**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ INDEX NO. \_\_\_\_\_\_\_\_**

**SCHOOL: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CLASS: \_\_\_\_\_\_\_\_\_\_**

**CANDIDATE’S SIGNATURE: \_\_\_\_\_\_\_\_**

121/1

MATHEMATICS

PAPER 1

MARCH, 2019

2½ HRS

**BURAMU 1 JOINT EXAM – 2019**

Kenya Certificate of Secondary Examination (K.C.S.E)

121/1

Mathematics

Paper 1

March, 2019

2½ Hrs

**INSTRUCTIONS TO CANDIDATES**

* *Write your name and index number in the spaces provided above.*
* *This paper consists of* ***TWO*** *sections. Section* ***I*** *and Section* ***II****.*
* *All answers and working must be written on the question paper in the spaces provided below each question.*
* *Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.*
* *Marks may be given for correct working even if the answer is wrong.*
* *Non-programmable silent calculators and KNEC mathematical tables may be used except where stated otherwise.*

**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** | **GRAND**  **TOTAL** |
|  |  |  |  |  |  |  |  |  |

**This paper consists of 15 printed papers. Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing**

**SECTION 1 (50 MARKS)**

***Answer all questions in this section.***

1. Without using tables or calculator, evaluate: (3 marks)
2. The following data shows the marks scored by 30 students in an exam.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Marks** | 54 | 58 | 64 | 66 | 73 | 76 |
| **No. of students** | 5 | 6 | 9 | 5 | 3 | 2 |

1. State the mode. (1 mark)
2. Calculate the mean giving your answer correct to two decimal places. (2 marks)
3. Use logarithms correct to 4 decimal places to evaluate: (3 marks)
4. Simplify: (3 marks)
5. Using a ruler, a pair of compasses and a set square, construct on the upper side of a line **BC**, 8 cm long, a line **BD** such that <**DBC** = 37.5º. use the line **BD** to divide **BC** into 5 equal portions. (3 marks)
6. The marked price of a pair of shoes is Ksh. 2,400/=. Nicky bought the shoes after being allowed a discount of 15%. By this, the store owner made a 20% profit. Determine how much the store owner paid for the shoes. (3 marks)
7. Mamba’s clock gains 15 seconds every hour. He adjusted the time on his clock to read 1800 hours on Friday. What will be the time on his clock when the correct time will be 0600 hours on Wednesday the following week? (3 marks)
8. Solve for x in the equation: 4 cos (2x – 30) = -2 for 0º x 180º (3 marks)
9. The figure below is an incomplete sketch of a solid with a uniform cross-section. Complete the sketch showing the hidden edges with broken lines. (3 marks)



1. Express 1323 in the prime factor form. Hence solve for x and y in the equation:

3y-1 x 7x+1 = 1323 (3 marks)

1. The sum of the interior angles of a regular polygon is 1440º. Find the size of the exterior angle of the polygon. (3 marks)
2. The gradient of a straight line L1 passing through the points P (3,4) and Q (a, b) is - . another line L2 is perpendicular to L1 and passes through the points Q and R (2, -1). Determine the values of a and b. (3 marks)
3. A cylindrical solid of radius is 7 cm and length 30 cm floats lengthwise in water to a depth of 10.5 cm as shown in the figure below.



Calculate the area of the curved surface of the solid not in contact with water. (Use = )

(4 marks)

1. Solve the inequalities 2x – 5 > - 11 and 3 + 2x 13 and represent the solution on the number line. (3 marks)
2. An open rectangular container has internal dimensions; 35 cm length, 30 cm breath and 25 cm high. The thickness of the material making the container is 10 mm. find the volume of the material used to make the container in cubic centimetres. (3 marks)
3. In the figure below (not drawn to scale), PS = PQ = 19cm, <PSQ = 47º, <QRS = 58º and <SQR = 61º. Calculate the length of SR correct to 4 significant figures. (4 marks)



