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

**School ……………………………………………… Candidate’s Signature …………………………….**

 **Date…………………….……………………**

**121/1**

**MATHEMATICS**

 **PAPER 1**

**TIME: 21/2 HOURS**

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

**121/1**

**Mathematics**

**Paper 1**

 **21/2 hours**

**INSTRUCTIONS TO THE CANDIDATES**

* *Write* ***your name*** *and* ***index number*** *in the spaces provided above*
* *This paper contains two sections;* ***Section*** *1 and* ***Section 11****.*
* *Answer all the questions in* ***section 1*** *and only* ***five*** *questions from* ***Section 11***
* *All workings and answers must be written on the question paper in the spaces provided below each question.*
* *Marks may be given for correct working* ***even if*** *the answer is wrong.*
* *Non programmable silent electronic calculators and KNEC Mathematical tables may be used* ***EXCEP****T where stated otherwise.*
* *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
* ***This paper consists of 15 printed pages.***
* ***Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.***

**FOR EXAMINER’S USE ONLY**

**Section 1**

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

**Section 1I** **GRAND TOTAL**

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

**SECTION I (50 MARKS)**

***Answer all the questions in this section in the space provided***

1. A boy cycles a certain distance from **X t**o **Y** at 10km/hr, he returns at 12km/hr. The total time taken is 1hr 50min. find the distance **XY**. (3mrks)
2. Simplify p2 – 2pq + q2 (3mrks)

 2p2 -3pq + q2

1. Solve for X in the equation. (3mrks)

½ log2 81 + log2 (*x*2 – *x*/3) = 1

1. In the figure below **PQRS** is a trapezium with **QR** parallel to **PS**.**QR**=6cm, **RS**=4cm, **QS**=9cm and **PS**=10cm

 **Q** 6cm **R**

 9cm 4cm

**P** 10cm **S**

 **Calculate**

 (a). The size of angle **SQR** (2marks)

 (b). The area of triangle **PQS** (2marks)

 5. Find the value of *x* in the equation. (3marks)

 COS (3*x* – 180o ) = $\frac{\sqrt{3} }{2}$ in the range 0o$\leq $*x*$ \leq 180$*o*

1. A famer has a piece of land measuring 840m by 396m. He divides it into square plots of equal sizes. Find the maximum area of one plot. (3marks)
2. A liquid spray of 384g is packed in a cylindrical container of internal radius 3.2cm.

Given that the density of the liquid is 0.6g/cm3, calculate to 2 decimal places the height of the liquid in the container. (3marks)

1. ( a ) Find the inverse of the matrix. (1mark)

 

 (b) Hence solve the simultaneous equation using the matrix method. (2marks)

 $4x+3y=6$

 $3x+5y=5$

1. Two pipes **A** and **B** can fill an empty tank in 3hrs and 5hrs respectively. Pipe **C** can empty the tank in 4hrs. If the three pipes **A, B** and **C** are opened at the same time find how long it will take for the tank to be full. (3marks)

1. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh.51790 while in Kenya and converted the rest of the money into US dollars. Calculate the amount he received in US dollars. The. Exchange rates were as follows. (4marks)

 **Buying Selling**

 US dollars $ 65.20 69.10

 Sterling pounds £ 123.40 131.80

1. The gradient of a straight line L1, passing through the point **P** (3, 4) and **Q** (a, b) is -3/2. A line L2 is perpendicular to L1  through **Q** and **R** (2, -1). Determine the values of a and b. (3marks)

1. Find the number of sides of a regular polygon whose interior angel is 5 times the exterior angle.

 (3marks)

1. The points A, B and C lie on a straight line. The position vectors of A and C are

2 i + 3j + 9k and 5i - 3j + 4k respectively; B divides AC internally in the ratio 2:1 Find the:

˜

˜

˜

˜

˜

˜

( a ) Position vector of B (2marks)

(b )distance of B from the Origin (1mark)

