

KENYA CERTIFICATE OF BASIC EDUCATION (K.C.B.E)

GRADE 10

CORE MATHEMATICS

ENDTERM 1

PATHWAY: S.T.E.M

Time: 2 Hours

COMPETENCY BASED EDUCATION

LEARNER'S DETAILS

Name: _____

School: _____

Assessment Number: _____ **Date:** _____

School Code: _____ **Signature:** _____

INSTRUCTIONS TO LEARNERS

1. Write your name, school, assessment number, date, school code and then sign.
2. Answer all questions provided.
3. Show all your working properly.
4. Use mathematical tables or a calculator where necessary.

-CORE MATHEMATICS-

-003-

-Senior

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
Marks	3	3	3	3	10	10	7	10	7	3	3	3	4	3	4	4	3	3	10	10	10	100
Learner's Score																						
Performance Level																						

DESCRIPTION	SCORE
TOTAL SCORE	100
LEARNER'S SCORE	
PERFORMANCE LEVEL	

Level	Level	% Range	Points	Learner's score
Exceeding (EE)	EE1	90–100%	8	
	EE2	75–89%	7	
Meeting (ME)	ME1	58–74%	6	
	ME2	41–57%	5	
Approaching (AE)	AE1	31–40%	4	
	AE2	21–30%	3	
Below (BE)	BE1	11–20%	2	
	BE2	1–10%	1	

CORE MATHEMATICS: (100 Marks)

Answer all questions provided in this assessment paper.

1. Solve for x: $2^{x-3} \times 8^{x^2+2} = 128$ (3 marks)

2. Use logarithms to evaluate $3 \sqrt{\frac{1.23 \times 0.0468}{0.7782}}$ (3 mks)

3. Evaluate without using tables.
 $\log(3x+8) - 3 \log 2 = \log(x-4)$ (3mks)

4. A classroom measures $(x+2)$ m by $(x-5)$ m. If the area of the classroom is 60m^2 . Find its dimensions. (3mks)

5. Three solids, a cylinder, a sphere and a cone, are such that their radii are equal. It is also given that their surface areas are the equal. If the volume of the sphere is 904.9cm^3 . Find the volume of;(Give your answers to 4 s.f)

a) The cylinder (4 mks)

b) The cone. (4mks)

6. (a) A small field was surveyed and the measurements recorded in the surveyor's field book as in the table below. (AF=100M)

		F	
E	30	65	
		50	40 D
C	20	30	
		20	25 B
		A	

- (i) Using a scale of 1cm to 10m , make an accurate drawing of the map of the field. (4mks)

- (ii) Find the area of the field. (3mks)

b) Assuming that the baseline used in (a) runs in a northerly direction, give the position of D, relative to A, using bearing and distance. (3mks)

7. The heights of trees seedlings in a nursery were measured and recorded as in the table below.

Height x cm	0-5	6-15	16-25	26-45	46-75
No of seedlings	7	46	71	64	11

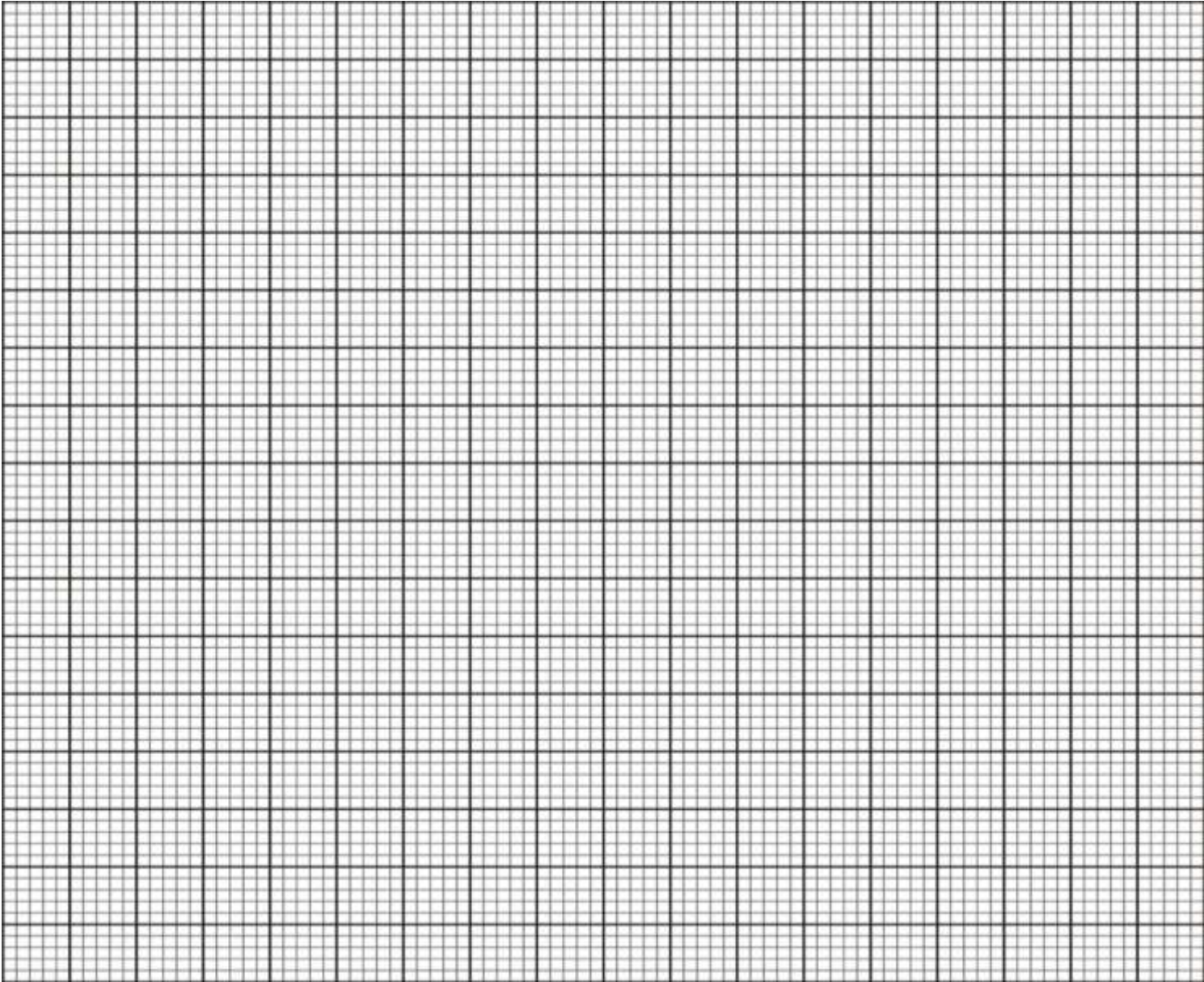
(a) Calculate the mean height. (4 mks)