**SECTION II (50 MARKS)**

*Answer any* ***five*** *questions from this section*

1. Mwanajuma and Mwangi entered a partnership. They contributed Ksh. 120,000/= and Ksh. 150,000/= respectively. After 18 months of business, Njambi joined the partnership and contributed Ksh. 90,000/=.
2. Determine the ratio of their contribution after three years of business. (3 marks)
3. After the three years, they realized a profit of Ksh. 510,000/=. They agreed to set aside 30% of the profit to cater for the cost of running the business and share the rest as per their contributions. Determine the difference in Mwangi’s and Njambi’s share of the profit. (4 marks)
4. Njambi then invested back her share into the business. Determine their new ratio of contributions at the end of the fourth year. (3 marks)
5. A women group decided to raise Kshs. 1,920,000/= to start a bakery business. One commercial oven was costing Ksh. 320,000/=. Before the actual payment was made, four of the members pulled out and each of those remaining had to pay an additional Ksh. 80,000/=.
6. If the original number of the group members was x, write down;
7. An expression of how much each was to contribute originally. (1 mark)
8. An expression of how much the remaining members were to contribute after the four pulled out. (1 mark)
9. Determine the numbers who actually contributed towards the project. (5 marks)
10. After sometime, the members agreed to dissolve the business and sold all the commercial ovens to another group at a discount of 10% per oven. Calculate how much each member got after the sale. (3 marks)
11. (a) Given that T-1 = ⅛ (4 marks)

(b) Two ladies bought trouser suits and skirt suits from a boutique at Ksh. x and Ksh. y respectively: Jane paid Ksh. 12,000/= for 3 trouser suits and 4 skirt suits. Lucy paid Ksh. 32,000/= for 7 trouser suits and 12 skirt suits.

1. Form a matrix equation to represent this information. (2 marks)
2. Use matrix method to find the cost of one trouser suit and one skirt suit. (4 marks)
3. A bus leaves town X for town Y 240 km away at an average speed of 60 km/h at 8.00 am. Thirty minutes later a car leaves town Y and travels towards town X at an average speed of 80 km/h.
4. (i) Calculate the time when the bus met the car. (4 marks)

(ii) How far from X does the car meet the bus? (2 marks)

1. At the point of meeting, the car develops a puncture and the driver stops for 45 minutes to replace the wheel. At what speed must the car travel so as to get to **X** at the same time the bus reaches **Y**. (4 marks)
2. The distance S metres from a fixed-point O covered by a particle after ***t*** seconds is given by the equation S = t3 – 6t2 + 9t + 5.
3. Calculate the gradient to the curve at t = 0.5 seconds. (3 marks)
4. Determine the values of S at the maximum and minimum turning points of the curve.

(4 marks)

1. Sketch the curve of S = t3 – 6t2 + 9t + 5. (3 marks)
2. On the grid provided below draw the quadrilateral P (-3, 2), Q (-3, 6), R (-5, 4) and S (-5,2).

(1 mark)



On the same axes.

1. Draw P'Q1R1S1 the image of PQRS under an enlargement scale factor -1 about (0, 0).

(2 marks)

1. Draw P11Q11S11 the image of P1Q1S1 under a rotation - 90º about (0, 0). State the coordinates of P11Q11S11. (3 marks)
2. P111Q111S111 is the image of P11R11S11 when reflected in the line y + x = 0. Draw P111Q111S111. (2 marks)
3. State two pairs of the quadrilateral that are oppositely congruent. (2 marks)
4. The figure below is a plumb bob used by masons in building construction. It is a solid metal cylinder mounted on top of a cone. The dimensions are as shown below.



1. Calculate correct to 2 decimal places;
2. The volume of the plumb bob in cm3. (4 marks)
3. The curved surface area of the plumb bob. (3 marks)
4. The plumb bob is melted down and recast into a solid sphere. Calculate the radius of the sphere correct to 2 decimal places. (3 marks)
5. Four points **P**, **Q**, **R** and **V** lie on the same plane on a ranch. Point **Q** is 850m on a bearing of 310º from the point **P**. Point **R** is 1020m on a bearing of 075º from **Q**. Given that **V** is directly South of **R** and East of **P**.
6. Use a scale of 1cm rep. 100m to represent the relative positions of the four points on the ranch. (4 marks)
7. From the scale drawing, determine
8. The bearing and distance of point **P** from **R**. (2 marks)
9. The bearing of point **Q** from **V** (1 mark)
10. A road is to be constructed from point **Q** to the road joining **R** to **V**. find
11. The shortest distance of this road from Q to **RV**. (2 marks)
12. The distance from point **V** to the junction of the road in (c) above. (1 mark)