**NAME:……………………………………………………… INDEX NO:……………………**

**SCHOOL:………………………………………………….. DATE: ...................................... SIGN:…………………**

**121/1**

**MATHEMATICS**

**PAPER 1**

**TIME: 2 ½ HOURS**

**ELERAI PRE – MOCK EXAMINATIONS - 2016**

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

***MATHEMATICS PAPER 1***

***2 ½ HRS***

**INSTRUCTIONS TO CANDIDATES**

1. *Write your name and index number in the spaces provided at the top of this page.*
2. *This paper consists of two sections:* ***Section l and Section II.***
3. *Answer all questions in section* ***l and five*** *questions from* ***Section II.***
4. ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
5. *Marks may be given for correct working even if the answer is wrong.*
6. *Non- programmable silent electronic calculators and* ***KNEC Mathematical*** *tables may be used.*

#### For examiners’ 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 | GrandTotal |  |
|  |  |  |  |  |  |  |  |  |

*This paper consists of 17 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.*

**SECTION I (50 MARKS)**

**Answer all questions in the spaces provided**

1. Ivy has sh 180 in various denominations. Twenty shillings coins are one more than ten shillings coins, while five shillings coins are twice ten shillings coins. How much are the twenty shillings coins if all the coins are seventeen. (3mks)
2. Solve for x in the equation Sin ( 4x + 10 ) – cos (x +70) = 0 (2mks)
3. A group of 8 men can do a piece of work in 5 days working 6 hours per day. Calculate the number of days a group of 10 men, working at half the rate of the first group would take to complete the same work if they work 8 hours a day. (3mks)
4. Solve for t in the equation 4t + 2 2t+1 = 24 (3mks)

1. Ken intended to import a car worth US$ 8,500 from Japan. The exchange rates were as follows.

 Buying Selling

 US $1 104.16 104.85

 He later changed his mind and reconverted the money to Kenya shilling. How much in Kenya shillings did he gain or loss. (4mks)

1. Solve the following simultaneous equations. (3mks)

1. The sum of the interior angles of two regular polygons of sides (n-1) and n are in the ratio 3:4. Calculate the number of sides of the second polygon with n sides. (3mks)
2. A sector of a circle of radius 31.5cm subtends an angle of 80o at the centre. The sector is folded to form an open cone. A hemispherical bowl is fitted on the base of the cone. Find the surface area of the solid formed. (4mks)
3. Given that a = ½ , b = 2/3, c = 2/5 and d = ¾. Find the value of x if  without using mathematical tables or a calculator
4. Two trains P and Q are travelling in the same direction. Train P is travelling at 48km/h and train Q at 30km/h. if train P is 80m long and it takes 24 seconds to overtake train Q completely. Calculate:

 a) the length of train Q ( 3mks)

 b) the time it takes for the front of train P to pass the front of train Q. (1mk)

1. Find the area of a regular pentagon of sides 4cm giving your answer to three significant figures. (4mks)
2. A line with gradient 3 passes through points A(2,3) and B (4, k). Find the equation of a perpendicular bisector of line AB in the form ax + by + c = 0 (3mks)
3. From the roof of a house a boy can see a Mango three which is 20m away from the house. He measures the angle of elevation of the top of the tree as 21o and the angle of depression of the bottom of the tree as 13o. Find the height of the mango tree. Correct your answer to one decimal place. (3mks)

14 Wambua started working at a salary of Ksh 25,000 with an annual increament of Ksh 1600. After exactly 3 years, Kemboi was employed in the same company with a

 salary of Ksh 30,000 and an annual increament of Ksh 800. How long will it take fo the two to earn equal salaries after Kemboi’s employment. (3mks)

15 A cold water tap can fill a bath in 10 minutes while a hot water tap can fill it in 8 minutes. The drainage pipe can empty it in 5 minutes. The cold water and hot water taps are left running for 4 minutes, after which all the three taps are left running . Find how long it takes to fill the bath.

