



GENIUS EXAM 2024

NAME..... ADM Number.....

Candidate's Class.....

121/1

MATHEMATICS

2 ½ hours

KCSE PREDICTION 2024

121/1

MATHEMATICS

JULY 2018

2 ½ hours

Instructions to Candidates

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. This paper consists of **TWO** sections: **Section I** and **Section II**.
4. Answer **ALL** the questions in **Section I** and **only five** questions from **Section II**.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.**
7. Marks may be given 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.
9. **This paper consists of 14 printed pages.**
10. **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

For examiner's 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
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Grand total

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SECTION 1 (50 MARKS)

Answer all questions in this section

1. Evaluate without using a calculator

$$\frac{1}{4} + \frac{1}{5} \div \frac{1}{2} \text{ of } \frac{1}{3}$$

$$\frac{1}{2} \text{ of } \left(\frac{4}{5} - \frac{3}{4} + \frac{1}{2} \right)$$

(3mks)

2. Simplify completely.

$$\frac{3a^2 + 5ab - 2b^2}{9a^2 - b^2}$$

(3mk)

3. Solve for x in the equation.

$$27^x \times 3^{(2x-2)} = 9^{(x+2)}$$

(3 marks)



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4. Given that $\sin \theta = \frac{2}{3}$ and θ is an acute angle, find without using tables or calculators

(a) $\tan \theta$, giving your answer in surd form. (2mks)

(b) $\cos (90^\circ - \theta)$ (1mk)

5. Four machines give out signals at intervals of 24, 27, 30 and 50 seconds respectively. At 5.00pm all the four machines gave out a signal simultaneously. Find the time this will happen again. (3mks)

6. 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. (3mks)

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7. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790 while in Kenya and converted the rest of the money into U.S dollars. Calculate the amount he received in U.S dollars. The exchange rates were as follows.

	Buying	Selling.	
US \$	65.20	69.10	
Sterling Pound (£)	123.40	131.80	(4mks)

8. A straight line through the points A (2,1) and B(4,n) is perpendicular to the line $3y+2x=5$. Determine the value of n and the equation. (4mks)

9. Determine the quartile deviation of the set of numbers below. (2mks)
- 8, 2, 3, 7, 5, 11, 2, 6, 9, 4



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10. Solve the equation $2\cos 2(x + 30^\circ) = 1$ for $0^\circ \leq x \leq 360^\circ$. (3 marks)

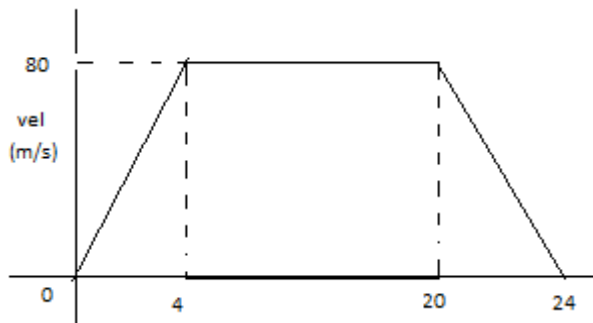
11. Without using tables or calculators, find the value of t in $\log_8(t + 5) - \log_8(t - 3) = \frac{2}{3}$ (3mks)

12. Solve for x : $3(x + 2) - \frac{20x - 5}{2} > 3\frac{1}{4}$ (3 mks)

13. Three years ago John was four times as old as his son Peter. In five years' time the sum of their ages will be 56. Find their present ages. (3mks)

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14. The figure below show a velocity time graph for a wagon.



(a) Find the total distance travelled by the wagon.

(2 marks)

(b) For how long did it maintain a constant speed?

(1mark)

15. The volumes of two similar solids are 800cm^3 and 2700cm^3 . If the surface area of the larger one is 2160cm^2 , find the surface area of the smaller figure. (3mks)



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16. A ball is in the shape of a sphere. It weighs 125g. The material used to make it has a density of 2.5g/cm^3 . What is the volume of the material to make a dozen such balls? (3 marks)



