GOLDLITE ONLINE SUPPLIES

KCSE NATIONAL SCHOOLS TRIALS AND JOINT SERIES 2025

MATHEMATICS PAPER 1

KABARAK HIGH
ALLIANCE BOYS
ALLIANCE GIRLS
ASUMBI GIRLS
KISII SCHOOL
KENYA HIGH
MANGU SCHOOL
MARANDA SCHOOL
MASENO SCHOOL
MERU SCHOOL
MOKASA JOINT 1
STAREHE GIRLS
STAREHE BOYS
LENANA SCHOOL
MOI GIRLS ELDORET
NAIROBI SCHOOL
FRIENDS SCHOOL KAMUSINGA

These exams have been compiled from recently done national schools' trials and joint series

KNEC COMPLIANT

GOLDLITE ONLINE SUPPLIES

Kenya Certificate of Secondary Education

KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

MOI HIGH SCHOOL KABARAK (MOKASA 1)

Kenya Certificate of Secondary Education

121/1 - MATHEMATICS - Paper 1

$2\frac{1}{2}$ *Hours*

Name……Adm……Class…….

School……Signature……Date……

Instructions to Candidates

(a) Write your name and Admission number in the spaces provided above.
*(b) This paper consists of two sections: **Section I** and **Section II**.*
*(c) Answer **ALL** questions in **section I** and **ANY** five questions in **section II**.*
(d) All answers and workings must be written on the question paper in the spaces provided below each question.
*(e) **Show all the steps in your calculation, giving your answer at each stage in the spaces below each question**.*
(f) Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

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

Grand Total

SECTION I (50 MARKS)

Answer **ALL** questions in this section

1. Without using a calculator, evaluate; (3 marks)

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

2. Solve for x in the equation. (3 marks)

$2^{(2x-1)} \times 16^{(2x-1)} = 1$

3. A metallic solid cone has a base radius of 6.4 cm and slant height 15.8 cm. If the density of the metal is 7.9 g/cm^3, calculate its mass in kg.(Take $\pi=\frac{22}{7}$) (3 marks)

4. Members of a group decided to raise K£100 towards a charity by contributing equal amount. Five of them were unable to contribute. The rest had, therefore, to pay K£1 more each to raise the same amount. How many members were in the group originally? (3 marks)

5. The LCM of three numbers is 1512 and their GCD IS 6. If two of the numbers are 54 and 72, find the least third possible number. (3 marks)

6. The exterior angle of a regular polygon is equal to one-third of interior angle. Calculate the number of sides of the polygon. (3 marks)

7. Find the reciprocal of 2.234.Hence use tables to evaluate $\left(\frac{5}{2.234}\right)^3$ to 4 significant figures

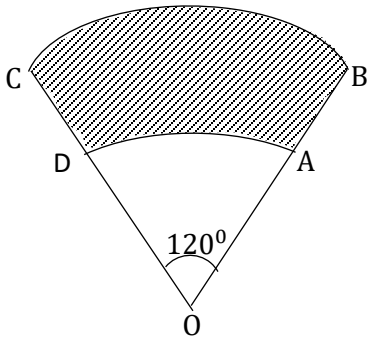
(3 marks)

8. The image of A (-2,5) under a transformation T is A' (2,2) B' (9, -5) is the image of B under the same translation T determine the coordinates of B. (3 marks)

9. Six men take 28 days working for 10 hours a day to pack 4480 parcels. How many more men working 8 hours a day will be required to pack 2560 parcels in 4 days. (3 marks)

10. From a point A, the student observed the angle of elevation to the top of the building to be 30^0, after walking from point A to point B 20m towards the foot of the building in an horizontal ground, he observed the angle of depression from the top of the building to be 72^0, find the height of the building correct to 2 decimal places. (4 marks)

11. A windscreen wiper of a car sweeps through an angle of 120^0. The shaded region in the figure below represents the area swept clean by the blade of the wiper AB. If OA = 14cm and OB = 21cm. Taking л = $\frac{22}{7}$, find the area of the glass swept clean to 1d.p (3 marks)



12. Use matrix method to solve the equation; $\begin{matrix} 4x - 5y = 13 \\ -2y + 3x = 8 \end{matrix}$ (4 marks)

13. Simplify completely. (3 marks)

$$\frac{3x^2 - 48}{3x^2 - 24x + 48}$$

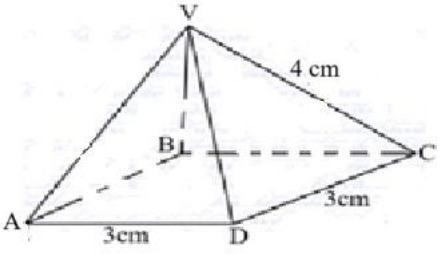
14. Use a ruler and a pair of compasses only to construct a triangle ABC in which AB = 4.3cm, BC = 3.9cm and angle ABC is 135^0. Measure AC. (3 marks)

15. A Kenyan bank bought and sold foreign currencies on two different days as shown below.

		Buying (In Ksh)	**Selling (In Ksh)**
12/28/2024	1 Sterling pound (£)	130.10	130.54
12/29/2024	South African Rand	9.52	9.58

A businessman arrived in Kenya on 12/28/2024 with £ 50000 Sterling pound. He changed the whole amount to Kenya shillings. While in Kenya, he spent 80% of the money and changed the balance to South African Rand before leaving for South Africa on 12/29/2024. Determine, to the nearest Rand, the amount he obtained. (3 marks)

16. The figure below shows a solid square based pyramid, draw a net of the solid (3 marks)



SECTION II: (50 MARKS)

*Answer any **FIVE** questions from this section*

17. A solid Q is made up of a hemi spherical bottom, cylindrical middle and conical top. The height of the cylinder is 14m and the height of the cone is 5m, the common radius of both figures is 2.1m. (Take $\pi=\frac{22}{7}$)

(a) Find the slant height of the cone correct to 2 decimal places. (2 marks)

(b) Find the total surface area of the solid Q correct to 4 significant figures (4 marks)

(c) Find the volume of solid Q to the nearest metres. (4 marks)

18. (a) The equation of a straight line L_1 is given by $6x + 3y - 12 = 0$. Another line L_2 is perpendicular to L_1 at $(m, 13)$. Line L_2 also passes through point K(3,5) .

(i) Find the value of m. (3 marks)

(ii) Find the equation of L_2 in the form of $ax + by + c = 0$, where a, b and c are integers. (2 marks)

(b) The equation of the base AB of an isosceles triangle ABC is $y = -2$ and the equation of side BC is $y + 2x = 6$. If points A and C are $(-6 , -2)$ and $(-1 , 6)$ respectively, Find;

(i) The coordinates of B (2 marks)

(ii) The equation of side AC. (3 marks)

19. A curve is represented by the function $y = \frac{1}{3}x^3 + x^2 - 3x + 2$

(a) Find the gradient function of the curve (1 mark)

(b) Determine the turning points on the curve (4 marks)

(c) Determine the nature of the turning points of the curve (3 marks)

(d) Sketch the curve of $y = \frac{1}{3}x^3 + x^2 - 3x + 2$ (2 marks)

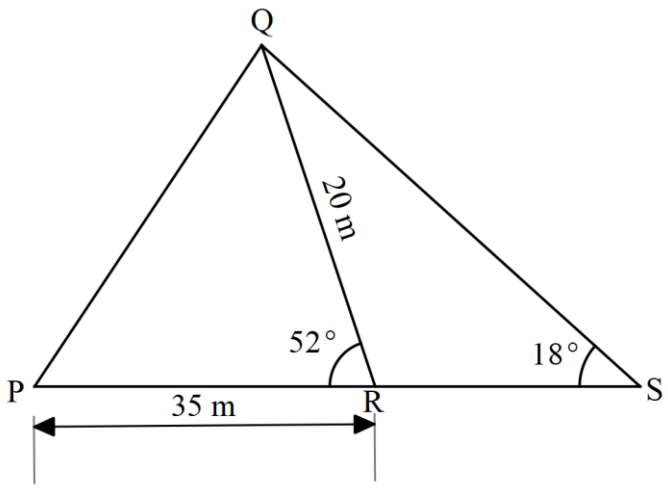
20. (a) A triangle has vertices A (1,2), B (7,2) and C (5,4). Draw triangle ABC on the Cartesian place (1 mark)

(b) A' (2, -1), B' (2, -7) and C' (4, -5) is the image of ABC under a transformation T. Draw triangle A'B'C' on the same grid and describe T fully. (3 marks).

(c) Draw triangle A" B"C" the image of triangle A'B'C; under a reflection in the line Y=X. State the coordinates of the vertices. (3 marks)

(d) Triangle A'''B'''C''' is the image of triangle A''B''C'' under an enlargement centre (-5,0) and linear scale factor of -1, and hence draw triangle A'''B'''C''' and state its coordinates. (3 marks)

21. The figure below represents two neighboring plots with QR as their common boundary.



Find to 2 decimal places,

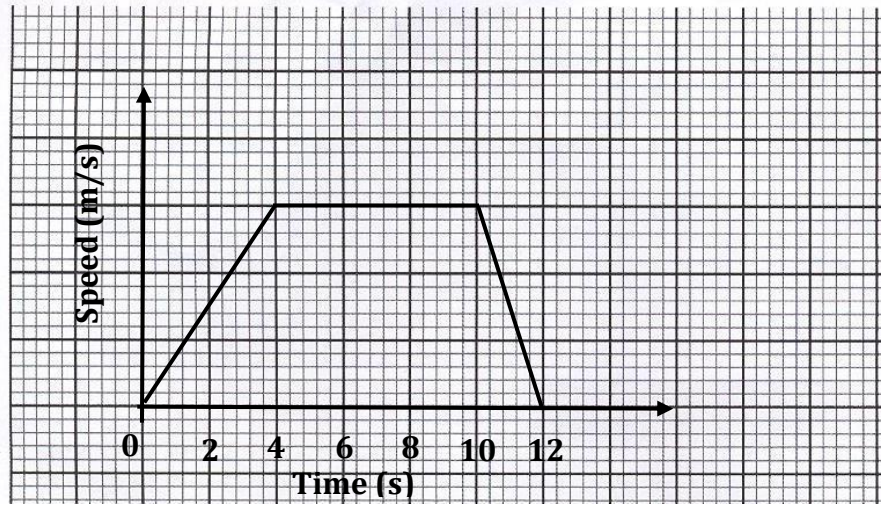
(a) The length of boundary PQ. (3 marks)

(b) The angle RQS. (1 mark)

(c) The length of boundary RS. (3 marks)

(d) Area of triangle QRS. (3 marks)

22. (a) The graph shows the speed of a car during an interval of 12 seconds.



