Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Admission No. \_\_\_\_\_\_\_\_\_\_\_\_Class\_\_\_\_

 Candidate’s signature \_\_\_\_\_\_\_\_\_\_\_

 Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**121/1**

**MATHEMATICS**

**PAPER 1**

**JULY/AUGUST 2019**

**2 ½ HOURS**

**MATHEMATICS**

**PAPER 1**

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**INSTRUCTIONS TO CANDIDATES**

1. Write your name, index number and class in the spaces provided.

2. Sign and write date of the of the examination in the spaces provided.

3. The paper contains two sections: Section I and II

4. Answer ALL questions in section I and **STRICTLY FIVE** questions from section II.

5. All working and answers must be written on the question paper in the spaces provided below each question.

6. Show all the steps in your calculations, giving you’re your answers at each stage in the spaces below each question.

7. Marks may be awarded for correct working even if the answer is wrong.

8. Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

**FOR EXAMINER’S USE ONLY**

**SECTION 1**

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

**GRAND TOTAL**

**SECTION II**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 TOTAL |
|  |  |  |  |  |  |  |  |  |

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121/1

Mathematics

Paper1

**This paper consists of 14printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing.**

**SECTION I:(50 Marks). Attempt ALL questions in this section**

1. Without using a calculator evaluate (3 Marks**)**

$$\frac{\left(3\frac{1}{3}+1\frac{1}{9}\right) ÷1\frac{1}{3}}{\left(4\frac{2}{9}- 2\frac{5}{9}\right)x \frac{2}{3}}$$

1. A basket ball team play 10 matches in a tournament. The following are scores in each match.

 9, 15, 17, 16, 7, 20, 21, 15, 10, 12

 Determine:

 (a) the mode. (1 mark)

 (b) the median. (2 marks)

1. The gradient of curve at any point is given by 2x – 1. Given that the curve passes through point (1, 5), find the equation of the curve. (3 Marks)
2. Simplify: $\frac{9x^{2}- 1}{3x^{2}+2x-1}$ (3 Marks)
3. Find the value of$\sqrt{\left(\frac{2x^{2}+2(p+r)}{p-r} ÷\frac{1}{2}\right)+r}$ ; if $p=r+2, x=p+1 $and$ r=2$ . (3 Marks)
4. A car uses 1 litre of petrol for every 8 kilometres. The car was to travel 480 kilometres and had 15 litre of petrol at the beginning of the journey. Each litre of petrol cost sh. 112.00. How much did it cost for the extra petrol added? (3mks)
5. Two pipes **A** and **B** can fill an empty tank in 3hrs and 5hrs respectively. Pipe **C** can empty the full tank in 6 hours. 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)

(3 marks)

1. Without using tables or calculators, find the value of **t** in

8

8

$$log\_{3}\left(t+5\right)-log\_{3}\left(t-3\right)=-2$$

1. The position vectors of A and B are given as **a** = 2**i** – 3**j** + 4**k** and **b** = -2**i** – **j** + 2**k** respectively.

Find to 2 decimal places, the length of vector **AB**. (3 Marks)

1. A regular polygon has internal angle of 1500 and side of length 10cm.
2. Find the number of sides of the polygon. (2 Marks)
3. Find the perimeter of the polygon. (2 Marks)

1. Solve for x in the equation. (3 Marks)

$9^{(2x-1) }$x $3^{(2x+1)}$= 243

1. The region R in the figure below is defined by the inequalities L1, L2 and L3.

**2**

**4**

**6**

**8**

**-2**

**-1**

**0**

**1**

**2**

**3**

**x axis**

**y axis**

**IR**

Find the three inequalities (3 Marks)

1. Two boys and a girl shared some money. The elder boy got $\frac{4}{9}$ of it, the younger boy got $\frac{2}{5}$ of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girl’s share.