(b) Using a scale of 1cm to represent 5 units along the horizontal axis, and a scale of 2cm to represent 5 units along the vertical axis, draw a histogram to represent the distribution. (3mks)

8. (a) Complete the table below for the equation $y=x^2+3x-6$ given $-6\leq x\leq 4$. (5 marks)

X	-6	-5	-4	-3	-2	-1	0	1	2	3	4
Y	12			-6			-6				22

(b) using a scale of 1cm to represent 2 units in both axes draw the graph of $y=x^2+3x-6$.



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

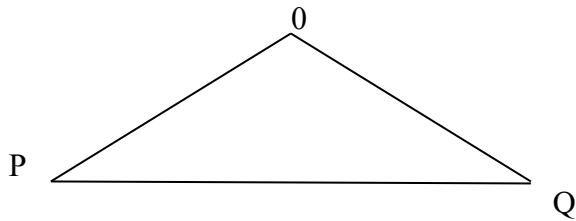
(i) $X^2+3x-6=0$

(2mks)

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

(3mks)

9. (a) In the figure below O is the centre of the circle whose radius is 6cm and PQ is 9cm.



Calculate the area of major segment.

(4mks)

(a) Find the area of a triangle ABC with sides 7cm, 9cm and 11cm long.

(3mks)

10. A man withdrew some money from a bank. He spent $\frac{3}{10}$ of the money on his daughter's school fees and $\frac{3}{5}$ of the remainder on his son's school fees. If he remained with Ksh 10 500, calculate the amount of money he spent on son's school fees. (3 marks)

11. Solve for x (3 marks)
- $$9^{(x+1)} + 3^{(2x+1)} = 108$$

12. The volume of two similar solid spheres are 4752 cm^3 and 1408 cm^3 . If the surface area of the smaller sphere is 352 cm^2 , find the surface area of the larger sphere. (3 marks)

13. When a given length of a piece of wire is divided into pieces measuring 20 cm or 24 cm or 26 cm or 28 cm, a piece of wire 7cm always remained. Find the length of wire. (4 marks)

14. Solve the equation $6x^2 - 13x + 6 = 0$ using the completing the square method. (3 marks)

15. Using a ruler and a pair of compasses only, construct a trapezium ABCD in which $AB = 5\text{ cm}$, $AD = 6\text{ cm}$, $DC = 10\text{ cm}$, $\angle BAD = 105^\circ$ and AB is parallel to DC. Draw a perpendicular from B to DC hence measure the height of the trapezium. (4 marks)

16. Two friends Ojwang and David live 40 km apart. One day Ojwang left his house at 9.00 a.m. and cycled towards David's house at an average speed of 15 km/h. David left his house at 10.30 a.m. on the same day and cycled towards Ojwang's house at an average speed of 25 km/h. Determine;

i. The time taken before the two friends met. (3 marks)

ii. The time they met. (1 mark)