The Distance travelled in the first 4 seconds is 40m.

Find:

(i) the maximum speed reached. (2 marks)

(ii) the average speed for the whole journey. (2 marks)

(b) Wafula left Webuye at 8.00 am towards Mumias at an average speed of 90km/hr. Nekesa also left Webuye at 8.21 am towards Mumias along the same road of an average speed of 97km/hr.

Determine:

(i) the time Nekesa caught up with Wafula. (3 marks

(ii) the distance from Webuye when Nekesa caught up with Wafula. (3 marks)

23. The table below show marks obtained by 60 students in mathematics exam.

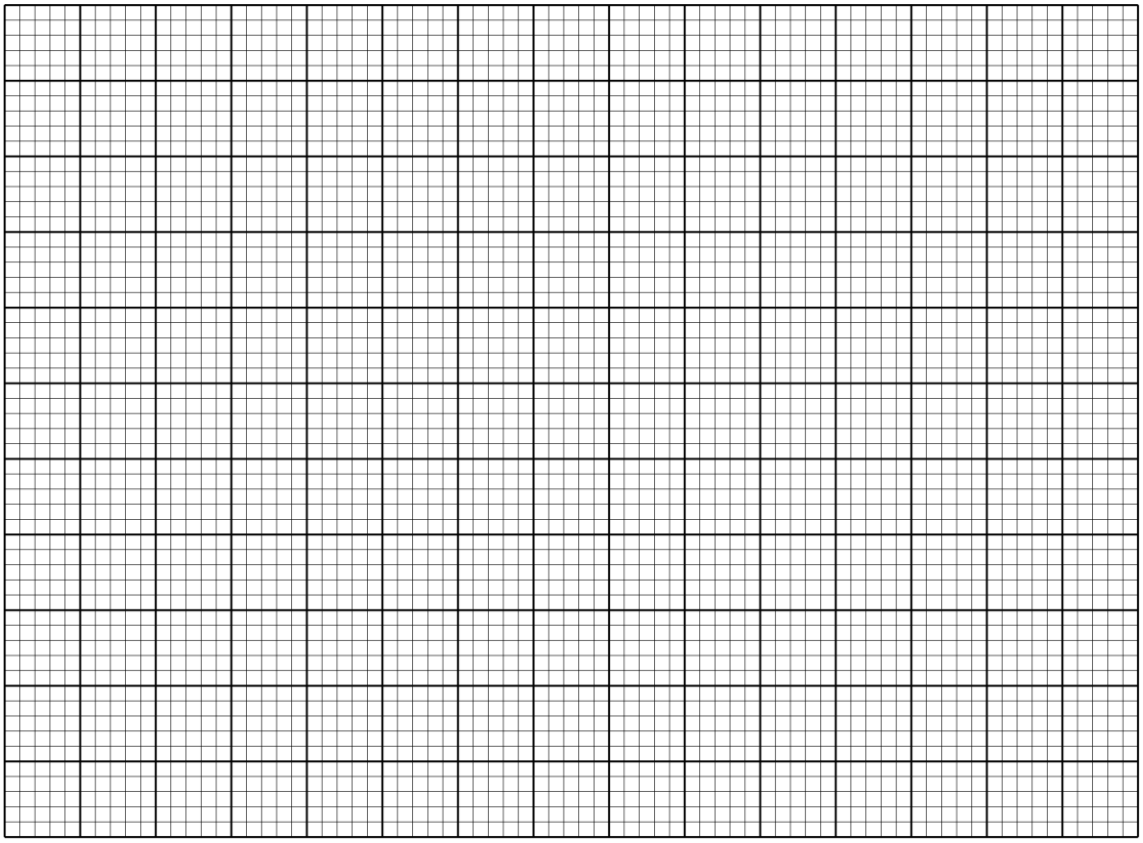
MARKS	30- 34	35-39	40 -44	45 -49	50 -54	55 -59	60-64
NO. OF STUDENTS	3	6	5	12	8	Y	7

(a) Find the value of Y in the above table. (2 marks)

(b) State the modal class. (1 mark)

(c) Calculate the mean mark of the students (3 marks)

(d) On the grid provided draw a histogram and a frequency polygon on the same axes to represent the above data. (4 marks)



24. (a) Complete the table below for the function $y = x^2 - 3x - 4$ (2 marks)

x	-1	0	1	2	3	4
y						

Use the trapezium rule with 5 strips to estimate the area bounded by the curve $y = x^2 - 3x - 4$, x – axis and the lines $x = -1$ and $x = 4$. (3 marks)

(b) Use integration method to calculate the exact area in (b) above (3 marks)

(c) Determine the percentage error in estimating the area by trapezium rule. (2 marks)

GOLDLITE ONLINE SUPPLIES

Kenya Certificate of Secondary Education

KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

Name …… **Admission number** ……

Candidate's Signature……**Date**……

KANGA SCHOOL TRIAL SERIES

121/1

MATHEMATICS

FORM 4

TIME: 2 ½ HOURS

INSTRUCTIONS TO CANDIDATES

1. *Write your name and admission number in the spaces provided at the top of this page.*
2. *This paper consists of two sections:* **Section I and Section II.**
3. *Answer **all** questions in* **section I** and ONLY five questions in Section **II.**
4. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
5. *Marks may be given for correct working even if the answer is wrong.*
6. ***KNEC** Mathematical tables may be used.*

For Examiner's Use Only

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

17	18	19	20	21	22	23	24

Grand Total

SECTION I 50 Marks
Attempt all the questions in this section

1. Evaluate; (3 marks)

$$\frac{-12\div(-3)\times4-(-20)}{-6\times6\div(-6)}$$

2. Solve the following expressions using substitution method. (3 marks)

$3x + 4y = 3$
$x + 6y = 7$

3. Solve for x; $9^x \times 27^{x-1} = 1$ (3 marks)

4. The surface area of two similar bottles are 12 cm^2 and 108 cm^2 respectively. If the larger one has a volume of 810 cm^3, find the volume of the smaller one. (3 marks)

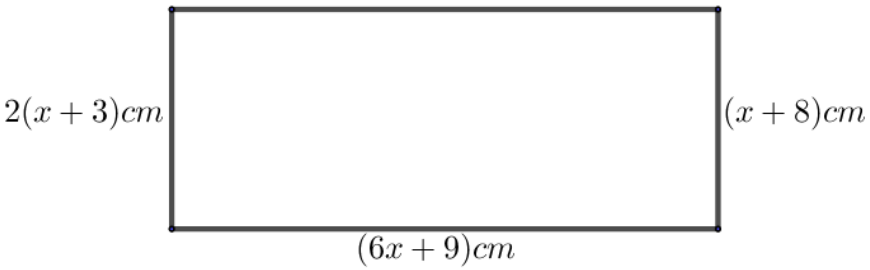
5. Express $0.2\dot{7}$ as fraction hence solve $0.2\dot{7} - 0.14$ (3 marks)

6. The sum of interior angles of a regular polygon is 1 080°

a) Find the size of each exterior angle. (2 marks)

b) Name the polygon. (1 mark)

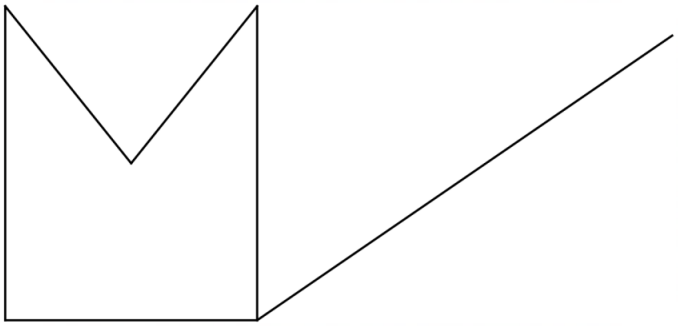
7. Calculate the area of the figure below; (3 marks)



8. Use reciprocal tables to solve the following correct to 4 significant figures; (3 marks)

$$\frac{6}{0.272} - \frac{2}{20.36}$$

9. Complete the sketch of a solid shown below, showing both the visible and hidden lines. (3 marks)



10. Simplify; (3 marks)

$$\frac{a+b}{2} - \frac{2a-b}{3}$$

11. A Kenyan bank buys and sells foreign currencies as shown below.

	Buying (Ksh)	Selling (Ksh)
1 US Dollar	76.38	75.19
1 UK Pound	132.92	132.95

A tourist arrived in Kenya from Britain with 126,000 UK sterling pounds. He converted the pounds into Kenyan shillings. While in Kenya he spent half of the money. He changed the balance to US dollars. Calculate to the nearest Dollar, the amount he received. (4 marks)

12. The average lap time for 3 athletes in a long-distance race is 36 seconds, 40 seconds and 48 seconds respectively. If they all start the race at the same time, **find** the number of times the slowest runner will have been overlapped by the fastest athlete at the time they all cross the starting point together again. (3 marks)

13. The position vectors of points **A** and **B** are $2i + 3j + 9k$ and $-5i + k$ respectively. Calculate $|AB|$ leaving your answer in surd form. (3 marks)

14. Evaluate; (3 marks)

$$\frac{1\frac{7}{8} + \frac{2}{3}\ of\ 2\frac{1}{4} - 1\frac{3}{4}}{1\frac{3}{5} - 4\frac{1}{2} \div 1\frac{4}{5} + 1\frac{1}{3}}$$