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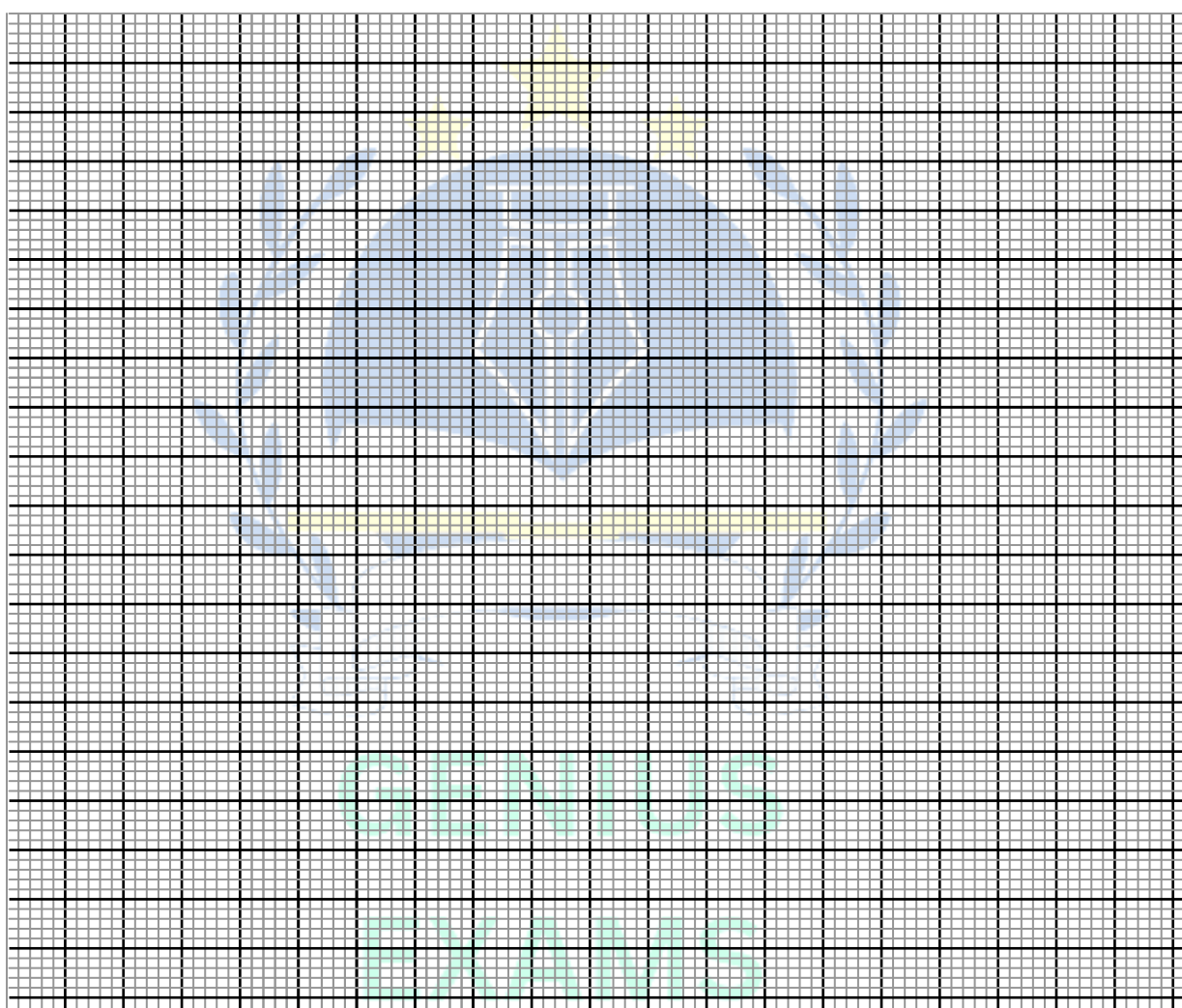
SECTION II (50 MARKS)

Answer any five questions in this section.

17. (a) Complete the table below for the equation $y = x^2 + 3x - 6$ given $-6 \leq x \leq 4$ (2mks)

x	-6	-5	-4	-3	-2	-1	0	1	2	3	4
y											

- (b) draw the graph of $y = x^2 + 3x - 6$ (3mks)



- (c) Use your graph to solve the quadratic equations.

(i) $x^2 + 3x - 6 = 0$

(2mks)



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(ii) $x^2 + 3x - 2 = 0$

(3mks)

18. 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:

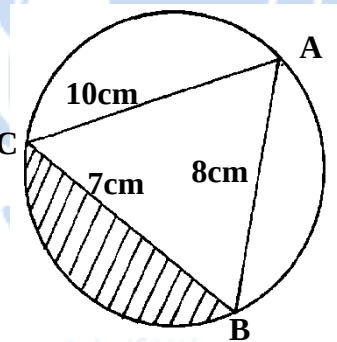
(i) The total amount of money received from the sales of hand bags that month.