17. Simplify completely; $\frac{(m+5n)^2+(m-5n)^2}{3m^2+75n^2}$ (3 marks)

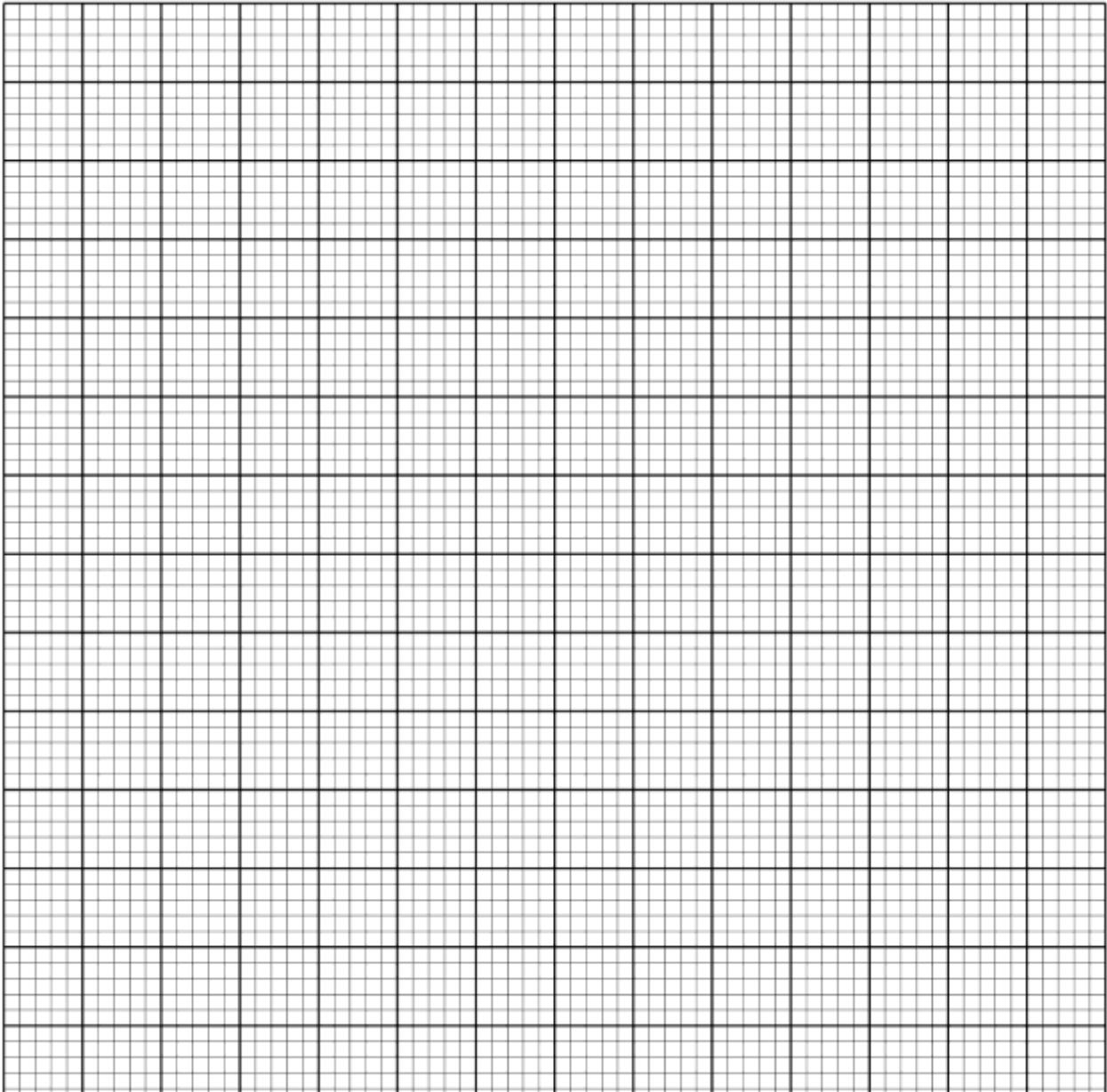
18. Use logarithms to evaluate.

$$\frac{39.51 \times 614}{0.758}$$

(3 marks)

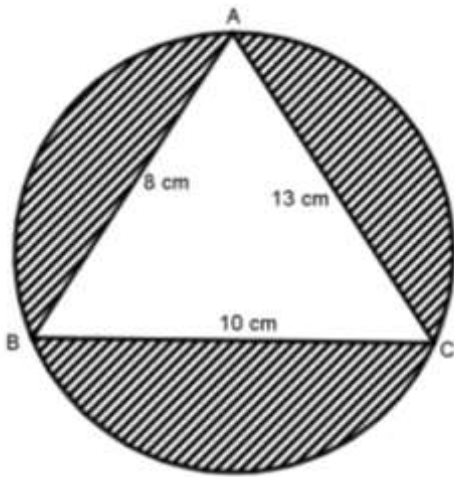
19. The vertices of a triangle ABC are A(1,1), B(4,1) and C(6,4)

a) On the grid below, draw the triangles.



- i. ABC. (1 mark)
 - ii. $A'B'C'$, the image of triangle ABC under a negative quarter turn about the origin. (2 marks)
 - iii. $A''B''C''$, the image of triangle $A'B'C'$, under reflection in the line $y = x$. (2 marks)
- b) Triangle $A'''B'''C'''$, with vertices $A'''(-1, -5)$, $B'''(-4, -5)$ and $C'''(-6, -2)$, is the image of, triangle $A''B''C''$, under a transformation **T**.
- i. Draw the triangle $A'''B'''C'''$, (1 mark)
 - ii. Describe fully the transformation **T**. (2 marks)
- c) State **any** pair of triangles which are:
- i. Directly congruent. (1 mark)
 - ii. Oppositely congruent. (1 mark)

20. The figure below shows a triangle inside a circle. $AB = 8\text{ cm}$, $BC = 10\text{ cm}$ and $AC = 13\text{ cm}$



Calculate

- (a) The area of triangle ABC. (3 marks)

(b) Angle BAC

(2 marks)

(c) The radius of the circle.

(2 marks)

(d) Area of the shaded region.

(3 marks)

21. A construction company makes concrete by mixing cement, sand and ballast such that the ratio of cement to sand is 1:2 and that of sand to ballast is 3:4.

a) Determine:

i. The ratio of cement to ballast in the concrete.

(2 marks)

ii. The number of bags of ballast required to make a concrete with 27 bags of sand.
(2 marks)

b) The cost of a bag of cement, sand and ballast is Ksh 680, Ksh 136 and Ksh 102 respectively. Calculate the cost of one bag of concrete.
(2 marks)

- c) The construction company requires to transport 30 tonnes of sand to a site using a tractor. The tractor carries a maximum of 3 600 kg of sand and costs Ksh 8 000 per trip. Calculate the least amount of money required to transport the sand to the site. (4 marks)

THE 47 COUNTIES C1 SCHOOLS' JOINT NATIONAL SBA ASSESSEMENT

SENIOR SCHOOL ASSESSMENT

TERM 2: MIDTERM ASSESSMENT 2026

GRADE 10 – CORE MATHEMATICS 006 JUNE

Time: 2 Hours

LEARNER'S DETAILS

Name: _____ **School:** _____

Assessment Number: _____ **Date:** _____

School Code: _____ **Signature:** _____

INSTRUCTIONS TO CANDIDATES

1. Write your name in the spaces provided above.
2. Write the name of your school and your stream.
3. Write your admission number and date.
4. This paper consists of two sections: A and B.
5. Answer all questions.
6. Show your working clearly.
7. All answers must be written in the spaces provided.
8. Do NOT remove any page.

