Name: ..... Class:

..... Adm.No.....

School: .....Date:

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Sign:

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121/2
MATHEMATICS
PAPER 2
TIME: 2 ½ HOURS

M O K A S A J O I N T E X A M I N A T I O N - 2019

Kenya Certificate to Secondary Education

MATHEMATICS (PAPER 2)

TIME: 2 ½ HOURS

Instructions

- *Write your name, class, admission number, school, date and signature in spaces provided above.*
- *The paper contains **two** sections **A** and **B.***
- *Answer **all** questions in section **A** and **any five** questions from section **B** in the spaces provided below each question.*
- *Show all the steps in your calculations giving your answers at each stage in the spaces below each question.*
- *Non-programmable silent electronic calculator and mathematical tables may be used except where stated otherwise.*

For Examiner's Use Only

SECTION A

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

SECTION B

17	18	19	20	21	22	23	24	**TOTAL**

PERCE

SECTION A (50 MARKS)

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

1. Use logarithms to evaluate. **(4 marks)**

$$\sqrt{\frac{(0.08294)^2 \times 39.24^3}{8458}}$$

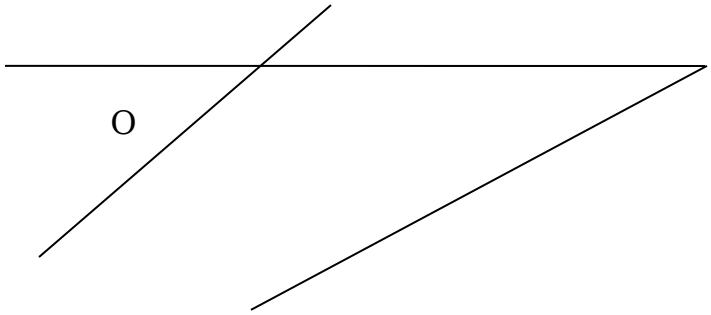
2. Given that $\frac{\sqrt{5}+\sqrt{2}}{\sqrt{5}-\sqrt{2}} = a + b\sqrt{c}$. Find the values of a, b and c. **(3 marks)**

3. Use completing square method to solve. **(3 marks)**

$2x^2 + 5x = -3$

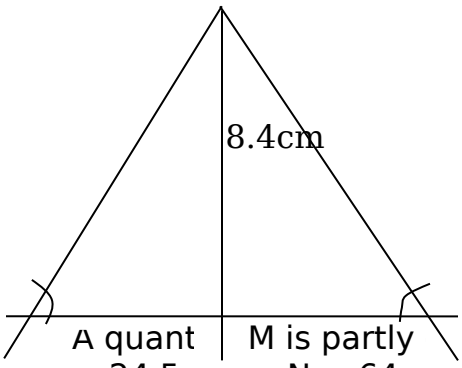
4. In the figure below O is the centre of the circle. DC is diameter chord BA and DC intersect at R and TP is a tangent. AT = 8cm, PT = 12cm and OD = 8cm.

Find the length of:
(i) BA (**2**



5. The equation of curve; $y=x^3+2x+1$. Find the equation of the tangent to the curve at point x = 1. **(3 marks)**

6. In the figure below $\angle A=62^0, \angle B=40^0, BC=8.4cm$ and CN is the bisector of $\angle ACB$. Calculate the length CN to 1 decimal place. **(3 marks)**



A quant M is partly stant and partly varies as the cube root of N. If M = 24.5 when N = 64 and M = 18.5 when N = 27; Find the constants and determine equation connecting M and N.

(4 marks)

8. Draw a line PQ = 4 cm. Indicate by shading the region within which a variable point must lie if $PA \leq 3cm$ and $PA > AQ$.
(3 marks)

9. Solve using matrix method. **(4 marks)**

$2x+3y=23$
$x+5y=29$

10. Given that $y=\frac{2p-r}{p+3q}$, make p subject of the formula. **(3 marks)**

11. Find the area under curve $y=x^2+2$, between x = 2 and x = 6 by trapezium rule sing 4 strips.
(3 marks)

12. Solve for ϑ in the equation. **(4 marks)**
$\sin(2\theta-10)=-0.5$ for $0^0\leq\theta\leq360^0$

13. Solve the equation: **(3 marks)**

$$\left(\frac{1}{\log_x 10}\right)^2+\log_{10}x^2-3=0$$

14. State the amplitude, period and phase angle of $y=2\sin\left(\frac{1}{2}x+30^0\right)$

(i) Amplitude **(1 mark)**

(ii) Period **(1 mark)**

(iii) Phase angle **(1 mark)**

15. Obtain the centre and radius of the circle represented by the equation. **(3 marks)**
$x^2+y^2-10\,y+16=0$

16. (a) Use binomial expansion to expand $\left(2+\frac{3}{x}\right)^5$ up to the fourth term. **(2 marks)**