15. Simplify $\frac{12x^2 - 16x}{20 - 11x - 3x^2}$ (3 marks)

16. Given that $\cos A = \frac{5}{13}$ and angle A is acute, find without using a calculator the value of $2\ tan\ A\ +\ 3\ sin\ A$. (3 marks)

SECTION II (50 Marks)

Answer any Five questions ONLY in this section

17. Triangle $A(3,4), B(9,4), C(6,6)$ is mapped onto $A'\ B'\ C'$ under reflection $y = x$.

a) Plot the object and the image. (3 marks)

b) $A'\ B'\ C'$ is transformed by an enlargement scale factor 2 and centre of enlargement (4,0) to obtain $A''\ B''\ C''$. State the coordinates of $A''\ B''\ C''$ and plot. (4 marks)

c) $A''\ B''\ C''$ is transformed by a positive quarter turn to obtain $A'''\ B'''\ C'''$. State its coordinates and plot. (3 marks)

18. Three teachers Mark, Nashon and Nyongesa decided to buy a plot. The plot owner offered the plot at 5.8 million but agreed to be paid 75% of the value as initial deposit in the ratio 5: 3: 2 respectively and the remaining amount be paid after 2 years including an additional 5% of the

initial value for processing the plot documents. The total balance was paid in the same ratio as the deposit.

a) How much of the deposit did each contribute? (5 marks)

b) What amount of money were the teachers to pay at the end of 2 years. (3 marks)

c) How much of the total value did Nashon pay? (2 marks)

19. Heights in cm for 50 seedlings were recorded in the table below.

3	7	15	11	19	4	15	16	6	20
22	8	20	4	19	14	13	8	21	12
9	21	13	8	16	17	8	7	12	13
12	8	17	3	18	5	12	11	12	14
10	16	9	18	9	15	10	14	12	14

a) Starting with 3 and using a class interval of 4, draw a frequency distribution table. (2 marks)

b) Using the frequency distribution table in (a) above, calculate:

i. The mean height. (3 marks)

ii. The median height. (3 marks)

c) On the grid provided below, draw a frequency polygon to represent the information in the table in (a) above. (2 marks)

20. Point A and B have the coordinates as $(6,6)$ and $(4,1)$ respecively.

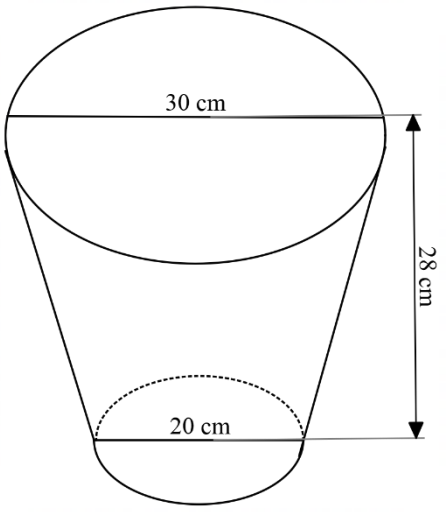
a) Find the equation of the line AB. (3 marks)

b) Find the midpoint of AB. (2 marks)

c) Find the equation of perpendicular bisector of AB (3 marks)

d) Find the y intercept of the line AB (2 marks)

21. The diagram below shows an open bucket with top diameter 30 cm and bottom diameter 20 cm. the height of the bucket is 28 cm: $\left(Take\ \pi = \frac{22}{7}\right)$



Find the:

a) Capacity of the bucket in litres (5 marks)

b) Area of the metal sheet required to make 100 such buckets, taking 10% extra for overlapping and wastage. (5 marks)

22. Towns P and Q are 400 km apart. A motorbike travelling at an average of 60km/h left town P for town Q at 1:20 p.m. A matatu travelling at an average speed of 80km/h also left town P for town Q at 2:00 p.m.

(a) Calculate the;

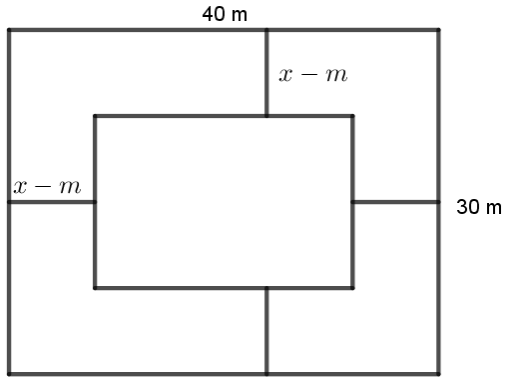
i. Distance covered by the motorbike by 2:00 p.m. (2 marks)

ii. Distance from town P in km where the matatu caught up with the motor bike. (3 marks)

iii. Time when the matatu caught up with the motor bike. (2 marks)

(b) A truck travelling at an average speed of 40km/h left town Q for town Pat 2:00pm. Determine the time when the truck and matatu met (3 marks)

23. A rectangle plot measures of 40m by 30m.A rectangular path of width x m is situated inside the plot surrounding the kitchen garden as shown in the **figure below.**



i. Form and simplify the expression in x for the area of the

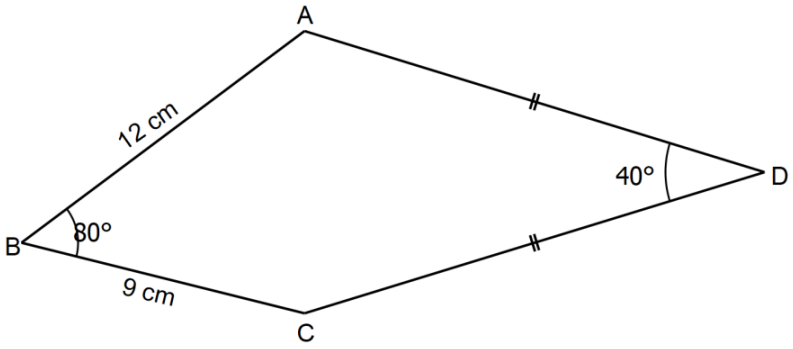
a) Path (2 marks)

b) Kitchen garden. (1 mark)

ii. The area of the path is two times the area of the kitchen garden form an equation in x and hence solve for x. (4 marks)

iii. Determine the perimeter of the lawn (3 marks)

24. The figure below is a quadrilateral ABCD in which AB = 12 cm, BC = 9 cm, CD = AD, and $\angle ABC = 80°$ and $\angle ADC = 40°$.



a) Calculate, correct to one decimal place:

i. The length AC. (2 marks)

ii. The length DC. (2 marks)

iii. The size of angle BAD. (3 marks)

b) Calculate the area of the quadrilateral ABCD, correct to one decimal place. (3 marks)

GOLDLITE ONLINE SUPPLIES

Kenya Certificate of Secondary Education

KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

Name …… **Admission number** ……

Candidate's Signature……**Date**……

MANG'U SCHOOL TRIAL

121/1
MATHEMATICS
Paper 1
2½ hours

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
*(c) This paper consists of **TWO** sections: **Section I** and **Section II**.*
*(d) Answer **ALL** the questions in **Section I** and only **Five** from **Section II**.*
(e) All answers and working must be written on the question paper in the spaces provided below each question.
*(f) **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
(g) Marks may be given for correct working even if the answer is wrong.
*(h) **Non – programmable** silent electronic calculators **and** KNEC Mathematical tables may be used except where stated otherwise.*
*(i) **This paper consists of 16 printed pages.***
*(j) **Candidates should check the question papers 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

Grand Total	

SECTION I (50 MARKS)

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

1. Evaluate without using a calculator. (3 Marks)

$$\frac{\frac{5}{6} of \left(4\frac{1}{3} - 3\frac{5}{6}\right)}{\frac{5}{12} x \frac{3}{25} + 1\frac{5}{9} \div 2\frac{1}{3}}$$

2. Without using a calculator or mathematical tables simplify. (3 Marks)

$$\sqrt{\frac{0.504\ X14.3\ X910}{0.28\ X\ 1.17\ X\ 28.6\ X7}}$$

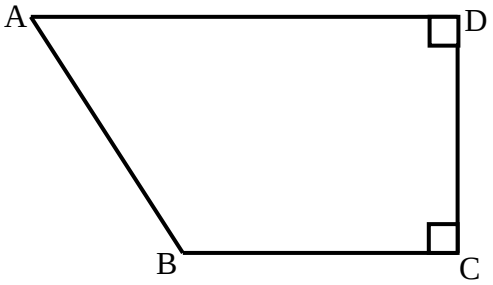
3. Find the value of x if (3 Marks)

$$\left(\frac{27}{8}\right)^{x+7} = \left(\frac{4}{9}\right)^{-3x}$$

4. Three sirens wail at intervals of thirty minutes, fifty minutes and thirty minutes. If they wail together at 7.18 a.m. on Monday, what time and day will they wail together? (3 Marks)

5. A two-digit number is such that the sum of the ones digit and the tens digit is 10. If the digits are reversed, the number exceeds the original number by 54. Find the number. (3 Marks)

6. The figure below shows quadrilateral ABCD in which AB = 6cm. BC = $\frac{1}{2}$CD, CD = DA and angle ADC = angle BCD = 90^0.