FOR OFFICIAL USE ONLY (EXAMINER'S USE)

SECTION	SECTION A	SECTION B	% SCORE	EE1	EE2	ME1	ME2	AE1	AE2	BE1	BE2
SCORE RANGE	30 MARKS	50 MARKS		90-100	75-89	58-74	41-57	31-40	21-30	11-20	1-10
POINTS				8 POINTS	7 POINTS	6 POINTS	5 POINTS	4 POINTS	3 POINTS	2 POINTS	1 POINT
LEARNER'S TOTAL SCORE											

SECTION A (30 MARKS)

Answer ALL questions in this section.

1. a) Categorize the following set of numbers into rational and irrational numbers: (2 marks)

$$\{\sqrt{9}, 0.333\dots, \pi, \sqrt{12}, -4, \frac{2}{7}, 1.414\}.$$

rational numbers	irrational numbers

- b) Farmer John counted 25 composite numbers among his first 100 goats. If he considers goats numbered with prime numbers to be the healthiest, how many 'unhealthy' goats (excluding number 1) does he have in the first 100? (2 marks)

2. Using mathematical tables, find the reciprocal of 0.004278. Hence, evaluate: (3 marks)

$$\frac{5}{0.004278} - 2.15 \times 10^2$$

3. A bacterial culture doubles in number every hour. If the initial number of bacteria is 2^3 , find:

- a) The number of bacteria after 5 hours, leaving your answer in index form. (1 mark)

b) Solve for x in the equation: (2 marks)

$$3^{2x-1} \times 81^x = 243.$$

4. Given that $\log_{10}2 = 0.3010$ and $\log_{10}3 = 0.4771$, evaluate the following without using mathematical tables:

a) $\log_{10}18$ (2 marks)

b) $\log_{10}\sqrt{0.6}$ (2 marks)

5. a) Expand and simplify the expression:

$$(3x - 2y)(x + 4y) - (2x - y)^2.$$

(2 marks)

b) Factorize completely the quadratic expression:

$$4p^2 - 12pq + 9q^2.$$

(2 marks)

6. A rectangular piece of land has a length that is 5 meters more than its width. If the area of the land is 150 square meters, form a quadratic equation representing this information. (Let the width be x meters).

(2 marks)

7. Solve the following quadratic equations by factorization:

a)

$$x^2 - 7x + 12 = 0$$

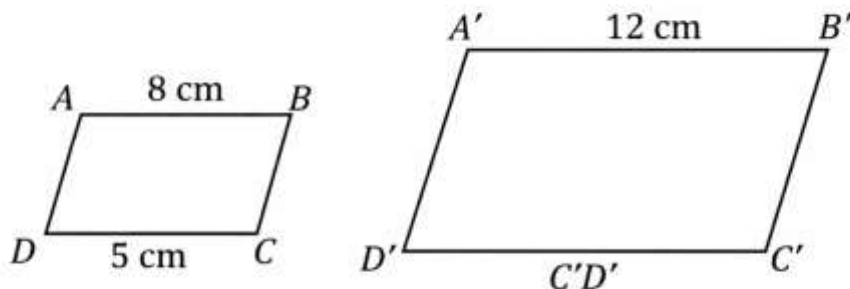
(2 marks)

b)

$$3x^2 + 11x - 4 = 0$$

(2 marks)

8. The diagram below shows two mathematically similar shapes. If the side length AB is 8 cm and the corresponding side $A'B'$ is 12 cm, calculate the linear scale factor of enlargement from $ABCD$ to $A'B'C'D'$. If $CD = 5$ cm, find $C'D'$. (3 marks)



9. State the number of lines of symmetry and the order of rotational symmetry for the following plane figures:

a) A square (1 mark)

b) A parallelogram (1 mark)

SECTION B (50 MARKS)

(Answer ANY FOUR questions in this section)

10. a) Simplify:

