**Name: ……………………………..........................................…...... Index No: ………………...........**

**Date: ............................. Signature………...............**

**121/1**

## MATHEMATICS

**Paper 1**

**March, 2015**

**2½ Hours**

# MOKASA JOINT EVALUATION EXAMINATION

**Kenya Certificate of Secondary Education**

**INSTRUCTIONS TO CANDIDATES**

*1. Write your name, index number, signature and date in the spaces provided at the top of this page.*

*2. The paper contains two sections: Section I and Section II. Answer* ***ALL*** *the questions in Section I and* ***ANY FIVE*** *from Section II.*

*3. Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.*

*4. Marks may be given for correct working even if the answer is wrong.*

*5. Silent non - programmable electronic calculators and KNEC Mathematical tables may be used unless otherwise stated.*

**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 fifteen (17) printed pages.***

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

Paper1 **section 1**(50marks)

1. Points S(-2,2) and T(-3,7) are mapped onto S1(4,-10) and T1(0,10) by an enlargement . Calculate the enlargement scale factor. (3marks)
2. Given that $\frac{1}{2x}=(0.732)^{3}$ +$\sqrt[3]{85.3}$ , use mathematical tables to find the value of x in standard form correct to 3 significant figures (3marks)
3. Simplify $\frac{12x^{2}+ax-6a^{2}}{ 9x^{2} -4a^{2}}$ (3 marks)
4. All prime numbers less than ten are arranged in ascending order to form a number.

 (a) Write down the number formed (1 mark)

(b) Express the number in (a) above in expanded form (2 marks)

1. A two digit number is such that the one’s digit is four more than the tens digit, and the sum of the digits is 14. Find the number (3 marks)
2. Paul bought a refrigerator on hire purchase by paying monthly instalments of Ksh. 2000 per month for 40 months and a deposit of Ksh. 12,000. If this amounted to an increase of 25% of the original cost of the refrigerator, what was the cash price of the refrigerator? (3 marks)

7. Find all the integral values of x which satisfy the inequality (3 marks)

3 (1 + x) < 5x – 11 < x + 45

1. Without using calculator, evaluate

$\left(\frac{7}{3}\left[\frac{2}{5}of1\frac{2}{3}-\frac{1}{2}\left(\frac{1\frac{2}{3}-2\frac{1}{2}}{\frac{1}{3}-\frac{19}{27}}\right)^{\frac{1}{2}}+\frac{2}{3}\right]\right)^{\frac{1}{2}}$leaving the answer as a mixed fraction.**(**4 marks**)**

1. During a certain month, the exchange rates in a bank were as follows;

|  |  |  |
| --- | --- | --- |
|  | Buying (Ksh.) | Selling (Ksh.) |
| 1 US $ | 91.65 | 91.80 |
| 1 Euro | 103.75 | 103.93 |

A tourist left Kenya to the United States with Ksh.1 000,000.On the air port he exchanged all the money to dollars and spent 190 dollars on air ticket. While in US he spent 4500 dollars for upkeep and proceeded to Europe. While in Europe he spent a total of 2000 Euros. How many Euros did he remain with? (3marks)

10. A school decided to make a beautiful picnic site to be used by students and teachers as a resting point. The site was designed to be triangular in shape measuring 40 metres, 60 metres and 80 metres. Calculate the area of the picnic site. (Answer correct to 1 d.p) (3 marks)

11 A regular *n*-sided polygon has its interior angle equal to 4 times its exterior. Find *n.* (3 marks)

12. The ratio of the lengths of the corresponding sides of two similar rectangular petrol tanks is 3:5.The volume of the smaller tank is 8:1m3.Calculate the volume of the larger tank. (3 marks)

13. ABCD is a rhombus. A is the point (2, 1) and C is the point (4, 7). Find the equation of the diagonal BD in the form ax + by = c. (3marks)

14. A man walks directly from point A towards the foot of a tall building 240m away. After covering 180m, he observes that the angle of elevation of the top of the building is 450.Determine the angle of elevation of the top of the building from A. (3 marks)

15. The G.C.D. and L.C.M. of three numbers are 3 and 1008 respectively. If two of the numbers are 48 and 72, find the least possible value of the third number. (3 marks)

16. An ant moved from Y to X the midpoint of RS through P in the right pyramid below

**Y**

**15cm**

**•**

**•**

**O**

**12cm**

**R**

**Q**

**P**

**S**

**8cm**

**X**

O

Draw the net of the pyramid showing the path of the ant hence find the distance it moved. (4marks)