Calculate the area of the quadrilateral ABCD. (4 Marks)

7. The interior angle of a regular polygon is 108^0 larger than the exterior angle. How many sides has the polygon? (3 Marks)

8. A salesman is paid a salary of Sh. 10,000 per month. He is also paid a commission on sales above Sh. 100,000. In one month he sold goods worth Sh. 500,000. If his total earning that month was Sh. 56,000. Calculate the rate of commission. (3 Marks)

9. A cylinder of radius 14cm contains water. A metal solid cone of base radius 7cm and height 18cm is submerged into the water. Find the change in height of the water level in cylinder. (3 Marks)

10. Simplify the following. (3 Marks)

$$\frac{2x-4}{12-3x^2} - \frac{1}{3x+6}$$

11. A mother is now $2\frac{1}{2}$ times as old as her daughter Mary. Four years ago the ratio of their ages was 3:1. Find the present age of the mother. (3 Marks)

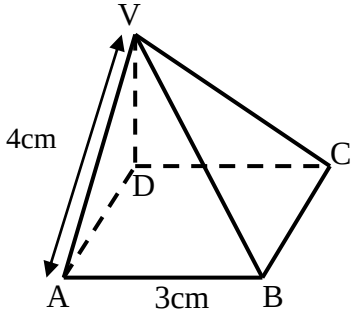
12. The line which joins the point A (3, k) and B (-2, 5) is parallel to the line whose equation is $5y + 2x - 7 = 0$. Find the value of k. (3 Marks)

13. A Kenyan bank buys and sells foreign currencies at the exchange rates shown below.

	Buying (KShs.)	Selling (KShs.)
1 Uuro	147.86	148.00
1 US Dollar	74.22	74.50

An American arrived in Kenya with 20 000 Euros. He converted all the Euros to Kenya shillings at the bank. He spent KShs. 2,512,000 while in Kenya and converted the remaining Kenya shillings into US Dollars at the bank. Find the amount in Dollars that he received. (3 Marks)

14. The diagram below represents a right pyramid on a square base of side 3cm. The slant edge of the pyramid is 4cm.



(a) Draw a labelled net of the pyramid.
(2 Marks)

(b) On the net drawn, measure the height of a triangular face from the top of the pyramid. (1 Mark)

15. Using logarithms tables only, evaluate. (4 Marks)

$$\sqrt[3]{\frac{849.6\ X\ 2.41}{3941}}$$

16. Use reciprocal and square tables to evaluate, to 4 significant figures, the expression. (3 Marks)

$$\frac{1}{0.3654} - 4.151^2$$

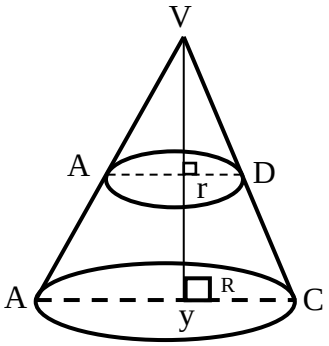
SECTION II (50 MARKS)
Answer only five questions in this section in the spaces provided.

17. A group of people planned to contribute equally towards buying land at a price of Shs 180,000. However 3 members of the group withdrew from the project. As a result, each of the remaining members were to contribute KShs. 3000 more.
(a) Find the original number of members in the group. (6 Marks)

(b) How much would each person have contributed if the 3 people had not withdrawn. (2 Marks)

(c) Calculate the percentage increase in the contribution per person caused by the withdrawal.(2 Marks)

18. The figure below shows a cone from which a frustum is made. A plane parallel to the base cuts the cone two thirds way up the vertical height of the cone to form frustum ABCD. The top surface radius of the frustum is labelled r and the bottom radius R.



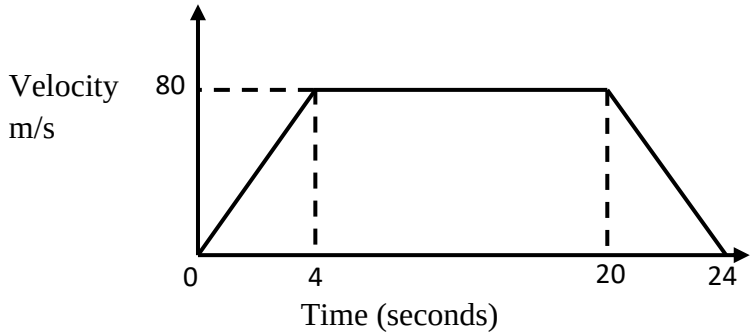
(a) Find the ratio r:R. (1 Mark)

(b) Given that r = 7cm, find R. (2 Marks)

(c) If the height VY of the original cone is 45cm. Calculate to the nearest whole number the volume of the frustum. (Take $\pi = \frac{22}{7}$) (4 Marks)

(d) The frustum represents a bucket which is used to fill a rectangular tank measuring 1.5m long, 1.2m wide and 80cm high with water. How many full buckets of water are required to fill the tank. (3 Marks)

19. (a) The figure below is a velocity time graph for a car.



(i) Find the total distance travelled by the car. (2 Marks)

(ii) Calculate the deceleration of the car. (2 Marks)

(b) A car left Nairobi towards Eldoret at 7.12 a.m. at an average speed of 90km/h. At 8.22 a.m, a bus left Eldoret for Nairobi at an average speed of 72km/hr. The distance between the two towns is 348km. Calculate:

(i) the time when the two vehicles met. (4 Marks)

(ii) the distance from Nairobi to the meeting place. (2 Marks)

20. The following distribution shows the marks obtained by 82 students in a Mathematics test.

Marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Frequency	3	18	13	14	17	12	5

(a) State the modal class. (1 Mark)

(b) Calculate to 2 decimal places:

(i) the mean mark (4 Marks)

(ii) the difference between the median and the mean marks. (5 Marks)

21. John bought 3 brands of tea; A, B and C. The cost price of the three brands were Sh. 25, Sh. 30 and Sh. 45 per kilogram respectively. He mixed the three brands in the ratio 5:2:1 respectively. After selling the mixture, he made a profit of 20%.

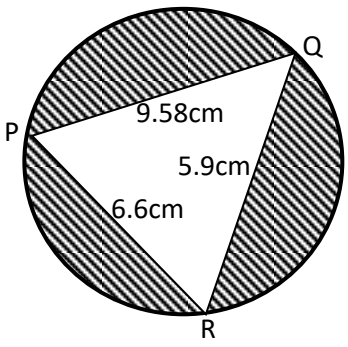
(a) How much profit did he make per kilogram of the mixture? (4 Marks)

(b) After one year the cost price of each brand was increased by 10%.

(i) For how much did he sell one kilogram of the mixture to make a profit of 15%? (Give your answer to the nearest 5 cents) (3 Marks)

(ii) What would have been his percentage profit if he sold one kilogram of the mixture at Sh. 45. (3 Marks)

22. Triangle PQR is inscribed in the circle. PQ = 7.8cm, PR = 6.6cm and QR = 5.9cm.



Find;

(a) size of angle QPR (3 Marks)

(b) the radius of the circle. (3 Marks)

(c) the area of the shaded region. (4 Marks)

23. P, Q and R are three villages such that PQ = 10km, QR = 8km and PR = 4km are connecting roads.

(a) Using a scale of 1cm to represent 1km, locate the relative positions of the three villages. (2 Marks)

(b) A water tank T is to be located at a point equidistant from the three villages. By construction locate water tank T and measure its distance from R. (2 Marks)

(c) Determine the shortest distance from T to the road PQ by construction. (2 Marks)

(d) Determine the area enclosed by the roads PQ, QR and PR by calculation. (3 Marks)

24. Triangle PQR has vertices at P (2,3), Q(1,2) and R(4,1), while triangle $P^IQ^IR^I$ has vertices $P^I(-2,3)$,$Q^I(-1,2)$, $R^I(-4,1)$

(a) (i) Draw triangle PQR and $P^IQ^IR^I$ on the grid provided. (2 Marks)

(ii) Describe fully a single transformation which maps triangle PQR onto triangle $P^IQ^IR^I$. (1 Mark)

(b) (i) On the same grid, draw triangle $P^{II}Q^{II}R^{II}$ the image of PQR under a reflection on the line $y + x = 0$ (2 Marks)

(ii) Describe fully a single transformation which maps triangle $P^{II}Q^{II}R^{II}$ onto triangle PIQIRI. (1 Mark)

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Kenya Certificate of Secondary Education

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Name …… **Admission number** ……

Candidate's Signature……**Date**……

MARANDA SCHOOL TRIAL SERIES

121/1
MATHEMATICS ALT A
PAPER 1
Time: 2 HOURS 30 MINUTES

Instructions to Candidates

a) *Write your name, index number and class in the spaces provided at the top of this page.*
b) *This paper consists of **TWO** sections: **Section A** and **Section B**.*
c) *Answer **ALL** the questions in **Section A** and any **five** questions from Section **B**.*
d) ***Show all the steps in your calculation, giving your answer at each stage in the spaces provided below each question**.*
e) *Marks may be given for correct working even if the answer is wrong.*
f) ***Non-programmable** silent electronic calculators and **KNEC** Mathematical tables maybe used, except where stated otherwise.*
g) ***This paper consists of 16 printed pages.***
h) ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing**.*
i) ***Candidates should answer the questions in English**.*

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

SECTION A (50 MARKS)

(Answer all questions in this section)

1. Evaluate without using mathematical tables or a calculator; (3 Marks)

$$\frac{0.0078 \times 1.21 \times 3.6}{2.42 \times 0.054}$$

2. Use the prime factors of 7056 and 74088 to evaluate (3 Marks)

$$\frac{\sqrt[3]{74088}}{\sqrt{7056}}$$

3. A bus left Nairobi and travelled towards Busia at an average speed of 60 km/h. After $1\frac{1}{4}$ hours, a car left Nairobi and travelled along the same road at an average speed of100 km/h. If the distance between Nairobi and Busia is 420 km, Determine the distance the car travelled to catch up with the bus.