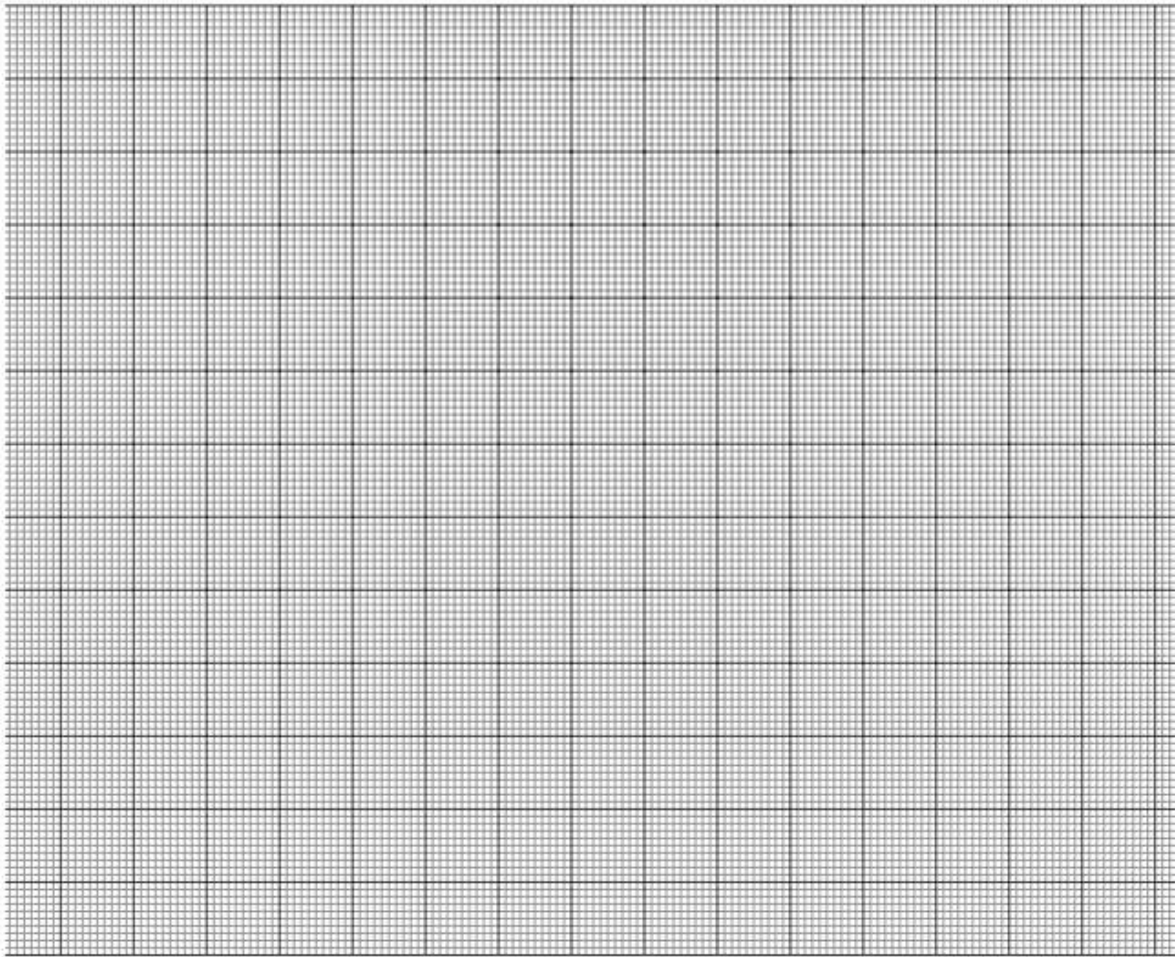
$$\frac{(2^{n+1} \times 8^{n-1})}{4^{2n}}$$

(4 marks)

b) Solve the equation: (3 marks)

$$\log_{10}(x^2 - 3x) = \log_{10}4$$

c) On a graph, triangle ABC has coordinates A(2,2), B(4,4), C(6,2).
Find the coordinates after enlargement scale factor 2 about centre (1,1). (3 marks)



11. Two buses, A and B, start at the same time from two towns, Nakuru and Nairobi, which are 160 km apart. Bus A travels from Nakuru to Nairobi at an average speed of v km/h. Bus B travels from Nairobi to Nakuru at an average speed which is 10 km/h slower than bus A's speed.

a) Write expressions in terms of v for the time taken by each bus to complete the journey. (2 marks)

b) The journey for bus B took 20 minutes longer than the journey for bus A. Form a quadratic equation in v to represent this information. (3 marks)

c) Solve the quadratic equation by factorization and determine the speed of bus A. (3 marks)

d) Find the speed of bus B. (2 marks)

12. A cylinder-shaped water tank has a diameter of 2 meters and a height of 3 meters. A second cylinder, which is mathematically similar to the first one, has a diameter of 3 meters.

a) Find the linear scale factor of enlargement from the first cylinder to the second. (2 marks)

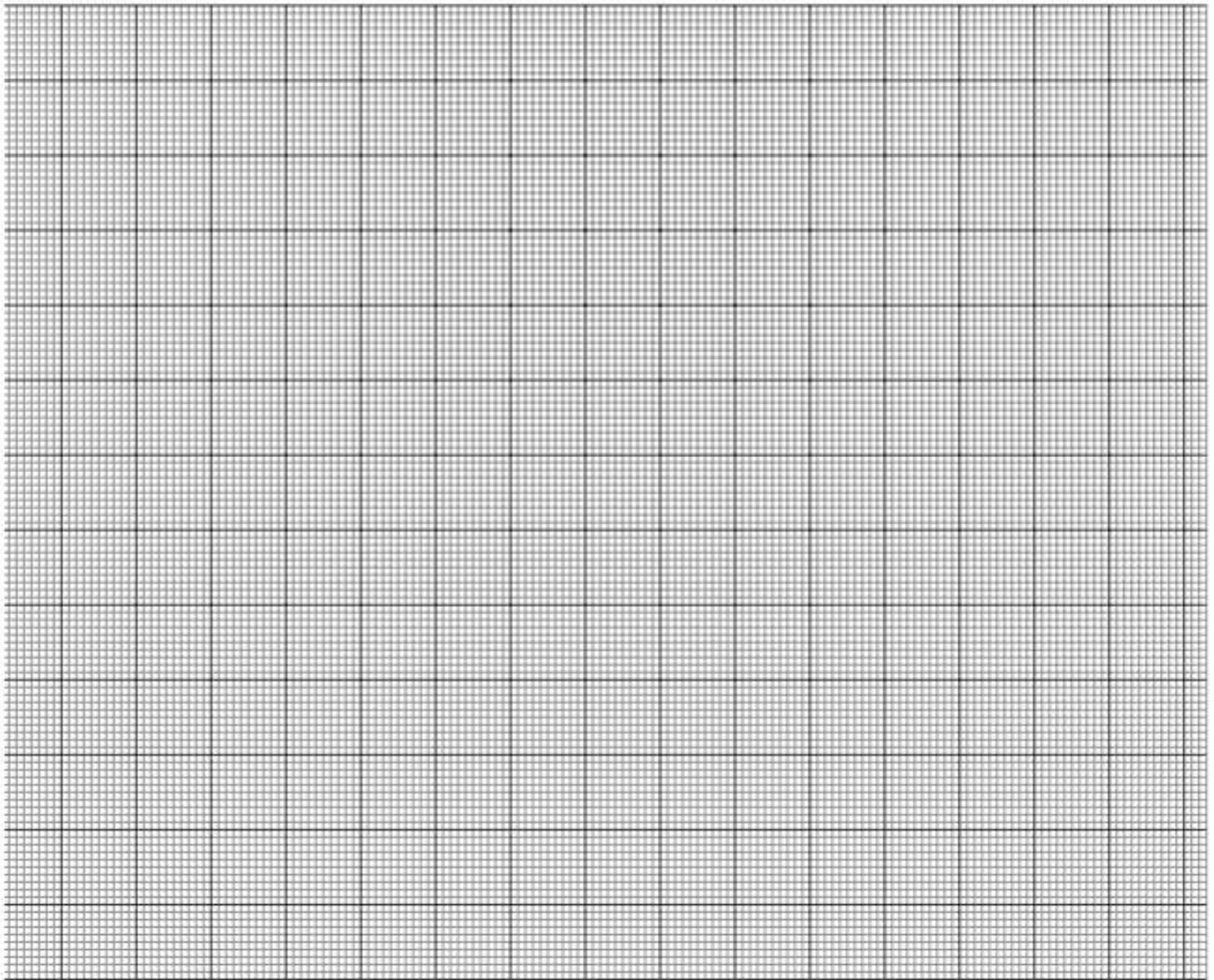
b) Calculate the volume of the first cylinder. (Take $\pi = \frac{22}{7}$) (2 marks)

