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

SCHOOL:……………………………………… CANDIDATE'S SIGN ………………………..

DATE …………………………………………..

121/1
MATHEMATICS
Paper 1
July/ August-2015
Time: 2 ½ Hours

BONDO SUB-COUNTY SECONDARY SCHOOLS JOINT EVALUATION TEST-2015
Kenya Certificate of Secondary Education (K.C.S.E)

121/1
MATHEMATICS
Paper 1
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Time: 2 ½ Hours

INSTRUCTIONS TO CANDIDATES
a)   Write your name and Index number in the spaces provided above.
b)   Sign and write the date of examination in the spaces provided above.
c)   The paper contains two sections. Section I and Section II.
d)   Answer all the questions in Section I and only FIVE questions from Section II
e)   Show all the steps in your working giving your answer at each stage in the spaces below each question.
f)   Marks may be given for correct working even if the answer is wrong
g)   Non-programmable silent electronic calculators and KNEC Mathematical tables may be used except where stated otherwise.

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 consists of 16 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.

SECTION I (50 MARKS)

Answer all questions in this section

1. Given that:

$$\frac{\frac{3}{5} \quad of \quad 60 - 2\frac{2}{3} \times 1\frac{1}{2}}{5\frac{5}{8} \times 1\frac{7}{9} - \frac{5}{4} \quad of \quad 4\frac{4}{5} + 2\frac{4}{5} \div \frac{7}{10}} = M^m$$

Find the value of m.   (3 marks)

2. A solid metal sphere of radius 4.2 cm was melted and the molten materials used to make a cube. Find to 3 significant figures the length of the side of the cube.   (3 marks)

3. Simplify the expression;   (3 marks)

$$\frac{4x^2 - y^2}{2x^2 - 7xy + 3y^2}$$

4.   Solve for x and y in

2^x+3^y=59

2^{x+8}-3^{3y+2}=13   (3 marks)

5.   A two digit number is such that its value is equal to four times the sum of its digits. If the digits are interchanged, the new number formed exceeds two thirds of the original number by 52. Find the number.   (4 marks)

6.   A train whose length is 86 m is travelling at 28km/h in the same direction as a truck whose length is 10m. If the speed of the truck is 60km/h and is moving parallel to the train, calculate the time it takes the truck to overtake the train completely.   (4 marks)

7.   In this question, use a pair of compasses and a ruler only.

   a)   Constuct triangle ABC such that AB=6cm, BC=8cm and <ABC=135^0.   (2 marks)

   b)   Construct the height of the triangle ABC taking BC as the base.   (1mark)

8.   Find the equation of the image of the line y=3x+5 under reflection in the line y=x.(3 marks)

9.   The ratio of the cost of commodity x to that of commodity y is 2:3 and the ratio of the cost of commodity y to that of commodity z is 6:1. If the total cost of the three commodities is sh. 2200, express the cost of commodity z as a percentage of commodity y.   (3 marks)

10.   A shear with x-axis invariant maps point P(4,3) onto P^1(10,3). Determine the shear matrix hence find the image of a point Q(1,-2) under the shear.   (3 marks)

11.   A Kenyan company received US dollars 100,000. The money was converted into Kenya shillings in a bank which buys and sells foreign currencies as follows:

	Buying(Ksh.)	Selling(Ksh.)
1 US dollar	77.24	77.44
1 sterling pound	121.93	122.27

   a)   Calculate the amount of money in Ksh the company received.   (2 marks)

b)   The company exchanged the Kenya shilling calculated in (a) above, into sterling pounds to buy a car from Britain. Calculate the cost of the car to the nearest sterling pound.

(2 marks)