(3 Marks)

4. Factorize: $16 + 12 - 8^2 - 6$ (2 Marks)

5. The length of three wires were 20m, 32m and 48m. Pieces of wire of equal length were cut from the three wires. Calculate the least number of pieces obtained. (3 Marks)

6. Given that sin $= \frac{4}{5}$ where x is an acute angle, find the value of $^2(90 -)°$ (3 Marks)

7. (a) Using a ruler and a pair of compass only construct triangle PQR such that PQ = 5cm, QR = 6 cm and $\angle = 60°$ (2 Marks)

b) Hence construct a circle passing through P, Q and R. State the radius of the circle. (3 Marks)

8. Equity bank buys and sells foreign currencies as shown:

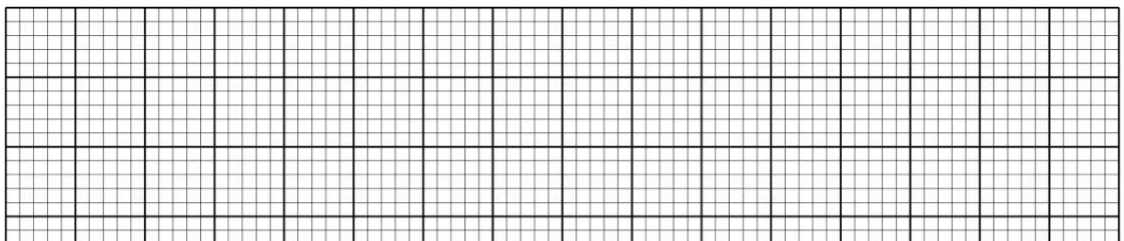
Currency	Buying (ksh)	Selling (ksh)
1 US Dollar	129.50	130.10
1 S.A Rand	7.03	7.51

A tourist arrived in Kenya with 6000 US Dollars and changed the whole amount to Kenya shillings. While in Kenya, he spent Sh.376000 and changed the balance to S.A Rand before leaving to South

Africa. Calculate in SA Rand he received. (3 Marks)

9. Solve the inequality sand state the integral values of . (3 Marks)
$(x + 11) > (4x - 19) \geq (2 + x)$

10. Use graphical method to solve the pair of simultaneous equations (3 Marks)
$2 + \quad = 3$
$5 + 3 = 7$



11. Mr. Mutua spends $\frac{1}{4}$ of his salary on school fees. He spends $\frac{2}{3}$ of the remainder on food and a fifth of what is left on transport. He saves the balance. In certain month, he saved Sh. 12500. What was his salary?(3 Marks)

12. Find x if $3^{2-3}+1 = 28$(3 Marks)

13. A measuring cylinder of base radius 5cm contains water whose level reads 6cm high. A spherical object is immersed in the water and the new level reads 10cm. Calculate the radius of the spherical object(3 Marks)

14. The interior angle of a regular polygon is $(x-50)^o$ while its exterior angle is $(2x+20)^o$. Find the number of sides of the polygon. (3 Marks)

15. The masses of two similar building blocks are 2.7 kg and 800grams respectively. Find the surface area of the larger block if the surface area of the smaller block is 150 cm^2.(3 Marks)

16. Town X is 20km in a bearing of 060^0 from Y, and Z is 30km in the direction 150^0 from Y. Using the scale 1cm represents 5km, find by scale drawing the distance of X from Z.(4 Marks)

SECTION B (50 MARKS)

(Answer only FIVE questions in this section)

17. A number of people agreed to contribute equally to buy books worth Ksh 1200 for a school library. Five people pulled out and so the others agreed to contribute an extra Ksh 10 each. Their contributions enabled them to buy books worth Ksh 200 more than they originally expected.

a) If the original numbers of people was x, write an expression of how much each was originally to contribute. (1 Mark)

b) Write down two expressions of how much each contributed after the five people pulled out.

(2 Marks)

c) Calculate the number of people who made the contribution.(5 Marks)

d) Calculate how much each contributed.(2 Marks)

18. The point A(-2, 4) and B(3,-6) lies on a straight line AB,

a) Find:

(i) The equation of the line AB in the form ax + by +c =0 where a, b and c are integers. (3 Marks)

(ii) The equation of the perpendicular bisector to AB(3Marks)

b) The points A and B are mapped onto A^1 and B^1 by translation vector M = $\begin{pmatrix} 2 \\ -1 \end{pmatrix}$. Find

(i) The co-ordinates of A^1 and B^1. (2 Marks)

(ii) The equation of the line passing through A^1 and B^1.(2 Marks)

19. The following measurements were recorded in a field book of a farm in metres (XY= 400m)

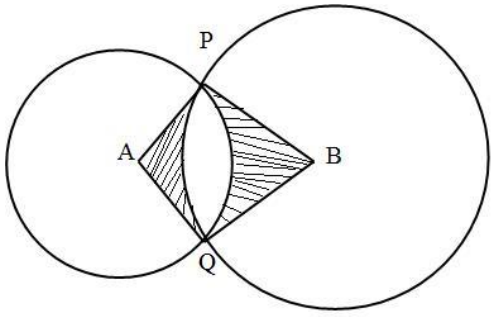
	Y	
C60	340	
	300	120D
B100	220	
	140	160F
A120	80	
	X	

a) Using a scale of 1cm representing 40m, draw an accurate map of the farm. (4 Marks)

b) Find the area of the farm in hectares.(4 Marks)

c) If the farm is on sale at Ksh 800,000.00 per hectare, find how much it costs. 2 Marks)

20. The diagram below shows two circles, centre A and B which intersect at points P and Q.
Angle PAQ = 75^0, angle PBQ = 45^0 and PA = 10cm.



Calculate:

(a) PQ to correct to 2 decimal places

(b) PB to correct to 2 decimal places (2 Marks)

(c) Area of the minor segment of the circle whose centre is A (2 Marks)

(d) Area of shaded region (4 Marks)

21. A school water tank is in the shape of a frustum of a cone, the height of the tank is 7.2m and the top and bottom radii are 6m and 12m respectively.

a) Calculate the slant height of the tank, correct to one decimal place. (2 Marks)

b) Calculate the area of the curved surface of the tank correct to 2d.p. (3 Marks)

c) Find the capacity of the tank, in litres correct to the nearest litre. (3 Marks)

d) On a certain day, the tank was filled with water. If the school has 500 students and each student uses an average of 40 litres of water per day, determine the number of days the student s would use the water.

(2 Marks)

22. A trader bought 5 shirts and 2 trousers at a cost of Ksh 2400. If he had bought 2 shirts and 4 trousers, he would have spent Ksh 800 **more**.

a) (i) Form two equations to represent the information above. (2 Marks)

(ii) Using matrix method find the cost of a shirt and a trouser. (4 Marks)

b) If the trader bought 16 shirts and 20 trousers and sold them making a profit of 20% per shirt and 15% per trouser, find the percentage profit made on the total sale. (4 Marks)

23. The velocity(v)of a vehicle measured at intervals of time(t) were recorded as follows

t(s)	0	2	4	6	8	10	12
v(m/s)	0	20	40	40	30	8	0

a) Represent this motion on a graph on the grid below (3 Marks)

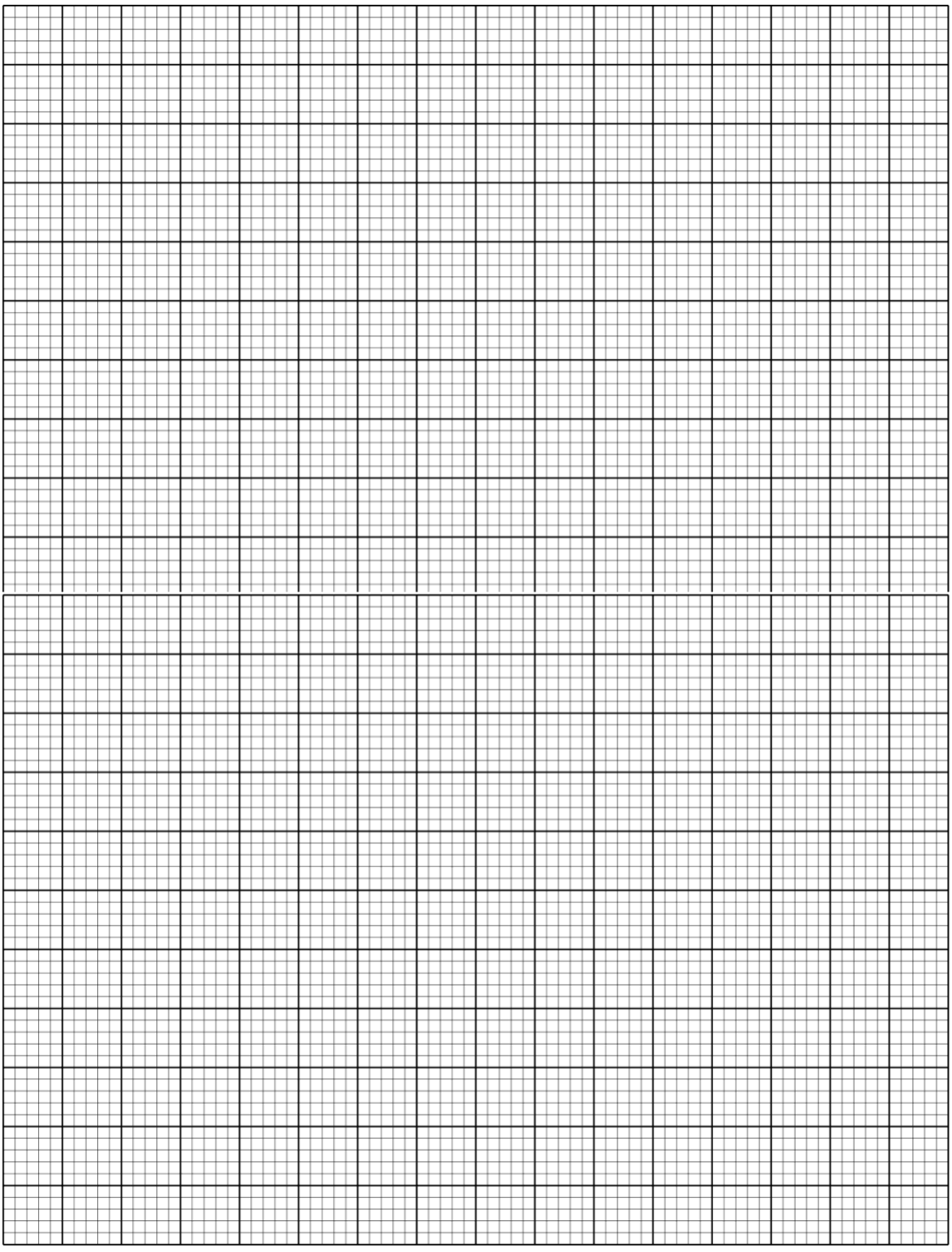
b) Calculate the acceleration

c) Calculate the total distance travelled by the vehicle

d) Calculate the average velocity of the vehicle (2 Marks)