c) Use the volume scale factor to find the volume of the second cylinder. (3 marks)

d) If it costs KSh 5,000 to paint the curved surface area of the first cylinder, find the cost of painting the curved surface area of the second cylinder, assuming the cost per unit area is the same. (3 marks)

13. The vertices of a triangle PQR are $P(2,1)$, $Q(5,1)$, and $R(2,4)$.

a) Plot triangle PQR on the grid provided. (2 marks)



b) Find the coordinates of the image $P'Q'R'$ when PQR is reflected in the x-axis. (3 marks)

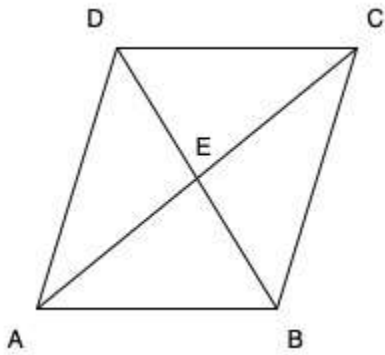
c) The image of triangle PQR under another reflection is $P''(1,2)$, $Q''(1,5)$, and $R''(4,2)$.

i) Plot $P''Q''R''$ on the same grid. (1 mark)

ii) Describe fully this reflection, including the equation of the mirror line. (2 marks)

d) Determine the line of symmetry for the combined shape formed by PQR and its image $P''Q''R''$. (2 marks)

14. The figure below shows a rhombus $ABCD$. The diagonals AC and BD intersect at point E .



- a) State two pairs of congruent triangles formed in the rhombus and give a reason for each. (3 marks)
- b) If $AC = 16$ cm and $BD = 12$ cm:
- i) Calculate the length of side AB . (3 marks)
- ii) Find the area of triangle ABE . (2 marks)
- iii) Show that the area of triangle ADE is equal to the area of triangle CBE . (2 marks)

GRADE 10 INTER C1 SENIOR SCHOOLS END OF YEAR EXAMINATIONS

KENYA CERTIFICATE OF BASIC EDUCATION

SENIOR SCHOOL ASSESSMENT

TERM 3: ENDTERM ASSESSMENT 2026

GRADE 10 – CORE MATHEMATICS

Time: 2 Hours

LEARNER'S DETAILS

Name: _____ . School: _____ .

Assessment Number: _____ . Date: _____ .

School Code: _____ . Signature: _____ .

INSTRUCTIONS TO CANDIDATES

1. Write your full name in the space provided above.
2. Indicate your school, stream, admission number, and date clearly.
3. This paper has **TWO sections: A and B**.
4. Attempt **ALL questions** in both sections.
5. Show all working clearly where necessary.
6. Write all answers in the spaces provided.
7. Do NOT remove any page from this paper.

FOR OFFICIAL USE ONLY (EXAMINER'S USE)

SECTION	SECTION A	SECTION B	% SCORE	EE1	EE2	ME1	ME2	AE1	AE2	BE1	BE2
SCORE RANGE	30 MARKS	50 MARKS		90-100	75-89	58-74	41-57	31-40	21-30	11-20	1-10
POINTS				8 POINTS	7 POINTS	6 POINTS	5 POINTS	4 POINTS	3 POINTS	2 POINTS	1 POINT
LEARNER'S TOTAL SCORE											

SECTION A (30 MARKS)

Answer ALL questions in this section.

- 1. Use logarithm tables to evaluate, correct to 4 significant figures:**

$$\frac{1.24 \times 10^{-1.0456}}{3.82}$$

- 2. Solve for x in the index equation: $8^{x-1} \times 4^{2x+1} = 32^x$**

- 3. Triangle ABC has side lengths $AB = 7$ cm, $BC = 9$ cm and $\angle ABC = 120^\circ$.**

Calculate the **exact area** of the triangle, leaving your answer in the form $a\sqrt{b}$ where a and b are rational numbers.

- 4. An annular metal washer has an outer radius of 8.4 cm and an inner radius of 5.6 cm.**

Taking $\pi = \frac{22}{7}$, calculate the **surface area of one face** of the washer.

5. The position vectors of points P and Q , relative to the origin, are $p = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and $q = \begin{pmatrix} -5 \\ 4 \end{pmatrix}$ respectively.

Find the magnitude of the vector $\overrightarrow{PQ}$, leaving your answer in **simplified surd form**.

6. A particle accelerates uniformly from rest and covers a displacement of 180 m in 12 seconds along a straight line.

Determine its velocity at the end of the **12 seconds**.

