spaces provided*

*(d) KNEC mathematical tables and non-programmable calculators may be used.*

***For Examiners Use***

**Section 1**

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

**Section 11**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | Total |
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| --- |
| Grand total |
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**SECTION I**

1. Evaluate using logarithms. [4 Marks]

1. Find the value of if the expression is a perfect square [2 Marks]
2. A rectangular block has a square base whose sides are exactly 8cm. Its height, measured to the nearest millimeter is 3.2cm. calculate the greatest possible error in calculating its volume [4 Marks]

1. A matrix is given by . Find [2 Marks]



1. The vectors are given as and . Another vector is such that . Calculate correct to 3 decimal places. [3 Marks]
2. Simplify by rationalizing the denominator; [2 Marks]

1. A scientific calculator is marked at sh. 1560. Under hire purchase it is available for a downpayment of sh. 200 and six monthly instalments of sh. 250 each. Calculate;
	1. The Hire purchase price. [2 Marks]
	2. The extra amount paid out over the cash price. [1 Mark]
2. Solve the equation; [3 Marks]

1. In the figure below, ABCD is a square of side 14cm. CXB and CYB are arcs of circle centre A and D respectively. Calculate the area of the shaded region [3 Marks]



1. Make the subject of the formula; [3 Marks]

1. In the figure below, BT is a tangent to the circle to the circle at B. AXCT and BXD are straight lines. AX=6cm, CT=8cm, BX=4.8cm and XD=5cm.

 

 Find the length of;

* 1. XC [2 Marks]
	2. BT [2 Marks]
1. Find the value of if the matrix is a singular matrix. [3 Marks]
2. The first – term of an arithmetic sequence is -7 and the common difference is 4.
3. List the first 6 terms of the sequence [2 Marks]
4. Determine the sum of the first 30 terms of the sequence [2 Marks]
5. A manufacturer sells a bottle of fruit juice to a trader at a profit of 40%. The trader sells it for sh. 84 at a profit of 20%. Find.
6. The traders buying price. [2 Marks]
7. The cost of manufacture of one bottle. [1 Mark]
8. ABC is a triangle whose base BC = 35. The point X on BC is such that BX=21cm, AX=16cm and angle AXB=600. Calculate;
	1. The length of AB [1 Mark]
	2. The length of AC [1 Mark]
	3. The size of angle BAC [1 Mark]
9. A small cone of height 8cm is cut off from a bigger cone to leave a frustrum of height 16cm. if the volume of the smaller cone is 160cm3, find the volume of the frustrum.

 [3 Marks]

**SECTION II answer ANY 5 questions in this section**

 **(50 marks)**

1. The position vectors of A and B with respect to the origin are respectively. Point M is the mid-point of AB and N is the mid-point of OA.
2. Find;
3. The coordinates of N and M [3 Marks]
4. The magnitude of NM [3 Marks]
5. Express vector NM in terms of OB [1 Mark]
6. Point P maps onto P´ by a translation.

Given that OP=OM+2MN. [3 Marks]

Calculate the coordinates of P´

1. Complete the table below for the function Y=2
2. [2 Marks]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
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1. On the grid provided, draw the graph of the function

 for and use your graph to determine the roots of the quadratic equation to 1 decimal place. [3 Marks]

1. Use your graph to solve the roots of the quadratic equations.
2. [2 Marks]
3. [2 Marks]
4. The table below shows the masses to the nearest kilograms of 65 animals in a farm.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Mass in Kg | 26-30 | 31-35 | 36-40 | 41-45 | 46-50 | 51-55 |
| Frequency | 9 | 13 | 20 | 15 | 6 | 2 |

Use the table to find.

1. Modal and median class [2 Marks]
2. Mean of the data [3 Marks]
3. The median mass [3 Marks]
4. The percentage of animals with a mass between 36kg and 45kg. [2 Marks]
5. 1. A matrix T is given by T=

Find T-1 [2 Marks]

* 1. Truphena bought 20 bags of maize and 25 bags of beans at a total cost of sh. 77,000. If she had bought 30 bags of maize and 20 bags of beans, she would have spent sh. 7,000 more.
1. Form a matrix equation from this information. [1 Mark]
2. Determine the cost of a bag of maize and a bag of beans. [3 Marks]
	1. She sold all the maize and beans at a profit of 10% on a bag of maize and 12 ½ % on a bag of beans. Calculate the total percentage profit. [4 Marks]
3. At the beginning of the year 2000, Kanyora bought two houses, one in Thika and the other in Nakuru each at 1,240,000. The value of the house in thika appreciated at a rate of 12% p.a.
	1. Calculate the value of the house in Thika after 9 years to the nearest shilling. [2 Marks]
	2. After years, the value of the house in Thika was 2,741,245 while the value of the house in Nakuru was 2,917,231.
4. Find [4 Marks]
5. Find the annuakl rate of appreciation of the house in Nakuru. [4 Marks]
6. The table below shows income tax rates.

**Taxable income Rate in shs. per k£**

**in k£ per month**

 1 – 325 2

 326 – 650 3

 651 – 975 4

 976 – 1300 5

 1301 – 1625 6

 Over 1626 7

Waketi earns a basic salary of 20,500. He has a house allowance of sh. 6,000 per month, medical allowance of sh. 4,000 per month and transport allowance of sh. 3,000 per month. He claims a tax relief of sh. 1,056 per month.

1. Calculate
	* 1. Waketi’s taxable income in k£ per month. [2 Marks]
		2. Gross tax. [3 Marks]
		3. Net Tax [2 Marks]
2. His net income per month has the following deductions

 Health insurance fund – sh. 150

 Loan interest – sh. 200

 Service charge – sh. 200

 Sacco loan – sh. 2,500

Calculate his net income per month. [3 Marks]

1. P varies directly as the square of Q and inversely as R.
2. If Q increases by 5% and R decreases by 10%, find the percentage change in P

 [5 Marks]

1. Given that P=2 when R=5 and Q=4, find the positive value of Q when P=4.5cm and R=5cm. [5 Marks]
2.
3. The first term of an arithmetic progression is 2. The sum of the first 8 terms of the AP is 240.
4. Find the common difference of the AP. [2 Marks]
5. Given that the sum of the first terms of the AP is 1,560. Find [2 Marks]
6. The 3rd, 5th and 8th terms of another AP from the first three terms of a G.P. If the common difference of the AP is 3.

Find.

1. The first term of G.P [4 Marks]
2. The sum of the first 9 terms of the G.P to 4 s.f. [2 Marks]