24. The vertices of quadrilateral OPQR are $(0,0)$, $(2,0)$, $(4,2)$ and $(0,3)$.The vertices of its image under a rotation are $'(1,-1)$, $''(1,-3)$ $''(3,-5)$and $''(4,-1)$. a)

(i) On the grid provided, draw OPQR and its image $'$ $''$ $''$ $''$ (2 Marks)



(ii) By construction, determine and state the centre and angle of rotation. (3 Marks)

b) On the same grid as (a) (i) above, draw $''''$, the image of $''''$ under a reflection in the line $=$ (3 Marks)

c) From the quadrilaterals drawn, state the pairs that are:

i. Directly congruent;

(1 Mark)

ii. Oppositely congruent (1 Mark)

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Name …… **Admission number** ……

Candidate's Signature……**Date**……

MERU SCHOOL TRIAL 1

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

a) *Write your name and admission number in the space provided at the top of this page*

b) *This paper consists of two sections;* ***section I*** *and* ***section II****.*

c) *Answer* ***ALL*** *questions in section I and only* ***FIVE*** *questions in section II*

d) *Show all the steps in your calculations; giving your answers at each stage in the spaces provided below each question.*

e) *Marks may be given for correct working even if the answer is wrong.*

f) *Non-programmable silent electronic calculators and KNEC mathematical tables may be used.*

g) *This paper consists of 15 printed pages*

FOR EXAMINER'S USE ONLY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL

SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

Contact us on 0724351706/0726960003

For more papers for all subjects and marking schemes

SECTION I (50 MARKS)

Answer ALL questions in this section in the spaces provided

1) Without using mathematical tables or calculator evaluate; (3mks)

$$\sqrt{\frac{1.90\times 0.032\times 1.08}{2.00\times 0.0038}}$$

2) Simplify completely $\dfrac{9a^2y-16b^2y^3}{4by^2-3ay}$ (3mks)

3) A water tank has a capacity of 50 litres. A similar model tank has a capacity of 0.25litres. if the larger tank has a height of 100cm. calculate the height of the model tank. (3mks)

4) Simplify $\sqrt{\dfrac{12x^4\,y^{-1}\,Z^5}{3x^{-2}y^{-3}\,Z^3}}$ (2 mks)

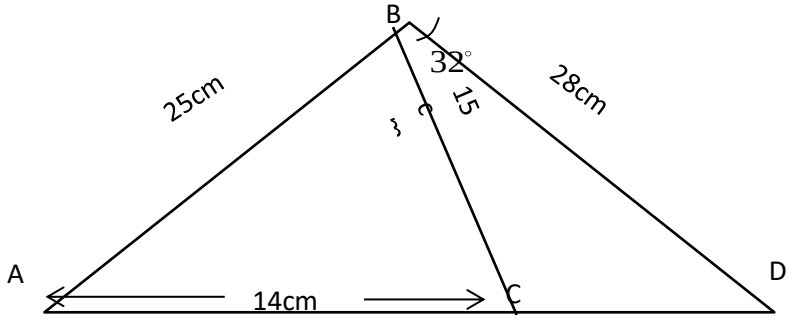
5) One interior angle of a certain polygon is 84^0. If each of the other angles is 147^0, how many sides does this polygon have? (3 mks)

6) During a certain period the exchange rates at a Pesa point were;

	Buying shs	Selling shs
Riyal	19.68	19.78

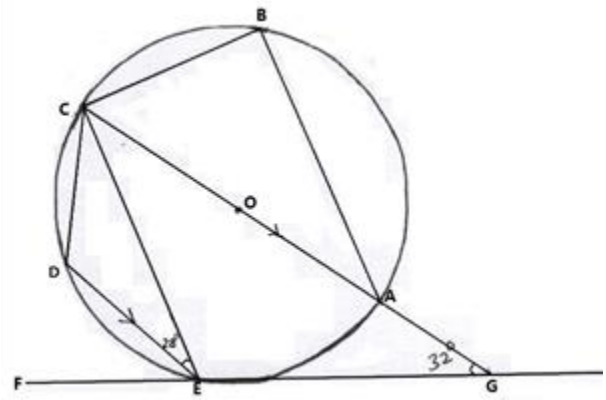
A tourist arrived with 5480 Riyal which he changed to Kshs. He spend $\frac{2}{3}$ of the total in visiting various sites. As he was leaving he changed all he had to Riyal. How much did he leave with? Answer to 1 d.p.
(3 mks)

7) Find the area of the triangle below given that lines AB=25cm, BC = 15cm, AC = 14cm, BD = 28cm and $\measuredangle CBD = 32^\circ$ (4mks)



8) A shear parallel to the x-axis maps point (1,2) onto a point (7, 2). Determine the shear factors and hence state the shear matrix (invariant line is y = 0) (3mks)

9) The diagram below shows a circle ABCDE. The line FEG is a tangent to the circle at point E. Line DE is parallel to CG,



Calculate

(a) AEG (2mks)

(b) ABC (2mks)

10) Wasike and Wanjala live 40km apart. Wasike starts cycling from his home at 8.00a.m toward's Wanjala's house at 16km/h. Wanjala stars cycling towards Wasike's house 30 minutes later at 8km/h. **what** time did they meet. (3mks)

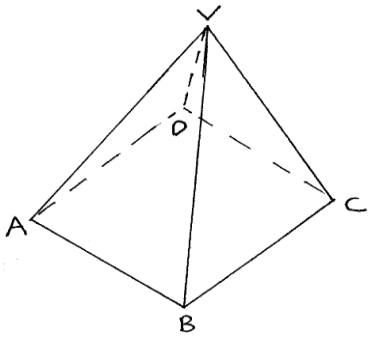
11) The line which joins the point A (3, K) and B (-2, 5) is parallel to the line whose equation is 5y+2x-7=0. Find the value of K. (3mks)

12) Given that $\text{Cos } A = \frac{5}{13}$ and angle A is acute, without using tables or calculator, find the value of (3 mks)

2 tan A + 3 sin A.

13) Find the greatest integral value of x which satisfies. $\frac{2x+3}{2} < \frac{8-3x}{5} < \frac{5x+6}{3}$ (3mks)

14) The figure below (**not drawn to scale)** is a right pyramid with slant height of 5cm and square base of 3cm.



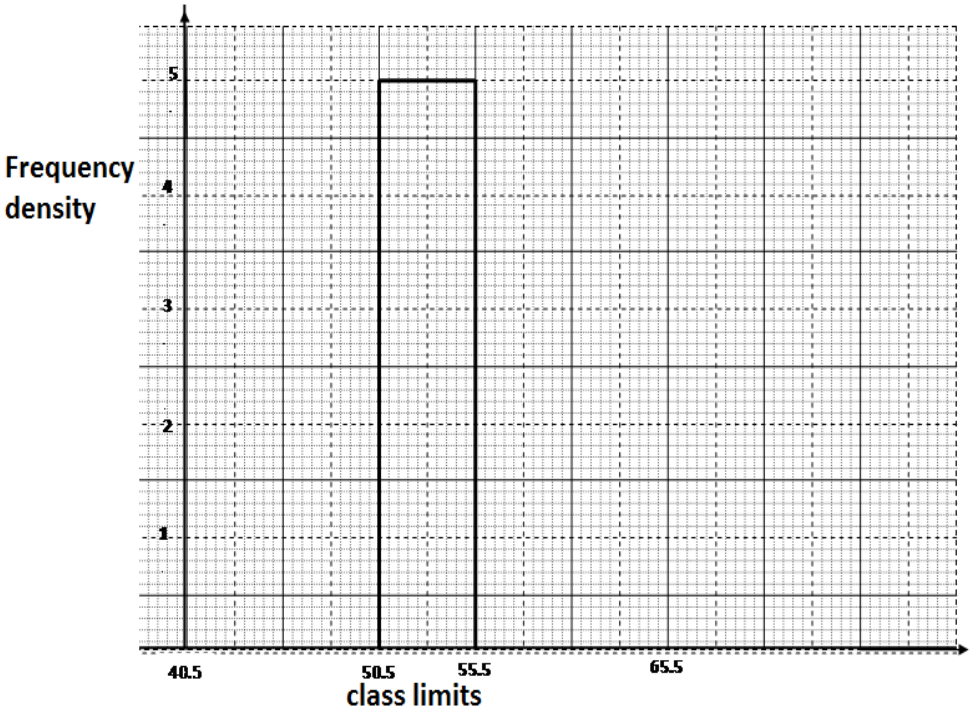
(a) Draw its net and label it. (2mks)

(b) Calculate the total surface area. (2mks)

15) A plane leaves town P to town Q on a bearing of 130º and a distance of 350km. it then flies 500km on a bearing of 060º to town R. Find, by scale drawing the distance between town R and town P. (3 mks)

16) The following data was obtained from the mass of a certain animal. Complete the table and the histogram below. (3 marks**)**

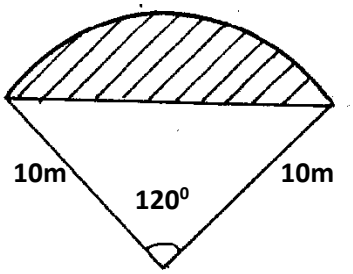
Mass(kg)	frequency
41-50	20
51-55	
56-65	40



SECTION II: (50 MARKS)

Answer only FIVE question from this section.

17) The ends of the roof of a workshop are segment of a circle of radius 10m. The roof is 20m long .The angle at the centre is 120^0 as shown in the figure below.