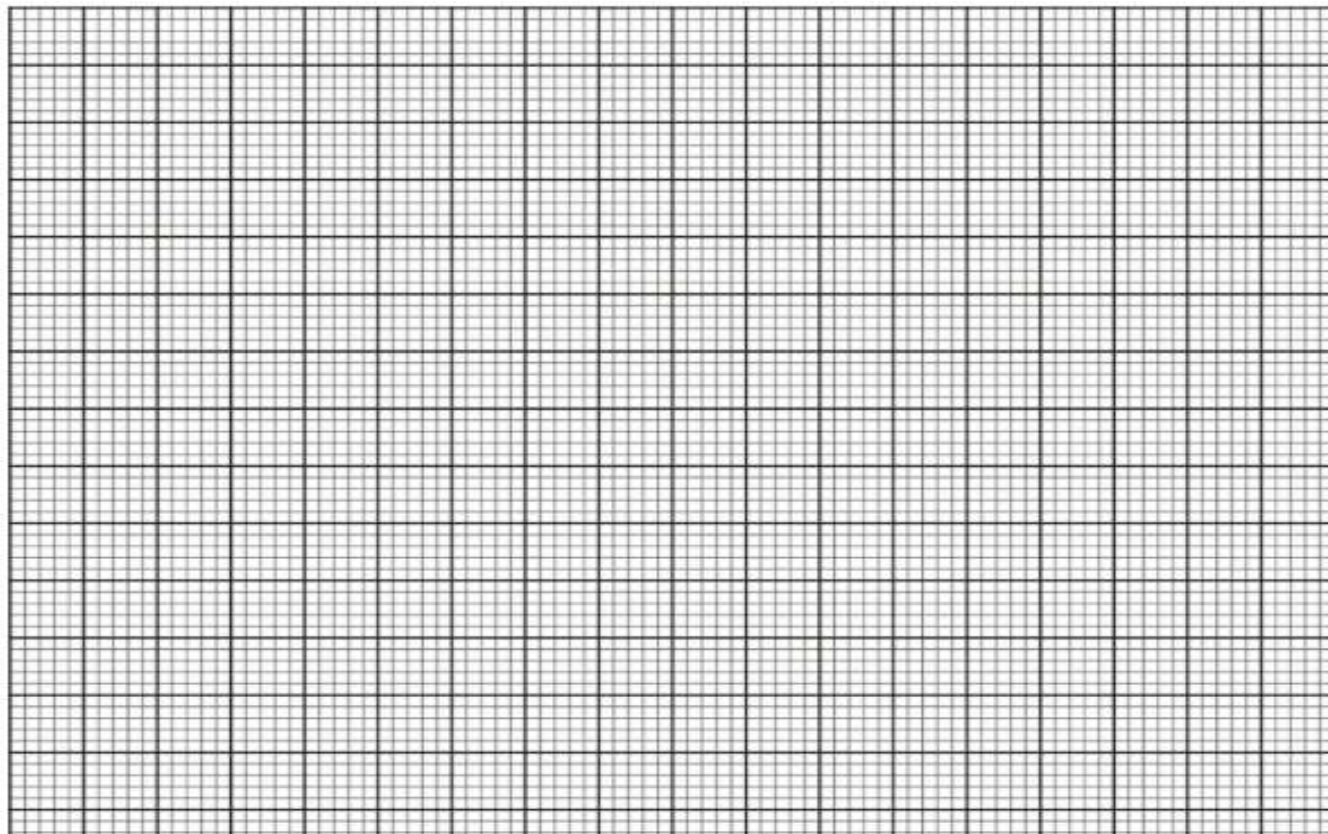
7. A quadrilateral $ABCD$ has side lengths

$AB = 6$ cm, $BC = 8$ cm, $CD = 10$ cm, $DA = 12$ cm, and diagonal $AC = 10$ cm.

Calculate the area of quadrilateral $ABCD$, correct to **2 decimal places**, using **Heron's formula** for each triangular component.

8. Point $A'(2, -5)$ is the image of $A(-4, 3)$ under a reflection across line L .

(a) Find the coordinates of the midpoint of AA' .



(b) Determine the equation of the mirror line L in the form

$$y = mx + c.$$

9. A bag contains 4 red balls and 6 blue balls.

Two balls are picked at random, one after another, **without replacement**.

(a) Draw a tree diagram to represent this experiment.

(b) Calculate the probability that **at least one red ball** is selected.

SECTION B (50 MARKS)

Answer ALL questions in this section.

10. A sector of a circle with radius $r = 12$ cm subtends an angle of $\theta = 105^\circ$ at the centre O . Points A and B lie on the arc such that $OA = OB = 12$ cm.

(a) Calculate the area of the sector OAB .

Take $\pi = 3.142$. [2 Marks]

(b) Calculate the area of triangle OAB . [3 Marks]

(c) Determine the area of the minor segment bounded by the chord AB and the arc AB . [2 Marks]