12.   Express 0.002197 in standard form hence, find the value of $(0.002197)^{\frac{-1}{3}}$ (2 marks)

13.   In the figure below, O is the centre of the circle and $<OAC=38^0$. Find $<ABC$.   (3 marks)
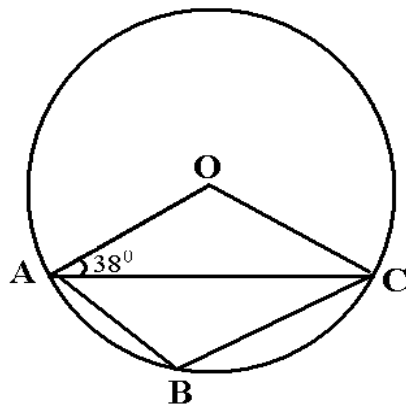
14.   The figure below shows an arc ACE of a circle with centre O and radius 6cm. If BC=CD=4cm, calculate the area of the shaded region if DE=AB=1.53cm.   (3 marks)
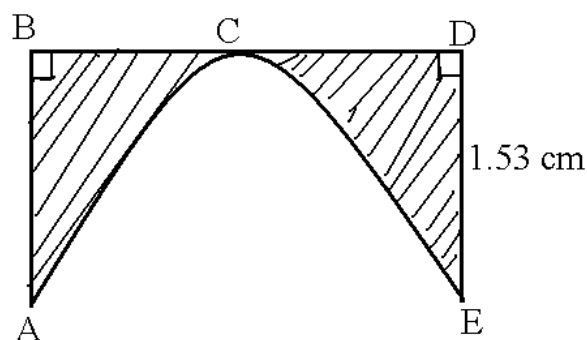
15. Hadija and Otieno bought the same types of pens and exercise books from the same shop. Hadija bought two pens and three exercise books for sh. 78. Otieno bought three pens and four exercise books for shs. 108. Calculate the cost of each item. (3 marks)

16. An arc of legth 5.5cm subtends an angle of $\frac{\pi}{3}$ radians at the centre of the circle. Find the radius of the circle. (3 marks)

SECTION B(50 MARKS)

Answer any 5 questions from this section.

17. Given that the co-ordinates of the points A, B and C are (3,-2);(6,4) and (9,3) respectively.

   a) Express the following vectors in terms of $\underset{\sim}{i}$ & $\underset{\sim}{j}$

   i) $\underset{\sim}{AB}$ (1 mark)

   ii) $\underset{\sim}{CB}$ (1 mark)

   b) Calculate the magnitude from A to C through B. (3 marks)

c)   Determine the co-ordinates of the mid-point of AC.   (2 marks)

d)   If R divides AC externally in the ratio 3:1, determine the co-ordinates of R. (3 marks)

18.   a)   i)   Find the coordinates of the stationary points on the curve $y=x^3-3x+2$. (3 marks)

            ii)   For each stationary point determine whether it is a minimum or a maximum.

                                               (4 marks)

b)   In the space provided, sketch the graph of the function $y=x^3-3x+2$.   (3 marks)
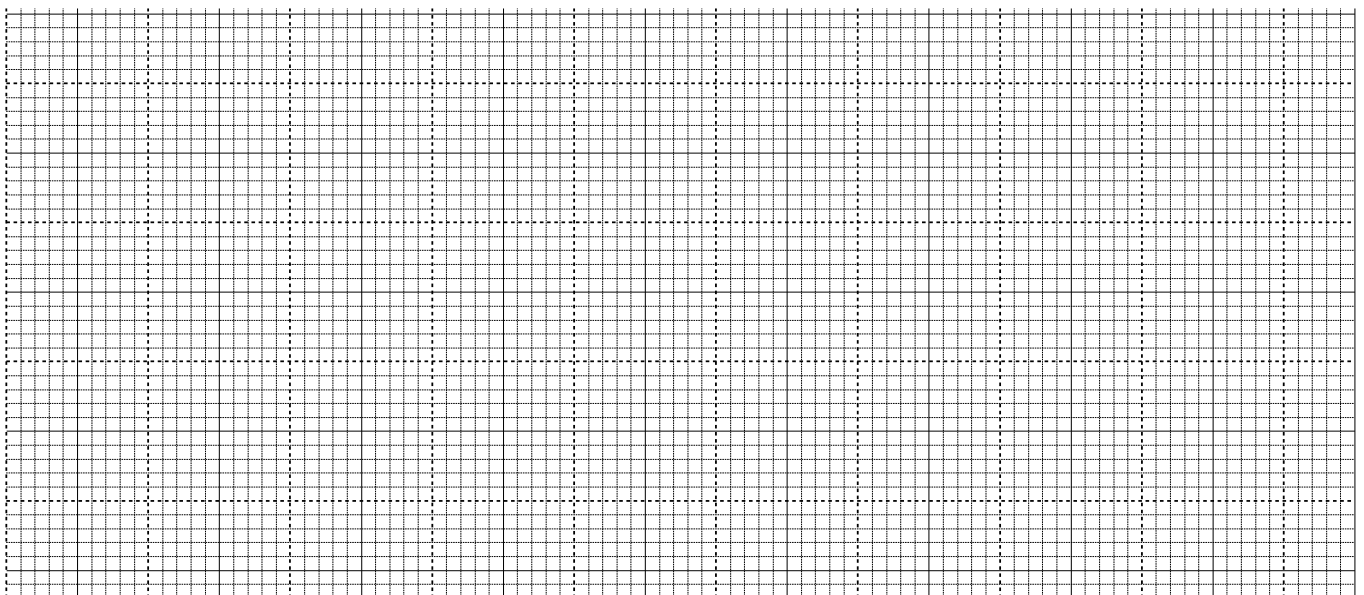
19.   Part of the inverted open cone of base radius 5cm and height 9cm is inverted into water in a cylindrical tank of diameter of 6 cm and height of 12cm full of water as shown;
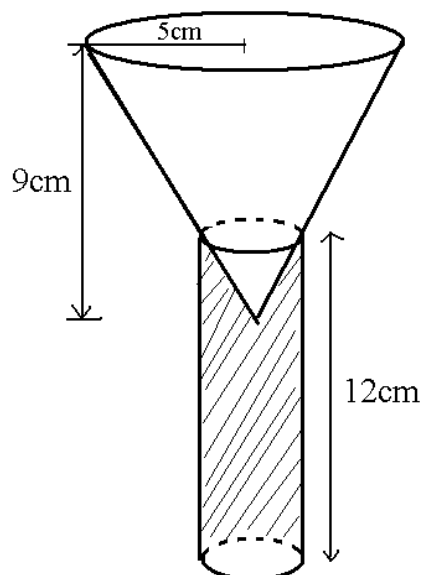
a) Calculate the volume of water left in the tank. (6 marks)