(b) Use the expansion above to evaluate: $(9.5)^5$. **(2 marks)**

SECTION B (50 MARKS)

*Answer any **five** questions in this section*

17. Two towns P and Q lie on the same parallel latitude such that P is due east of Q. When local time at Q is 9.50 am, the local time at P is 3.12 pm.

(a) Find the latitude difference between P and Q. **(2 marks)**

(b) Give that the longitude of P is 52^0E, find the longitude of Q. **(2 marks)**

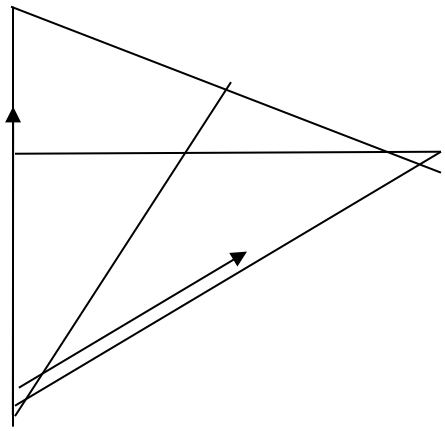
(c) A pilot took off from town Q and flew to town P along the parallel of latitude. The pilot took 3 ¼ hours travelling at an average speed of 860km/h to reach P. Calculate to 1 d.p the latitude of town P and Q if they both lie in the northern hemisphere.

(3 marks)

(d) Two towns R and S are both on the equator and 3820nm apart. Town R is due west of town S. Find the local time at R when the local time at S is 2.20 pm. (Take R = 6370km and $\pi=\frac{22}{7}$)

(3 marks)

18. In the figure below **OA** = **a** and **OB**=**b**, M is the mid-point of OA and AN:NB= 2 : 1.



(a) Express in terms of **a** and **b**.

(i) **BA** **(1 mark)**

(ii) **BN** **(1 mark)**

(iii) **ON** **(2 marks)**

(b) Given that **BX** = h**BM** and **OX** = k**ON**, determine the values of h and k.

(6 marks)

19. The table below shows Kenya Tax Rates in a certain year.

The table below shows the payable tax.

Income in (K£ per annum)	*Tax rates(Ksh. Per £)*
1 – 4512	2
4513 – 9,024	3
9,025 – 13,536	4
13,537 – 18,048	5
18,049 – 22,560	6
Over 22,560	6.5

In that year Muhando earned a salary of Ksh. 16,510 per month. He was entitled to a monthly tax relief of Ksh. 960.

Calculate:

(a) Muhando's annual salary in K£. **(2 marks)**

(b) The monthly tax paid by Muhando in Ksh. **(6 marks)**

(c) Find her net pay in Ksh. **(2 marks)**

20. A box contains 3 brown, 9 pink and 15 white cloth pegs. The pegs are identical except for the colour.

(a) Find the probability of picking.

(i) A brown peg. **(1 mark)**

(ii) A pink or a white peg. **(2 marks)**

(b) Two pegs are picked at random, one at a time without replacement. Find the probability that:

(i) both are brown pegs. **(3 marks)**

(ii) both pegs are of the same colour. **(4 marks)**

21. The first, fifth and seventh terms of an arithmetic progression (AP) correspond to the first three consecutive terms of a decreasing Geometric Progression (GP). The first term of each progression is 64, common difference of the AP is d and the common ratio of the G.P is r.