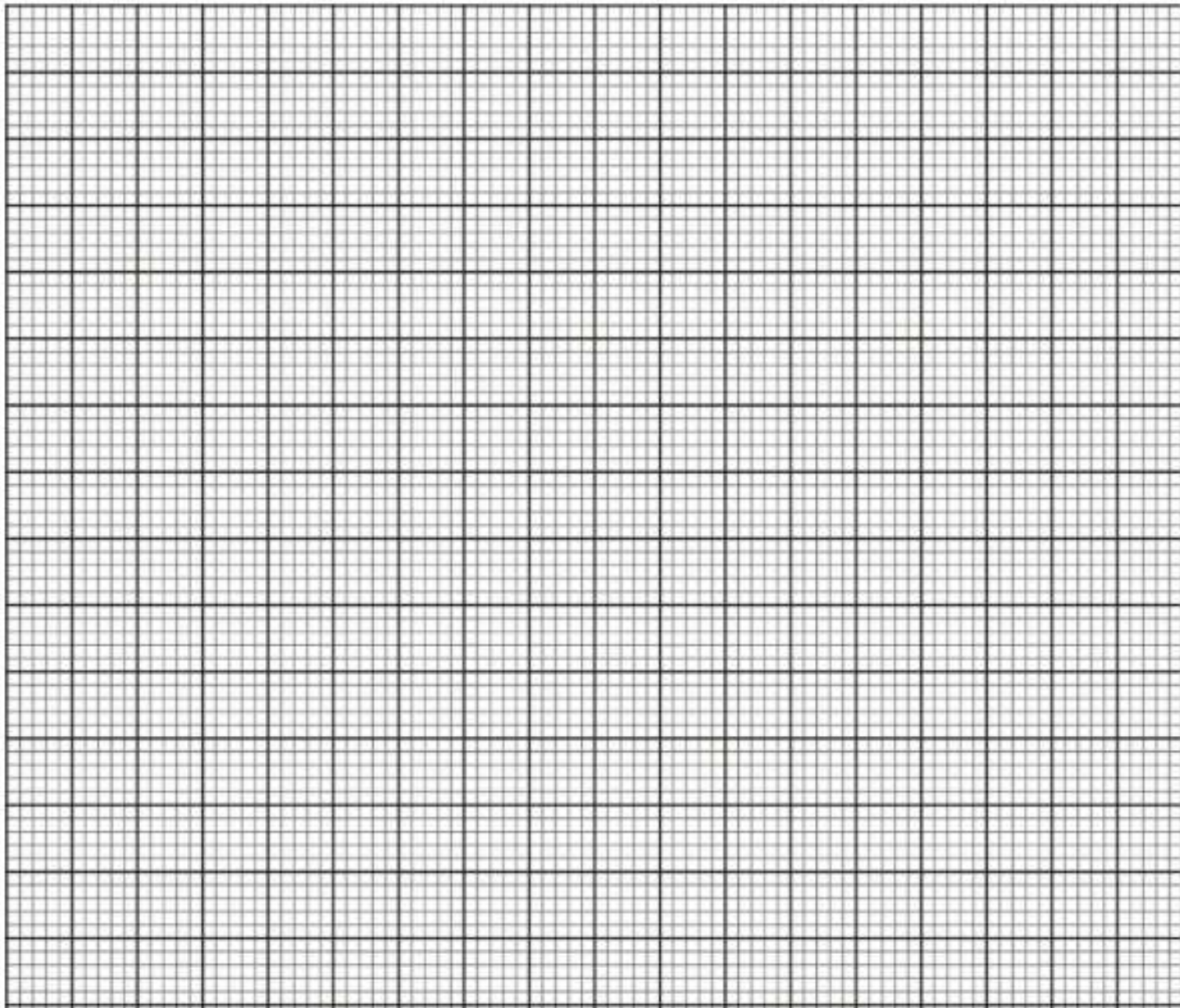
(d) A concentric inner circle creates an annulus of width 3 cm within the main circle.

Calculate the area of the annular sector formed between the same radial lines OA and OB . [3 Marks]

11. Triangle PQR has vertices $P(1, 2)$, $Q(4, 2)$, $R(3, 5)$.

(a) Triangle PQR undergoes an enlargement with centre $C(0,0)$ and linear scale factor $k = -2$ to form image $P'Q'R'$.

State the coordinates of P' , Q' , and R' . **[3 Marks]**



(b) Triangle $P'Q'R'$ is then rotated through $+90^\circ$ about the origin $(0,0)$ to map onto triangle $P''Q''R''$.

Determine the coordinates of P'' , Q'' , and R'' . **[3 Marks]**

12. Two cars, X and Y , start moving along a straight highway from town A towards town B , which is 240 km away. Car X leaves at 08:00 AM, travelling at a constant speed of 60 km/h. Car Y leaves town A at 08:30 AM, travelling at a constant speed of 80 km/h.

(a) Express the distance covered by each car as a function of time t , in hours, after 08:00 AM. [2 Marks]

(b) Calculate the time of day when Car Y overtakes Car X . [3 Marks]

(c) How far from town A does the overtaking take place? [2 Marks]

(d) If Car X experiences a breakdown immediately upon being overtaken and delays for **30 minutes** before continuing at 90 km/h, determine which car arrives at town B first and by how many minutes. **[3 Marks]**

13. The vector positions of three towns A , B , and C are given relative to an airfield O .

The vectors $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

Point C lies on AB such that $AC:CB = 2:3$.

Point M is the midpoint of OA .

(a) Express the vectors $\overrightarrow{AB}$ and $\overrightarrow{OC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. **[3 Marks]**

(b) Express the vector $\overrightarrow{MC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. **[2 Marks]**

(c) Line MC is produced to point N such that $\overrightarrow{MN} = k\overrightarrow{MC}$, and $\overrightarrow{BN} = h\mathbf{a}$,

where k and h are scalars. Show that $\overrightarrow{ON}$ can be expressed in **two different ways** and find the values of k and h . [4 Marks]

(d) Deduce the ratio in which point C divides MN . [1 Mark]

14. The frequency distribution table below shows the distribution of marks scored by Grade 10 students in an end-of-term mathematics test.

Marks Class	Frequency f
30–39	4
40–49	8
50–59	14
60–69	12
70–79	8
80–89	4

(a) State the **modal class** and calculate the **estimated mean mark** for the distribution. [4 Marks]

(b) Calculate the **median mark** using the interpolation method. **[3 Marks]**

(c) If two students are selected at random from the class, calculate the probability that **both scored 60 marks or above**.

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