(3Marks)

1. Use tables of reciprocals only to find the value of

$\frac{5}{0.0829}$ - $\frac{14}{0.581}$ (3 marks)

1. The figure below is a velocity – time graph for a car. (not drawn to scale).

80

y

4

24

20

x

80

Time (seconds)

Velocity (m/s)

1. Find the total distance traveled by the car? (2 Metres)

1. Calculate the deceleration of the car. (2 Marks)
2. A point C is on a line PQ where PQ = 9cm. C divides PQ such that.

 By construction locate C. (3 marks)

 **SECTION II (50 MARKS): Answer any five questions in this section.**

**17.** Arc of a circle of radius 40cm subtends an angle of 126° at the centre of the circle. Using $π=\frac{22}{7}$;

 (a) Calculate:

 (i) the length of the arc. (2 marks)

 (ii) the area of the sector. (2 marks)

1. The sector is folded to form a cone.

 Calculate:

 (i) the radius of the base of the cone. (2 marks)

 (ii) the height of the cone.correcr to 2 decimal places (2 marks)

 (iii) the capacity of the cone in litres correct to 2 decimal places. (2 marks)

1. The figure below shows a triangle **ABC** inscribed in a circle. **AC** = 10cm, **BC** = 7cm and

 **AB** = 10cm.

**10cm**

**B**

**C**

**A**

 **8cm**

**7cm**

 (a) Find the size of angle **BAC**. (3mks)

 (b) Find the radius of the circle. (2mks)

 (c) Hence calculate the area of the shaded region. (5mks)

1. A straight line passes through the points (8, -2) and (4,-4).
2. Write its equation in the form ax + by +c = 0, where a, b and c are integers. ( 3 Marks)
3. If the line in (a) above cuts the x-axis at point P, determine the coordinates of P. (2 Marks)
4. Another line, which is a perpendicular bisector to the line in (a) above cuts the y axis at the point Q. Determine the coordinates of point Q. (3 Marks)
5. Find the length of QP (2 Marks)
6. (a) A bus travelling at 99km/hr passes a check-point at 10.00a.m. and a matatu travelling at 132km/h in the same direction passes through the check point at 10.15a.m. If the bus and the matatu continue at their uniform speeds, find the time the matatu will overtake the bus. (6mks)
7. Two passenger trains A and B which are 240m apart and travelling in opposite directions at 164km/h and 88km/h respectively approach one another on a straight railway line. Train A is 150 metres long and train B is 100 metres long. Determine time in seconds that elapses before the two trains completely pass each other. (4mks)
8. The figure below shows triangle OPQ in which OS = $\frac{1}{ 3}$ OP and OR = $\frac{1}{3}$ OQ. T is a point on QS such that QT = $\frac{3}{4}$ QS

P

S

O

Q

R

T

1. Given that OP = p and OQ = q, express the following vectors in terms of p and q.

̃

̃

 (i) SR (1 Mark)

̃

(ii) QS (2 Marks)

̃

(iii) PT (2 Marks)

̃

(iv) TR (2 Marks)

̃

1. Hence or otherwise show that the points P, T and R are collinear. (3 Marks)

22. A saleswoman is paid a commission of 2% on goods sold worth over ksh. 100,000. She also paid a monthly salary of ksh. 12,000. In a certain month, she sold 360 handbags at ksh. 500 each.

a) Calculate the saleswoman’s earnings that month. (3 mks)

b) The following month the sales woman’s monthly salary was increased by 10%. Her total earnings that month were ksh. 17600. Calculate:

 (i) The total amount of money received from the sales of hand bags that month. (5 mks)

 ii) The number of handbags sold that month. (2 mks)

23.(a) Fill the table below for the function y = 2x2 + 6x – 5, for -4≤x≤3 (2 Marks)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| Y |  |  |  |  |  |  |  |  |

(b) (i) Draw the curve for y = 2x2 + 6x – 5, for -4≤x≤3 on grid given (3 Marks)



 (ii) On the same axes, draw line y = 7x + 1 (1Mark)

(c) Determine the values of x at the points of intersection of the curve (2 Marks)

y = 2x2 + 6x – 5 and line y = 7x + 1

(d) Use your graph to estimate the value of $2x^{2}+6x=5$ (2 Marks)

24.The displacement S metres of a moving particle after t seconds is given by

 S = 2t³ - 5t² + 4t + 2

 Determine

 (a) the velocity of the particle when t = 2. (3 marks)

 (b) the value(s) of t when the particle is momentarily at rest. (3 marks)

 (c) the displacement when the particle is momentarily at rest. (2 marks)

 (d) the acceleration of the particle when t = 5. (2 marks)