1. The sum of digits in a two digit number is 16. When the number is subtracted from the number formed by reversing the digits the difference is 18. Find the number. (3marks)
2. In Blessed Church Choir the ratio of males to females is 2:3. On one Sunday service ten male members were absent and six new female members joined the choir as guests for the day. If on this day the ratio of males to females was 1:3, how many regular members does the choir have? (3marks)
3. A businessman makes a profit of 20% when he sells a carpet for Ksh. 36000. In a trade fair he sold one such carpet for Ksh. 33600. Calculate the percentage profit made on the sale of the carpet during the trade fair. (3marks)

**SECTION II (50MARKS)**

***Answer any five questions in the spaces provided***

1. A Matatu and a Nissan left town A for town B 240km away at 8.00am travelling at a speed of 90km/hr and 120 km/h respectively. After 20minutes the Nissan had a puncture which took 30minutes to mend.

(a) How far from town A did the Nissan catch up with the Matatu? (6marks)

(b)At what time did the Nissan catch up with the Matatu? (1mark)

(c)At what time did the Matatu reach town B (3marks)

1. In the figure below PQ = 2500m, U T= 1000m and TS =2350m. PQR is a straight line. Parallel to UT and angle UPQ =22.5o.

 **S**

22.50

 **2350m**

 **U 1000m T V**

 **P 2500m C R**

 Calculate to the nearest meter

 (a) (i) U Q (2marks)

 (ii) T V (2marks)

 (iii) V S (2marks)

 (iv) P U (2marks)

 (b) Find the perimeter of the figure. (2marks)

1. The result for mathematical test of a hundred students is as shown below.

Marks No. of students

30-34 4

35-39 6

40-44 10

45-49 14

50-54 X

55-59 24

60-64 14

65-68 6

(a)Determine: (i) the value of X. (2marks)

 (ii) Modal class (1mark)

(b) Calculate: (i) Mean (5marks)

 (ii) Median) (2marks)

1. The diagram below shows a frustrum of a right circular cone. The radii of the circle at the top and the bottom are 1.5cm and 5cm respectively. The slant edge of the frustrum is 7cm long.

1.5cm

7cm

**5cm**

Calculate:

 (a) The height of the frustrum. (4marks)

 (b) The total surface area of the frustrum. (6marks)

1. **A B C D** is a parallelogram with **A** (1,1) and **C** (8, 10).**A** **B** has equation 4x-5y=1 and **B C** has equation 5x-2y=20 . Determine :

 (a) The coordinates of the point M where the diagonals meet. (2marks)

 (b) The coordinates of the verticals B and D. (5marks)

 (c) The length A B correct to three significant figures. (3marks)

1. ( a ) Using a ruler and a pair of compass only construct a parallelogram **ABCD** whose diagonals

 **AC** and **BD** intersect at a point O, given that **AC**=7.2cm and **BD** = 5.6cm and angle **AOB** = 45o.

 (3marks)

(b) Measure and state the length of **AB** and **BC**. (2marks)

(c) Construct the circum circle of ∆BOC and mark a point E on A B produced such that ∠ $BEC=45$0.

 (3marks)

(d) Calculate the area of quadrilateral BECO (2marks)

1. A straight line L passes through the point (-3, 5) and makes an angle of 45o with the horizontal.

( a) find the equation of the line L . (3marks)

(b) Given that line L intersects with the **X** axis at **A** and the **Y** axis at **B**, find in surd form the distance

 **AB** (4marks)

( c ) Find the area of triangle **ABC** given that **C** and **A** are equai-distance from O the origin.

 (3marks)

1. **ABCD** is a square of sides 60cm. If CP = **CQ** = X cm where P is a point on **CD** and **Q** is a point on **CB**.

 D P x C

 x

 Q

 A B

 (a)Express the area of **PCQ** and **ADP** in terms of x . (4marks)

 (b) Given the area of triangle APQ is 1000cm2. Find x (6marks)