(a) Calculate:

(i) The area of one end of the roof. (4mks)

(ii) The area of the curve surface of the roof. (2mks)

(b) What would be cost to the nearest shilling of covering the two ends and the curved surface with galvanized iron sheet costing sh.80 per square meter. (4mks)

18) A rectangular tank whose internal dimensions are 1.7m by 1.4m by 2.2m is three quarters full of milk.

a) Calculate the volume of milk in litres. (3 marks)

b) The milk is packed in small packets in a shape of a right pyramid with an equilateral base triangle of side 16cn. The height of each packet is 13.6cm. Full packets obtained are sold at ksh.25 per packet.

i) The volume in cm^3 of each packet to the nearest whole number. (3 marks)

ii) The number of full packets of milk. (2 marks)

iii) The amount of money realized from the sell of milk. (2 marks)

19) (a) On the grid provided below, plot the polygon A(3, 7), B(5, 5), C(3, 1), D(1, 5) on a cartesian plane (2mks)

(b) $A^1B^1C^1D^1$ is the image of ABCD under a translational $T\begin{pmatrix}-6\\-9\end{pmatrix}$. Plot $A^1B^1C^1D^1$ and state its coordinates. (2mks)

(c) Plot $A^{11}B^{11}C^{11}D^{11}$, the image of $A^1B^1C^1D^1$ after a rotation about (-1, 0) through a positive quarter turn. State its coordinates. (3mks)

(d) $A^{111}B^{111}C^{111}D^{111}$ is the image of $A^{11}B^{11}C^{11}D^{11}$ after a reflection in the line Y=x + 2. Plot $A^{111}B^{111}C^{111}D^{111}$and state its coordinates (3mks)

20) A straight line passes through the points (8, -2) and (4,-4).

a) Write its equation in the form ax + by +c = 0, where a, b and c are integers. (3 Marks)

b) If the line in (a) above cuts the x-axis at point P, determine the coordinates of P. (2 Marks)

c) Another line, which is perpendicular to the line in (a) above passes through point P and cuts the y axis at the point Q. Determine the coordinates of point Q. (3 Marks)

d) Find the length of QP (2 Marks)

21) Matrix P is given by

$$\begin{pmatrix} 4 & 7 \\ 5 & 8 \end{pmatrix}$$

(a) Find p^{-1} (3mks)

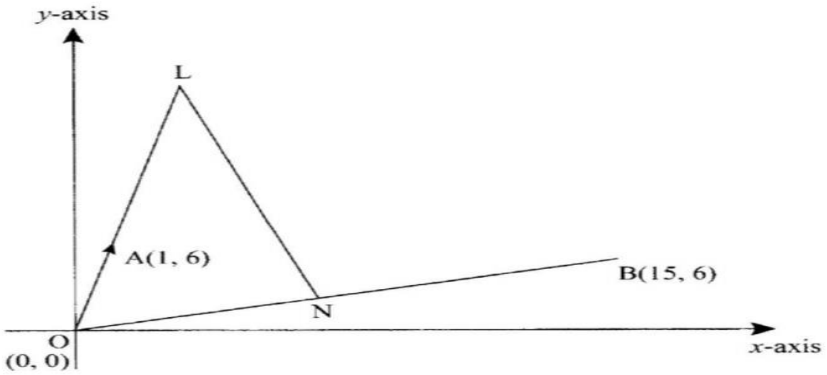
(b) Two institutes regions and Alphax purchased beans at sh.B per bag and maize at sh.M per bags. Regions purchased 8 bags of beans and 14 bags of maize for sh. 47,600. Alphax purchased 10 bags of beans and 16 bags of maize for sh. 57,400.

(i) Form a matrix equation to represent the information above (2mks)

(ii) Use the matrix p-1 to find the prices of one bag of each item (3mks)

(c) The price of bean later went up by 5% and that of maize remain constant. Regions bought the same quality of beans but spent the same total amount of money as before on the two items. State the new ratio of beans and maize. (2mks)

22. In the diagram below, the coordinates of points A and B are (1, 6) and (15, 6) respectively. Point N is on OB and that 3 ON = 2 OB.ne OA is produced to L such that OL = 3 OA



(a) Vector LN. (3 marks)

(b) Given that a point M is on LN such that LM:MN = 3:4, find the coordinate of M. (2 marks)

(c) If line OM is produced to T such that OM:MT = 6:1

(i) Find the position vector of T. (1 mark)

(ii) Show that points L, T and B are collinear. (4 marks)

23. Complete the table below for the functions $y = 2x^2 - 3x - 5$ *for* $-2 \le x \le 3$ (2 mks)

x	-2	-1	0	1	2	3
y						

(b) Draw the graph of $y = 2x^2 - 3x - 5$ from the table above. (2 mks)

(c) Use your graph to solve the equation $y = 2x^2 - 3x - 5 = 0$ (1 mk)

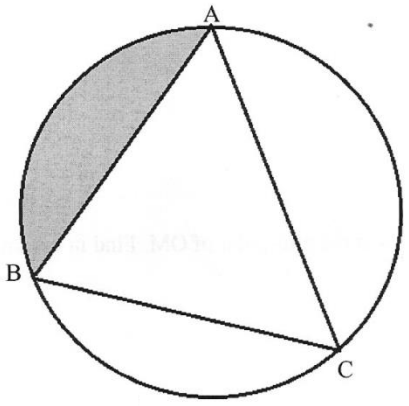
(e) From your graph, find the value of X which satisfy the simultaneous equations. (1 mk)

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

$y = 2x - 2$

(d) Write down the equation which is satisfied by the values of x in (e) above in the form $ax^2 + bx + c = 0$ (2 mks)

24. The diagram below shows a circle ABC with AB=12cm, BC=15cm, and AC=14cm



Calculate to 4 significance figures:

(a) The angle ACB (3mks)

(b) The radius of the circle. (3mks)

(c) The area of the shaded region (4mks)

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Candidate's Signature……**Date**……

STAREHE GIRLS' CENTRE MOCK EXAMINATION

121/1

MATHEMATICS
Paper 1
Time: 2½ Hours

Instructions to candidates

1. *Write your name, admission number and class in the spaces provided above.*
2. *The paper contains two sections:* ***Section I*** *and* ***Section II****.*
3. *Answer* ***ALL*** *the questions in* ***Section I*** *and* ***ANY FIVE*** *questions from* ***Section II****.*
4. *All working and answers must be written on the question paper in the spaces provided below each question.*
5. *Marks may be awarded for correct working even if the answer is wrong.*
6. *Negligent and slovenly work will be penalized.*
7. *on-programmable silent electronic calculators and mathematical tables are allowed for use.*

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

Grand Total %

Section I (50 marks)

Answer all the questions in this section in the spaces provided

1. Without using calculators evaluate $^1/_3$ of $\left(2\frac{3}{4} - 5\frac{1}{2}\right) \times 3\frac{6}{7} \div \frac{9}{4}$ {2 marks}

2. Use the method of completing the square to solve the quadratic equation
$2x^2 - 13x + 15 = 0$ {3 marks}

3. Solve for θ in the equation $6\cos^2\theta - \sin\theta - 4 = 0$ in the range $0^o \leq \theta \leq 180^o$. {3 marks}

4. The sides of a rectangle are x cm and (x + 1) cm. A circle has radius of (x + 2) cm. If the sum of the area of the rectangle and the circle is 184 cm^2. Using π as $\frac{22}{7}$ find the value of x. {4 marks}

5. Use binomial expansion to evaluate $\left(2 + \frac{1}{\sqrt{2}}\right)^5 + \left(2 - \frac{1}{\sqrt{2}}\right)^5$ {3 marks}

6. A line L_1 passes through point (1, 2) and has a gradient of 5. Another line L_2 is perpendicular to L_1 and meets it at a point where x = 4. Find the equation for L_2 in the form y = mx + c. {4 marks}

7. Find the value of x in the following equation. {3 marks}
$9^x + 3^{2x} - 1 = 53$

8. The first and the last terms of an AP are 2 and 59 respectively. If the sum of the series is 610, find the number of terms in the series and the common difference. {4 marks}

9. The equation of a circle is $2x^2 + 2y^2 + 12x - 20y - 4 = 0$. Determine the coordinates of the centre of the circle and state its radius. {3 marks}

10. Make b the subject of the formula $a = \frac{bd}{\sqrt{b^2 - d}}$ {3 marks}

11. Solve the inequality $3 - 2x \leq x \leq \frac{2x+5}{3}$ and show the solution on the number line. {4 marks}

12. Solve for x given that $\log_2 5x - \log_4 2x = 3$ {3 marks}

13. A salesman earns a basic salary of sh. 9,000 per month. In addition he is also paid a commission of 5% for sales above sh. 15,000. In a certain month he sold goods worth sh. 120,000 at a discount of 2½%. Calculate his total earnings that month. {3 marks}

14. A small cone of height 8 cm is cut off from a bigger cone to leave a frustum of height 16 cm. If the volume of the smaller cone is 160 cm^3, find the volume of the frustum. {3 marks}

15. Vector **OP** = 6i + j and **OQ** = -2i + 5j. A point N divides **PQ** internally in the ratio 3:1. Find **PN** in terms of i and j. {3 marks}

16. Without using mathematical tables or calculators express in surd form and simplify $\frac{1+Cos\,30^o}{1-Sin\,60^o}$ {3 marks}

SECTION II (50 MARKS)

Answer any five questions in this section

17. In the figure below, vector **OP** = **p** and **OR** = **r**. **OS** = 2r and **OQ** : **OP** = 3 : 2

a) Express the following vectors in terms of **p** and **r**.

i) **QR** {1 mark}

ii) **PS** {1 mark}

b) The lines QR and PS intersect at K. By expressing **OK** in two different ways, find the ratio PK : KS {8 marks}

