**Name**: ....................................................................................... **Adm No**: ...........................................................

**Class**: ............................... **Candidate’s Signature**: ....................................

**121/2**

**MATHEMATICS**

**Paper 2**

2½ hours

**MACHAKOS COUNTY KCSE TRIAL AND PRACTICE EXAM 2015**

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

**121/2**

MATHEMATICS

**Paper 2**

2½ hours

***Instructions to candidates***

1. *Write your name and index number in the spaces provided above.*
2. *Sign and write the date of the exam 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. ***This paper consists of 16 printed pages.***
10. ***Candidates should check the question papers to ascertain that all the pages are printed as indicated and that no questions are missing.***

**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**

**Grand**

**Total**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **Total** |
|  |  |  |  |  |  |  |  |  |

*A Special Performance Improvement Project*

*By His Excellency Dr. Alfred Mutua*

*Sponsored by the County Government of Machakos*

**SECTION I – 50 MARKS**

**Answer all questions in this section.**

1. The length and breadth of a metal sheet are measured to the nearest centimetre and recorded as 25cm and 16cm respectively.
2. Find the maximum possible error in the area of the sheet. (1 Mark)
3. Calculate to one decimal place the percentage error in the area of the sheet. (2 Marks)
4. The number of bacteria in a colony was originally 3 millions. This number doubled itself after every one hour. Calculate the number of bacteria generated in the colony during the 7th hour. (2 Marks)
5. Solve for θ in the equation.

6 Cos2θ - Sinθ - 4 = 0 in the range 00 ≤ θ ≤ 1800 (3 Marks)

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

Determine the coordinates of the centre of the circle and its radius. (2 Marks)

1. A quantity P is partly constant and partly varies as the square of Q when Q = 2, P = 40 and when Q = 3, P = 65. Determine the value of P when Q = 4. (4 Marks)
2. The table below shows the masses of 40 students in a form 4 class.

|  |  |
| --- | --- |
| Mass (kg) | Frequency |
| 40 - 44 | 4 |
| 45 - 49 | 10 |
| 50 - 54 | 15 |
| 55 - 59 | 8 |
| 60 - 64 | 3 |

1. State the modal class. (1 Mark)
2. Calculate the median mass (2 Marks)
3. Under a transformation whose matrix

T =

a figure whose area is 2.5cm2 is mapped onto a figure whose area is 10cm2. Find two possible values of a and hence write down two possible matrices for T. (4 Marks)

1. (a) Expand and simplify the binomial expression. (1 Mark)

(b) Use the first four terms of the simplified expression in (a) above to evaluate to 5 significant figures.

(1.98)5. (2 Marks)

1. Solve for x in the equation log (x – 1) = log 12 – log (x – 2) (3 Marks)
2. The figure below shows a circle centre O and AOC is a straight line. PB is a tangent to the circle at and angle PBC = 350.

C

B

D

P

A

O

Giving reasons for each answer, find the size of

1. Angle BDC (1 Mark)
2. Angle ACB (2 Marks)

1. Solve the simultaneous equation. (3 Marks)

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=

1. Wambua invested Sh. 6400 at 15% per annum compound interest for 3 years. Muinde invested twice that amount at 12% per annum simple interest for the same period of time. Find whose investment earned more interest and by how much. (4 Marks)
2. Make x the subject of the equation. (3 Marks)

3y = y +

1. Given the column vectors.

a = , b = , c = and that p = 2a - b + c

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express p as a column vector and hence calculate its magnitude to 3 significant figures. (3 Marks)

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1. The gradient function of a curve is given by = 2x – 4

Determine;

1. the equation of the curve given the curve passes through point (0,3) (2 Marks)
2. the coordinates of the turning point of the curve. (1 Mark)
3. A particle starts from 0 and moves in a straight line so that its velocity V ms-1 after t seconds is given by v = 3t – t2. The distance of the particle from 0 at time t seconds is s metres.
4. Express s in terms of t and c where c is a constant. (1 Mark)
5. Calculate the time taken before the particle returns to 0. (3 Marks)

**SECTION II – 50 Marks**

**Answer only 5 (Five) questions in this section.**

1. Kennedy bought three cows and twenty-five goats spending a total of Sh. 75000. If he had bought two cows and thirty three goats, he would have saved Sh. 5400. Kennedy later sold all his animals at a profit of 40% per cow and 50% per goat.

Determine;

1. the cost at which he bought each animal. (5 Marks)
2. the total amount of money Kennedy received after selling all the animals. (5 Marks)
3. Under a transformation represented by a matrix m a point p (x, y) is mapped onto PI, (xI,yI) where

=

1. Write down the matrix for m. (2 Marks)
2. Find the inverse of m. (3 Marks)
3. The points AI (16,-2) BI (-8, 1), CI (8,-1) and DI (9,-8) are the images of A, B, C and D respectively under M.

Determine the coordinates of A, B, C and D. (5 Marks)

1. The figure below shows the position of a boat Q which is observed sailing directly towards the pier P at the base of a vertical cliff PT. The angle of elevation of the top of the cliff from Q is 25.40. After 14 seconds the boat is at point R, and the angle for elevation of T is now 64.70.

T

P

Q

25.40

64.70

50 m

If the cliff is 50m high, calculate

1. The distance PQ (2 Marks)
2. The distance QR (4 Marks)
3. The speed of the boat in km/h (4 Marks)

1. Two towns on the earth’s surface are located at P (070N,300E) and Q (130S,300E). A pilot plans to fly from P to Q the shortest route between the two towns.
2. Calculate the shortest distance between P and Q in km. (5 Marks)

1. Find the distance in nautical miles (nm) (3 Marks)
2. The speed of the aircraft is 360 knots. Determine how long it takes to fly from P to Q. (2 Marks)

1. Veterinary researchers were experimenting with a new drug on fowls in a research station. A sample of fowls which were known to have the disease was used. In this sample 30 fowls were treated with the drug and the remaining 18 fowls were not treated.
2. Calculate the probability that a fowl selected at random from the sample is

(i) treated with the drug (1 Mark)

(ii) not treated with the drug (1 Mark)

1. The probability that a fowl treated with the drug will die is , while the probability that one which is not treated will die is .

Calculate the probability that a fowl picked at random from the sample is

(i) treated with the drug and will die (2 Marks)

(ii) not treated with the drug and will die (2 Marks)

(iii) treated with the drug and will not die (2 Marks)

(iv) not treated with the drug and will not die (2 Marks)

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)

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(ii) OR (2 Marks)

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(iii) SQ (1 Mark)

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1. You are further given that ST = mSQ and OT = nOR. Determine the values of m and n. (6 marks)
2. (a) Using a ruler and compasses only, construct triangle ABC such that AB = AC = 4.3cm and

angle ABC = 300.

(b) Measure BC (1 Mark)

1. A point p is always on the same side of BC as A. Draw the points of P such that angle BAC is always twice angle BPC. (2 Marks)
2. Drop a perpendicular from A to meet BC at D. Measure AD. (2 Marks)
3. Calculate the area of triangle ABC. (2 Marks)

1. Two variables A and B are connected by the equation.

A = kBn

Where k and n are constants.

The table below gives values of A and B.

A. 1.5 1.95 2.51 3.20 4.50

B. 1.59 2.51 3.98 6.31 11.5

(a) Find a linear equation connecting A and B (2 Marks)

1. On square paper draw a suitable straight line graph to represent the relation in (a) above

(scale 1cm to represent 0.1 units on both axis) (5 Marks)

1. Use your graph to estimate the values of k and n in to one decimal place. (3 Marks)