**SECTION II (50 marks)**

***ANSWER ANY FIVE***

17. Three warships A,B and C are at sea such that ship B is 500km on a bearing N30E from ship A. Ship C is 700km from ship B on a bearing of 120o.An enemy ship D is sighted 800km due south of ship B.

a)Taking a scale of 1cm to represent 100km, locate the positions of ships A, B ,C and D. (4 marks)

b) Find the bearing of:

i) Ship A from D (1 mark)

ii)Ship D from C (1 mark)

c) Use scale drawing to determine the distance between

i) D and A (1 mark)

ii) C and D. (1 mark)

d) Measure angle DAC and angle BCD (2 marks)

18. a) A rectangular tank of base 2.4m by 2.8m and a height of 3m contains 3600litres of water initially. Water flows into the tank at the rate of 0.5litres per second. Calculate:

i) The amount needed to fill the tank (2marks)

ii) The time in hours and minutes required to fill (3marks)

b). Pipe A can fill an empty tank in 3hours while pipe B can fill the same tank in 6hours .When the tank is full, it can be emptied by pipe C in 8hours .Pipes A and B are opened at the same time when the tank is empty .If one hour later pipe C is also opened, find the total time taken to fill the tank. (5marks)

19. A solid is made up of a conical frustum and a hemispherical top. The slant height of the frustum is 8cm and its base radius is 4.2cm.If the radius of the hemispherical top is 3.5cm

a) Find the area of:

i) the circular base. (2 marks)

ii) the curved surface of the frustum (3 marks)

iii) the hemispherical surface (3marks)

b) A similar solid has a total surface area of 81.51cm2.Determine the radius of its base. (2marks)

1. In the figure below, O is the center of the circle. PQ is a tangent to the circle at N. Angle NCD is 10∘ and angle ANP is 30∘

B

 C

 A D

 P N Q Giving reasons find;

1. Angle DON (2marks)
2. Angle DNQ (2marks)
3. Angle DBA (2marks)
4. Angle ONA (2marks)
5. Angle ODN. (2marks)
6. Two quantities P and Q are connected by the equation **P= KQn**. The table below gives the values of P and Q

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| P | 1.2 | 1.5 | 2.0 | 205 | 3.5 | 4.5 |
| Q | 1.58 | 2.25 | 3.39 | 4.74 | 7.86 | 11.5 |

1. State the linear equation connecting P and Q (1 mark)
2. Using a scale of 1cm to represent0.1 units in both axes, draw a suitable straight line graph on the grid provided (5 marks)
3. Use your graph in b) above to determine the approximate values of **K** and **n.** (2 marks)
4. From the graph, find the value of Q when P=3 (2 marks)

22. The displacement h metres of a particle moving along a straight line after t seconds is given by h=-2t3+$\frac{3}{2}$ t2 + 3t.

1. Find its initial acceleration (3 marks)
2. Calculate;

 i) The time when the object was momentarily at rest (3 marks)

 ii) Its displacement by the time it comes to rest (2 marks)

1. Calculate the maximum speed attained (2 marks)

23.a) Complete the table below for graphs of y=sinx and y=2sin(x+30) (2 marks)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | o | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 |
| sin x | 0 |  | 0.87 |  |  | 0.5 |  |  | -0.87 |  |  | -0.5 |  |
| 2sin (x+30) | 1 | 0.5 |  | 1.74 |  | 0 | -1 |  |  |  | -1 |  |  |

1. Using a suitable scale on the grid below draw the graphs of y = sin x and y = 2sin (x +30) for 0 ≤ x ≥ 3600 (4 marks)



c) State the transformations that would map y= sinx onto y=2sin(x+30). (2 mark)

d) Find the values of x which satisfy the equation sin x – 2sin (x +30) =0. (2 marks)

24. A trailer moving at a speed of 80km/h is being overtaken by a car moving at 100km/h in a clear section of a road. Given that the bus is 21m long and the car is 4m long.

1. How much time (in seconds) will elapse before the car can completely overtake the bus?

(3 marks)

1. How much distance (in metres) will the car travel before it can completely overtake the bus? (2 marks)
2. Given that as soon as the car completed overtaking the trailer, a bus heading towards the trailer and the car and moving at a speed of 90km/h became visible to the car driver. It took exactly 18 seconds for the car and the bus to completely by pass each other from the moment they first saw each other.
3. How far was the tail of the bus from the tail of the car at the instance they first saw each other given that the bus is 12 metres long? (3 marks)
4. How far a part was the trailer and the bus just immediately after the car and the bus had passed each other? (2 marks)