(5 mks)

ii) The number of handbags sold that month.

(2 mks)

19. The figure below shows a triangle ABC inscribed in a circle. $AC = 10\text{cm}$, $BC = 7\text{cm}$ and $AB = 10\text{cm}$.



- (a) Find the size of angle BAC .

(2mks)

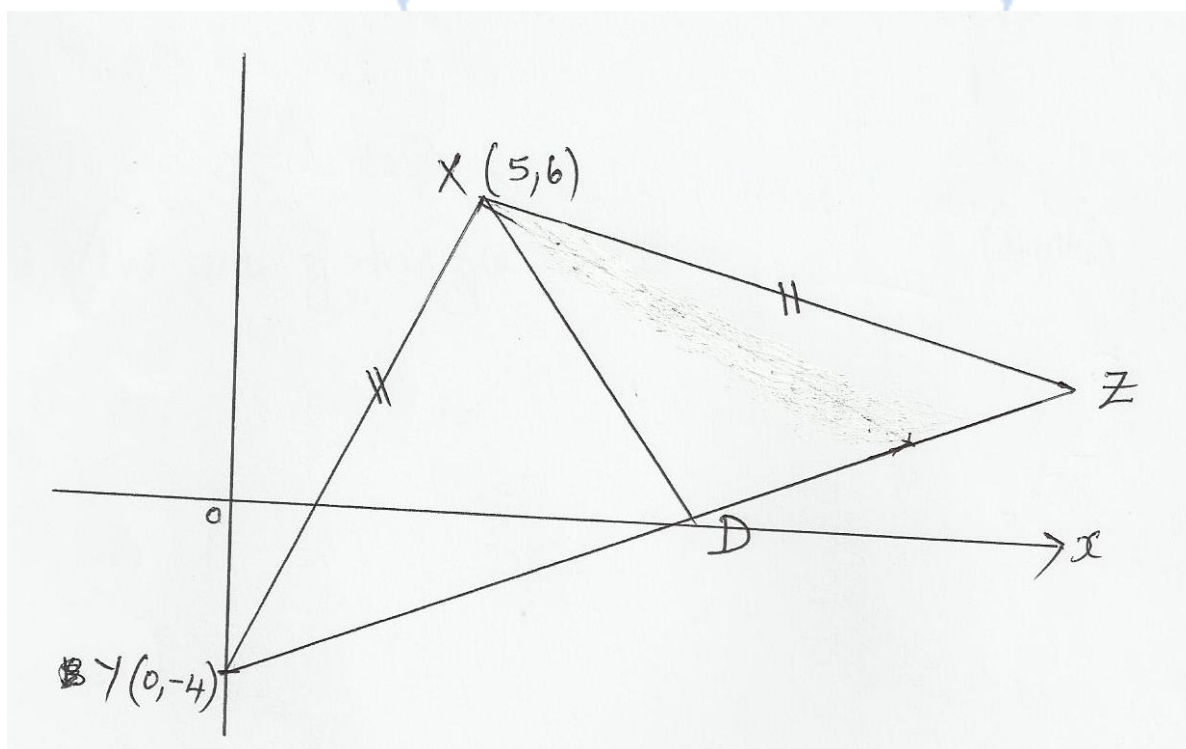
- (b) Find the radius of the circle.

(2mks)

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

(6mks)

20. The diagram below which is not drawn to scale, shows an isosceles triangle XYZ in which $XY = YZ$. The Coordinates of x and y are (5, 6) and (0, -4) respectively.



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Given that the equation of line YZ is $y = \frac{3}{4}x - 4$ and that the perpendicular from X to YZ meet YZ at D , find.