(a) Write term equations involving d and r. **(2 marks)**

(b) Find the values of d and r. **(4 marks)**

(c) Find the sum of the first 10 terms of:

(i) the Arithmetic Progression (AP) **(2 marks)**

(ii) the Geometric Progression (GP) **(2 marks)**

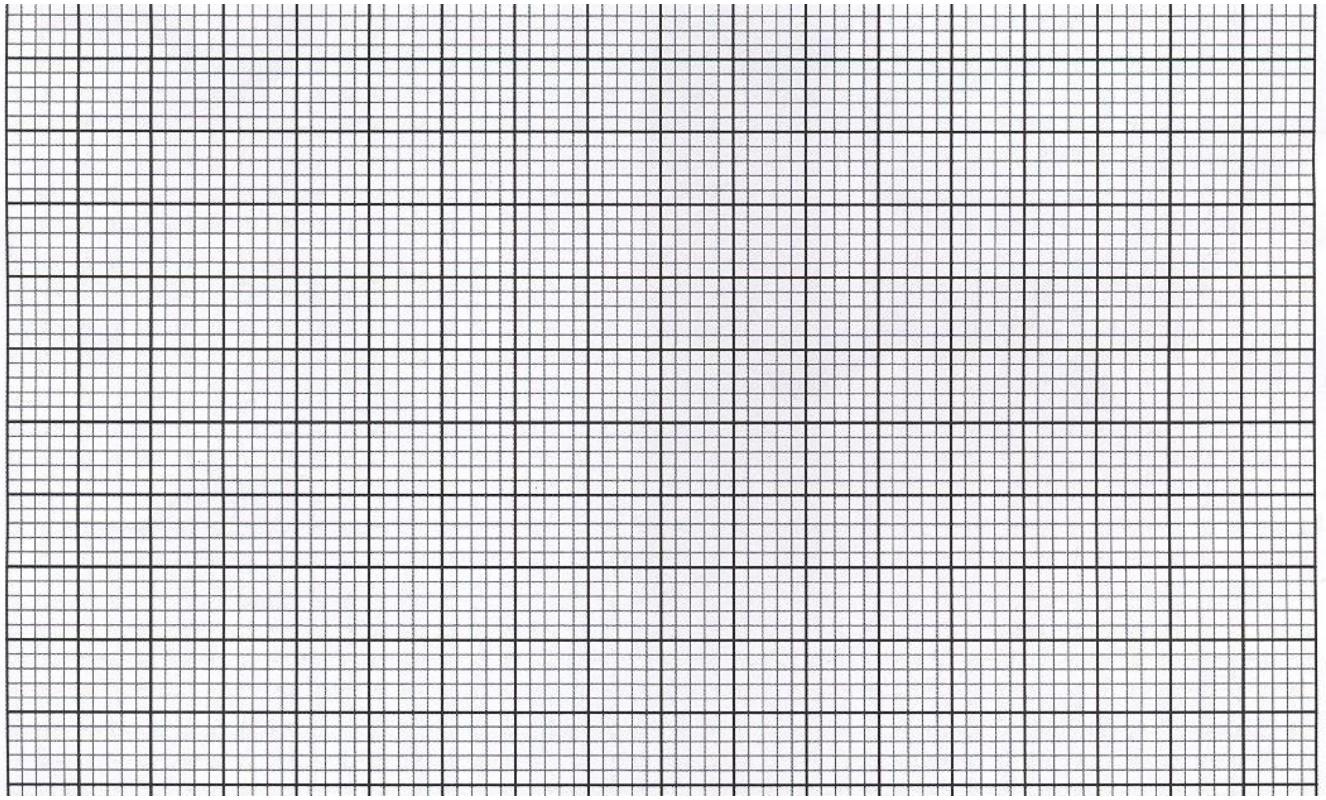
22. The quantities P and Q are connected by the equation $P=k\,R^{n}$. The table below shows values of P and R.

P	1.2	1.5	2.0	2.5	3.5	4.5
R	1.6	2.3	3.4	4.7	7.9	11.5

(a) State the linear equation connecting P and R. **(1 mark)**

(b) Using a scale of 2cm rep. 0.1 units on the y-axis and 1cm rep. 0.1 units on the

x-axis; Draw a suitable line graph on the grid provided. **(5 marks)**



(c) From the graph you have drawn, estimate the values of;