16 Simplify the following completely. (3mks)

 2a2b - 3a2 c + 4ab2  - 6abc

 3bc - 6b2c - 2ab2 - 4b3

**Section II (50 Marks)**

**Answer only five questions in this section**.

17 A particle starts from rest and moves in a straight line for the first 15 seconds with an acceleration of 11/5 m/s2. The velocity then remains constant for the next 35seconds before the particle undergoes a deceleration of 8/15 m/s2 and eventually comes to rest.

 a) Draw a velocity –time graph to represent the motion of the particle.(5mks)

 b) Using the graph drawn above calculate:

 i) The total distance travelled by the particle. (3mks)

 ii) The distance in the final 40 seconds. (2mks)

18 The marks obtained by 50 students in a maths test were as follows.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 35 | 51 | 83 | 60 | 61 | 73 | 44 | 90 | 70 | 93 |
| 56 | 34 | 52 | 61 | 43 | 57 | 40 | 58 | 88 | 64 |
| 52 | 71 | 25 | 86 | 79 | 35 | 73 | 44 | 71 | 95 |
| 63 | 53 | 48 | 78 | 65 | 98 | 21 | 72 | 67 | 82 |
| 46 | 54 | 62 | 35 | 70 | 41 | 63 | 23 | 50 | 68 |

a) Construct a grouped frequency table with class width of 10 (3mks)

b) State the modal class (1mk)

c) Find the;

 i) the mean mark (3mks)

 ii) median mark (3mks)

19 The number of people working in a factory decided to raise sh 72,000 to buy a plot land. Each person was to contribute the same amount. Before the contributions were collected, five of the people retired from working at the factory. This meant that the remaining contributors had to pay more to meet the same target.

 a) If n stands for the number of people working in the factory originally, show that the increase in the contribution per person was 360,000

 n( n – 5) (3mks)

 b) If the increase in the contribution per person was sh 1200, find the number of people originally working at the factory. ( 4mks)

 c) Calculate the percentage increase in the contribution person caused by retirement, giving your answer to one decimal place. (3mks)

20 A bucket is in the shape of a frustum with a base radius of 28cm and at top radius of 42cm. the height of the bucket is 30cm as shown below. The bucket contains water to a depth of 15cm (take Π = 22/7

 30cm

 15cm

 28cm

a) Calculate the volume of the water in the bucket. (6mks)

b) All the water in the bucket is poured into an open cylindrical container of radius 28cm. if the height of the cylinder is 60cm, calculate the internal surface area of the cylinder which is not in contact with the water. (4mks)

21 The field book below gives measurements of a field. The distances are given in metres and AF= 100m.

|  |  |  |
| --- | --- | --- |
|   | F |  |
|  E40C40 | 10080604020 | D50B30 |
|  | A |  |

a) Using a scale of 1cm represents 10m, draw a map of the field with straight boundary edges (4mks)

b) i) Find the area of the field square meters. (5mks)

 ii) Determine the area of the field in hectares. ( 1mk)

22 a) Triangle PQR has vertices P ( -4,1) Q( -2, 1) and R ( -3,4). Draw triangle PQR, on the grid provided. ( 1mk)

 b) Triangle PQR is reflected in the line y = x to produce P1Q1R1. Find the coordinates of P1Q1R1 and draw triangle P1Q1 R1 on the same axes. (2mks)

 c) Trial P1Q1R1  is rotated about the point (0,-1) through -90o to produce P2Q2R2

 Find the coordinates P2Q2R2  and draw triangle P2Q2R2 on the same axes. (2mks)

 d) P2Q2R2 is enlarged about the origin, scale factor -1 to produce triangle P3Q3R3  . On the same axes show triangle P3Q3R3  and its coordinates.(2mks)

 e) Triangle P3Q3R3 is given a shear with line y = 3 as invariant line and point R3 being mapped onto R4 ( 6,5). Draw triangle P4Q4R4 on the same axes and state the coordinate of P4Q4R4 (3mks)

23 Four towns A, B, C and D are such that town B is 150km due east of town A. Town C is 180km due north of town B. Town D is on a bearing of 330o from town A and on a baring of N 60oW from town B.

 a) Use a scale of 1cm to represent 30km to show the position of A, B, C and D (5mks)

 b) Determine:

 i) the distance and true bearing of D from C. (2mks)

 ii) The distance and the true bearing of C from A (2mks)

 iii) The compass bearing of A from C (1mk)

24 A particle moves along a straight line such that its displacement S metres from a given point is S = t3  - 5t2 + 3t + 4 where t is time in seconds.

 Find:

 a) The displacement of the particle at t = 5 (2mks)

 b) The velocity of the particle when t= 5 (3mks)

 c) The values of t when the particle is momentarily at rest. (3mks)

 d) the acceleration of the particle when t = 2 ( 2mks)