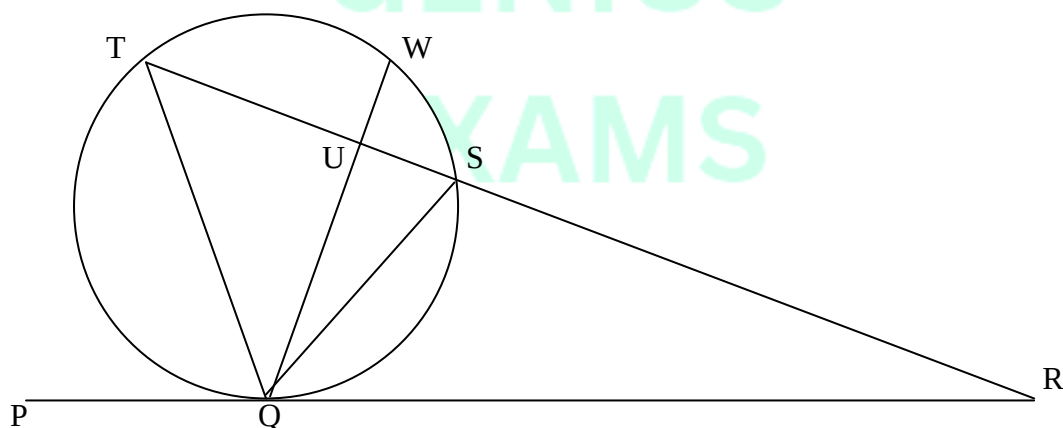
(i) The equation of XD (2 marks)

(ii) The coordinate of D (2 marks)

(iii) The coordinates of Z (2 marks)

(iv) The area of triangle XYZ (4 marks)

21. In the figure below, PQR is a tangent at Q and RST is a straight line. $\angle QTU = 50^\circ$, $\angle UTW = 33^\circ$ and $\angle TRQ = 25^\circ$



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Giving reasons in each case, calculate

(i) Angle TSQ

(3 marks)

(ii) Angle TSW

(3 marks)

(iii) Angle TUQ

(2 marks)

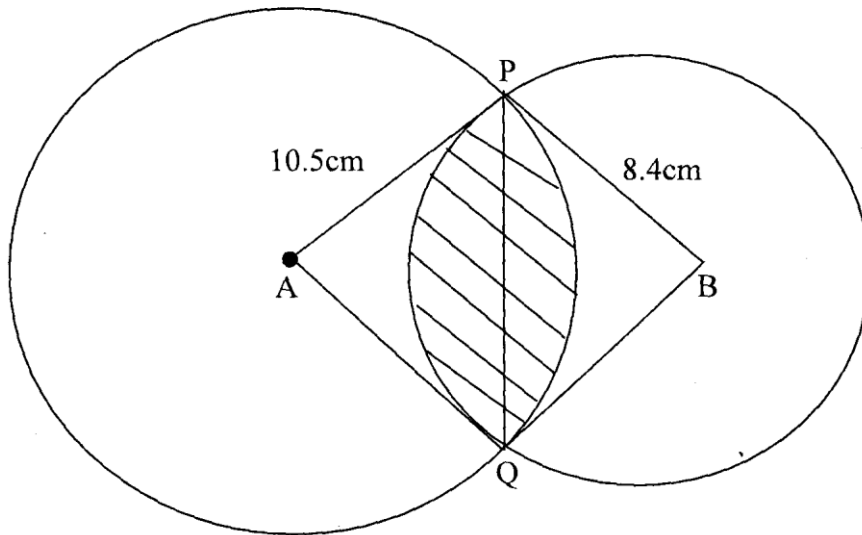
(iv) Angle PQW

(2 marks)



22. The figure below shows two circles of radii 10.5 and 8.4cm and with centres A and B respectively. The common chord PQ 9cm.

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- (a) Calculate angle PAQ. (2 mks)

- (b) Calculate angle PBQ. (2 mks)

- (c) Calculate the area of the shaded part. (6 mks)

23. A and B are two towns 360 kilometers apart. A bus left **A** at 8.00 am travelling at 60km/h for town **B**. After forty minutes, a saloon car left **A** travelling in the same direction as the bus at a speed of 80km/h.

a) How far from **B** did the saloon car catch up with the bus?

b) At what time did it catch up with the bus?

c) When the saloon caught up with the bus it got a break - down and had to be repaired before proceeding to **B** at the same speed. If they both reached **B** at the same time, find how long it took to repair the saloon?



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24. An arithmetic progression (AP) has the first term a and the common difference d .

- (a) Write down the third, ninth and twenty fifth terms of the AP in terms of a and d . (1mk)
- (b) The AP above is increasing and the third, ninth and twenty fifth terms form the first three consecutive terms of a Geometric Progression (G.P) The sum of the seventh and twice the sixth terms of the AP is 78. Calculate:-
- (i) the first term and common difference of the AP. (5mks)

- (ii) the sum of the first nine terms of the AP. (2mks)



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(iii) The difference between the fourth and the seventh terms of an increasing AP. (2mks)





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