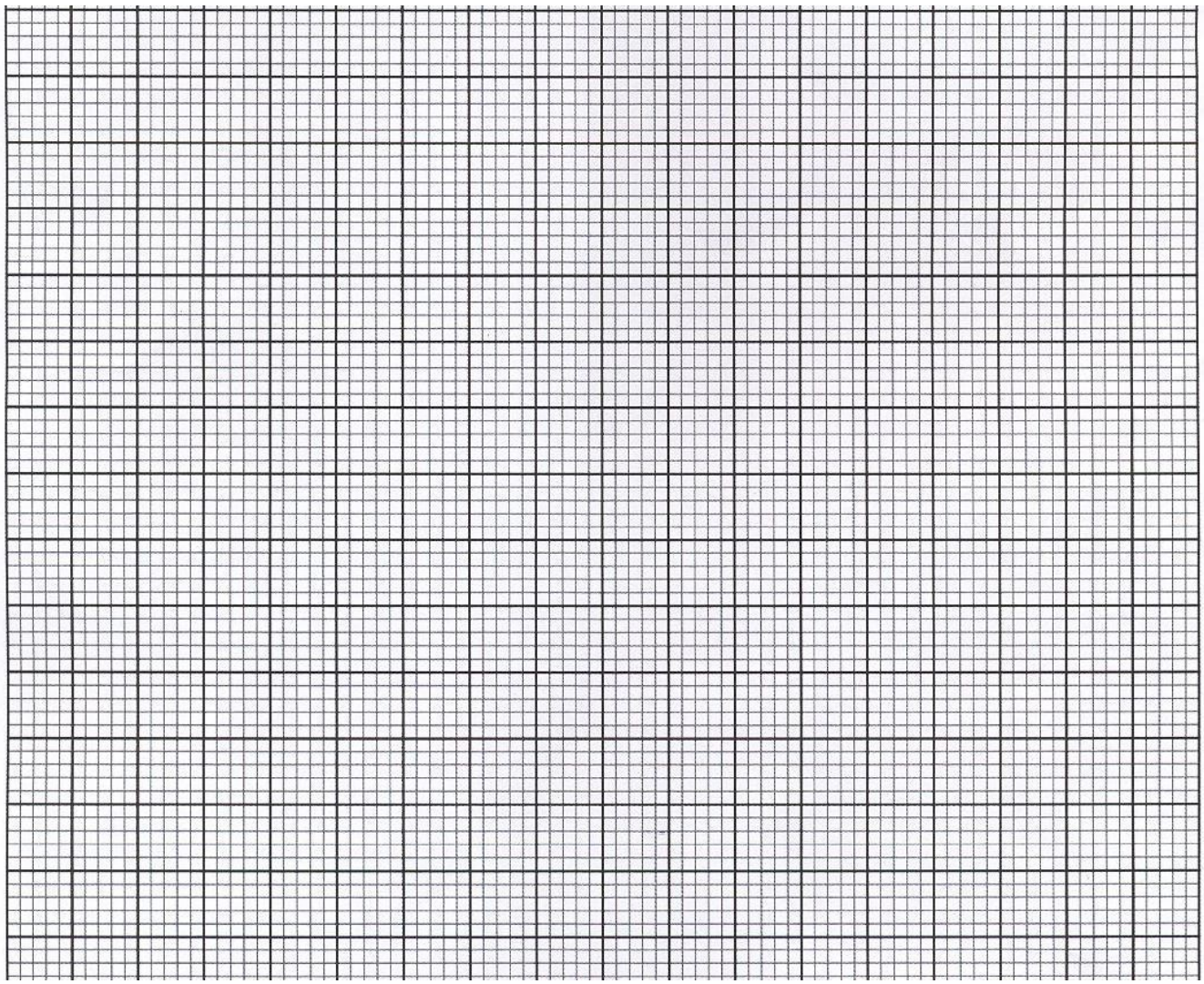
(i) n **(2 marks)**

(ii) k **(1 mark)**

(d) Find the linear law connecting P and R. **(1 mark)**

23. (a) Determine the stationary points of the curve; $y=x^3-3x^2-9x+2$ **(6 marks)**

(b) Sketch the given curve above. **(4 marks)**



24. The dimensions of a rectangular floor are such that:

- the length is greater than the width but utmost twice the width.
- the sum of width and length is more than 8m but less than 20m. If x represents the width and y the length.

(a) Write the inequalities to represent the above information. **(4 marks)**

(b) (i) Represent the inequalities on the grid below. **(4 marks)**

(ii) Using the integral values of x and y, find the maximum possible area of the floor.
(2 marks)