b) Calculate the surface area of the cone not submerged in water. (4 marks)

20. a) On the grid provided draw triangle ABC with A(3,4), B(1,3) and C(2,1). (1 mark)

b)   Draw triangle $A^I B^I C^I$ the image of triangle ABC under a rotation of $+90^0$ about (O,O)

                                                                        (2 marks)

c)   Draw triangle $A^{II} B^{II} C^{II}$ the image of triangle $A^I B^I C^I$ under a reflection in the line y=x

                                                                        (2 marks)

d)   Draw triangle $A^{III} B^{III} C^{III}$ the image of triangle $A^{II} B^{II} C^{II}$ under a rotaion of -90^0 about (0,0)   (2 marks)

e)   Describe a single transformation that maps triangle ABC onto triangle $A^{III} B^{III} C^{III}$

                                                                       (1 mark)

f)   Write down the equations of the lines of symmetry of the quadrilateral $BB^{II} A^{III} A^I$

(2 marks)

21. Three points P, Q and R are on a level ground. Q is 240 M from P on a bearing of 230^0. R is 120m to the east of P.

    a)   Using a scale of 1 cm to represent 40m, draw a diagram to show the position of P, Q and R

                                                                (3 marks)

    b)   Determine;

         i)   The distance of R from Q.   (2 marks)

         ii)   The bearing of R from Q.   (1 mark)

c) A vertical post stands at P and another at Q. A bird takes 18 seconds to fly directly from the top of the post at Q to the top of the post at P. Given that the angle of depression of the post at P from the top of the post at Q is 9^0, calculate;

i) The distance to the nearest meter, the bird covers, (2 marks)

ii) The speed of thebird in km/h. (2 marks)

22. A private farmer in Bondo produced 14,400 bags of rice in 2007. This was a decrease of 20% over the production in 2006. In 2008 he increased production by 30%. In 2009, he managed to produce 12,000 bags of rice.

a) Find the number of bags of rice he produced in:

i) 2006 (2 marks)

ii) 2008 (2 marks)

b) What was the percentage decrease in production in 2009 over that period of year?

(2 marks)

c)   Calculate the percentage decrease in production in 2009 over that in 2006.(2marks)

d)   The price per bag of rice was sh. 3500 in 2009, how much did he get if he sold 65% of the produce in that year?   (2 marks)

23.   The frequency distribution table below represents the number of Kg of meat sold in a butchery.

Mass in Kg	1-5	6-10	11-15	16-20	21-25	26-30	31-35
Frequency	2	3	6	8	3	2	1

   a)   State the modal frequency.   (1 mark)

   b)   Calculate the mean mass to the nearest kilograms.   (5 marks)

   c)   Calculate the median mass.   (4 marks)

24.   a)   Complete the table for the function;

$y=\cos 2x$

x^0	0	15	30	45	60	75	90	105	120	135	150	165	180
$y=\cos 2x$	1	0.9				-0.9	1		-0.5			0.9	

(2 marks)

b)   Use trapezium rule with 13 ordinates to estimate the area under the curve $y=\cos 2x$ and the lines x=0 and x=180^0.   (3 marks)

c)   Use mid ordinate rule with six strips to estimate the area under the curve $y=\cos 2x$ and the lines x=0 and x=180^0 (3 marks)

d)   Hence find the difference   in the areas (b) and (c) above.   (2 marks)

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