18. On the graph paper provided, plot the triangle

a) whose co-ordinates are A(1, 2) B(5, 4) and C(2, 6) {1 mark}

b) On the same axes

i) Draw the image $A^1B^1C^1$ of ABC under a rotation of 90^o clockwise about origin. {2 marks}

ii) Draw the image $A^{11}B^{11}C^{11}$ of $A^1B^1C^1$ under a reflection in the line y = -x. State the coordinates of $A^{11}B^{11}C^{11}$. {3 marks}

c) $A^{111}B^{111}C^{111}$ is the image of $A^{11}B^{11}C^{11}$ under the reflection in the line x = 0. Draw the image $A^{111}B^{111}C^{111}$ and state its coordinates. {2 marks}

d) Describe a single transformation that maps $A^{111}B^{111}C^{111}$ onto ABC. {2 marks}

19. A bus left Kitale at 10.45 a.m and travelled towards Nairobi at an average speed of 60 km/h. A Nissan left Kitale on the same day at 1.15 p.m and travelled along the same road at an average speed of 100 km/h. The distance between Kitale and Nairobi is 500 km.

a) Determine the time of the day when the Nissan overtook the bus. {6 marks}

b) Both vehicles continued towards Nairobi at their original speed. Find how long the Nissan had to wait in Nairobi before the bus arrived. {4 marks}

20. The table below shows how income tax was charged in a certain year.

(Kenya pounds)	(Ksh. per Kenya pound)
1 – 3630	2
3631 - 7260	3
7261 - 10890	4
10891 - 14520	5
14521 - 18150	6
18151 - 21780	7
21781 and above	7.5

During the year Mwadime earned a basic salary of Ksh. 25,200 and a house allowance of Ksh. 12,600 per month. He was entitled to a personal tax relief of Ksh. 1,162 per month.

a) Calculate:

i) Mwadime's taxable income in Kenya pounds per annum. {2 marks}

ii) The net tax he pays per month. {6 marks}

b) Apart from income tax he also contributes monthly NHIF Ksh. 1600, WCPS Ksh. 1000. Calculate his net monthly pay. {2 marks}

21. X, Y and Z are three quantities such that X varies directly as the square of Y and inversely as the square root of Z.

a) Given that X = 18 when Y = 3 and Z = 4, find X when Y = 6 and Z = 16. {5 marks}

b) If Y increases by 10% and Z decreases by 19%, find the percentage increase in X. {5 marks}

22(a) A port B is on a bearing 080^o from a port A and a distance of 95 km. A Submarine is stationed at a port D, which is on a bearing of 200^o from A, and a distance of 124 km from B. A ship leaves B and moves directly Southwards to an Island P, which is on a bearing of 140^o from A. The Submarine at D on realizing that the ship was heading to the Island P, decides to head straight for the Island to intercept the ship. Using a scale of 1 cm to represent 10 km, make a scale drawing showing the relative positions of A, B, D and P. {4 marks}

Hence find:

b) The distance from A to D. {2 marks}

c) The bearing o the Submarine from the ship when the ship was setting off from B. {1 mark}

d) The bearing of the Island P from D. {1 mark}

e) The distance the Submarine had to cover to reach the Island P. {2 marks}

23. The data below represent the heights taken to the nearest centimeters of 40 lemon trees in a garden. (NB: A = Assumed mean)

Height (cm)	f	x	d = x - A	fd	d^2	fd^2
131 – 140	3					
141 – 150	4					
151 – 160	7					
161 – 170	11					
171 – 180	9					
181 – 190	5					

191 – 200	1					

a) Complete the table. {6 marks}

b) Using 165.5 as the assumed mean, calculate the mean height. {2 marks}

c) Calculate the standard deviation of the distribution. {2 marks}

24. The line segment BC = 7.5 cm long is one side of triangle ABC.

a) Use a ruler and compasses only to complete the construction of triangle ABC in which $\angle ABC = 45^o$, AC = 5.6 cm and angle BAC is obtuse. {3 marks}

b) Draw the locus of a point P such that P is equidistant from a point O and passes through the vertices of triangle ABC. {3 marks}

c) Locate point D on the locus of P equidistant from lines BC and BO. Q lies in the region enclosed by lines BD, BO extended and the locus of P. Shade the locus of Q. {4 marks}

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KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

Name …… **Admission number** ……

Candidate's Signature……**Date**……

ASUMBI GIRLS HIGH SCHOOL

121/1

MATHEMATICS

FORM 4

TIME: 2 ½ HOURS

INSTRUCTIONS TO CANDIDATES

1. *Write your name and admission number in the spaces provided at the top of this page.*
2. *This paper consists of two sections:* **Section I and Section II.**
3. *Answer **al**l questions in* **section I** and ONLY five questions in Section **II.**
4. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
5. *Marks may be given for correct working even if the answer is wrong.*
6. ***KNEC** Mathematical tables may be used.*

For Examiner's Use Only

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

17	18	19	20	21	22	23	24

Grand Total

SECTION I (50 Marks)
Answer all the questions in this section

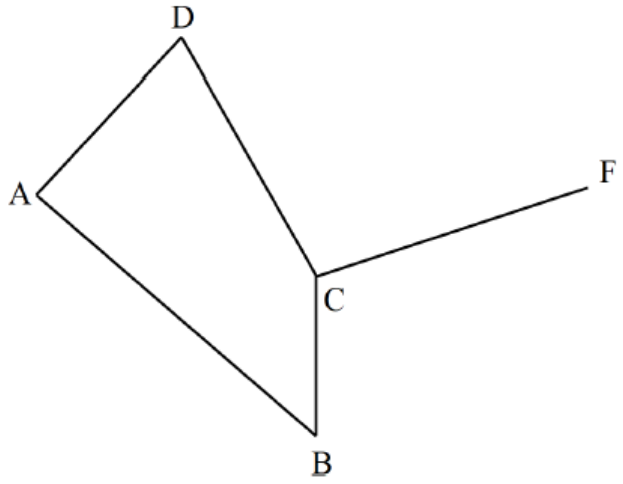
1. A man withdrew some money from a bank. He spent $\frac{3}{10}$ of the money on his daughter's school fees and $\frac{3}{5}$ of the remainder on his son's school fees. If he remained with Ksh 10 500, calculate the amount of money he spent on son's school fees. (3 marks)

2. Solve for x (3 marks)

$$9^{(x+1)} + 3^{(2x+1)} = 108$$

3. 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)

4. The figure below represents a sketch of the cross – section of a solid ABCDEFGH and its edge CF. Complete the sketch of the solid showing the hidden edges using dotted lines. (3 marks)



5. 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)

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

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

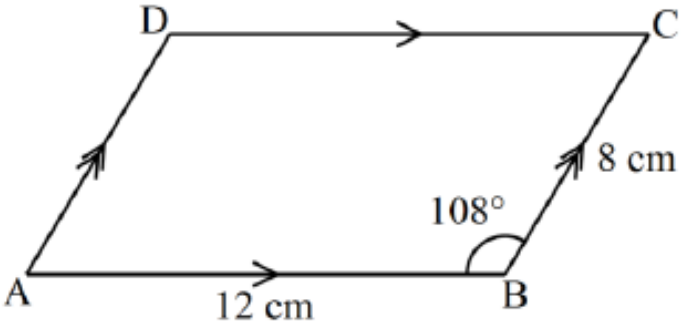
8. Given that $\tilde{\boldsymbol{a}} = 2p - ¾\ q$ where $p = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ and $q = \begin{pmatrix} 16 \\ 4 \end{pmatrix}$ Find column vector $\tilde{a}$. (2 marks)

9. 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)

10. In the figure below, ABCD is a parallelogram in which AB = 12 cm, BC = 8 cm and angle ABC = 108°.



Calculate the area of the parallelogram correct to 3 significant figures. (3 marks)

11. Without using mathematical tables or a calculator evaluate. (3 marks)

$$\frac{\tan 30^o \ \tan \ 60^o}{\sin 60^o \cos 30^\circ}$$

12. Given that $M = \begin{pmatrix} 4 & 5 \\ 2 & 3 \end{pmatrix}$ and $N = \begin{pmatrix} -2 & 3 \\ 1 & -1 \end{pmatrix}$, find $M^{-1}N$ (3 marks)

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

14. Use logarithms to evaluate. (3 marks)

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

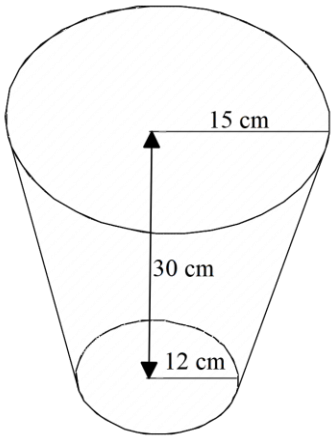
15. Dr. June needs to import a car from Japan that costs US dollars (USD) 5 000 outside Kenya. He intends to buy the car through an agent who deals in Japanese Yen (JPY). The agent charges a 20% commission on the price of the car and a further 80 325 JPY for shipping the car to Kenya. Find the amount in Kenya shillings that Dr. June will need to send to the agent to get the car given that 1 USD = Ksh. 120 and 1USD = 135 JPY (3 marks)

16. In a right angled triangle, the two sides enclosing the right angle measure $(3x - 2)$cm and $(x + 2)$ cm. If the area of the triangle is 17.5 cm^2, find the length of these two sides. (3 marks)

SECTION II (50 Marks)

Answer any Five questions only in this section

17. The diagram below shows a frustum which represents a bucket with an open end diameter of 30 cm and bottom diameter 24 cm.



The bucket is 30cm deep. (Use π = 3.142)

(a) Calculate the capacity of the tank in litres. (5 marks)

(b) The bucket is used to fill an empty cylindrical tank of diameter 1.4m and height 1.2m.

i. Calculate the capacity of the tank in litres. (3 marks)

ii. Determine the number of buckets that must be drawn in order to fill the tank. (2 marks)

18. Three islands P, Q, R and S are on an ocean such that island Q is 400Km on a bearing of $030°$ from island P. Island R is 520 km and a bearing of $120°$ from island Q. A port S is sighted 750 km due South of island Q.

a) Taking a scale of 1cm to represent 100Km, give a scale drawing showing the relative positions of $P, Q, R \text{ and } S$. (4 marks)

b) Use the scale drawing to find the bearing of:

i. Island R from island P (1 mark)

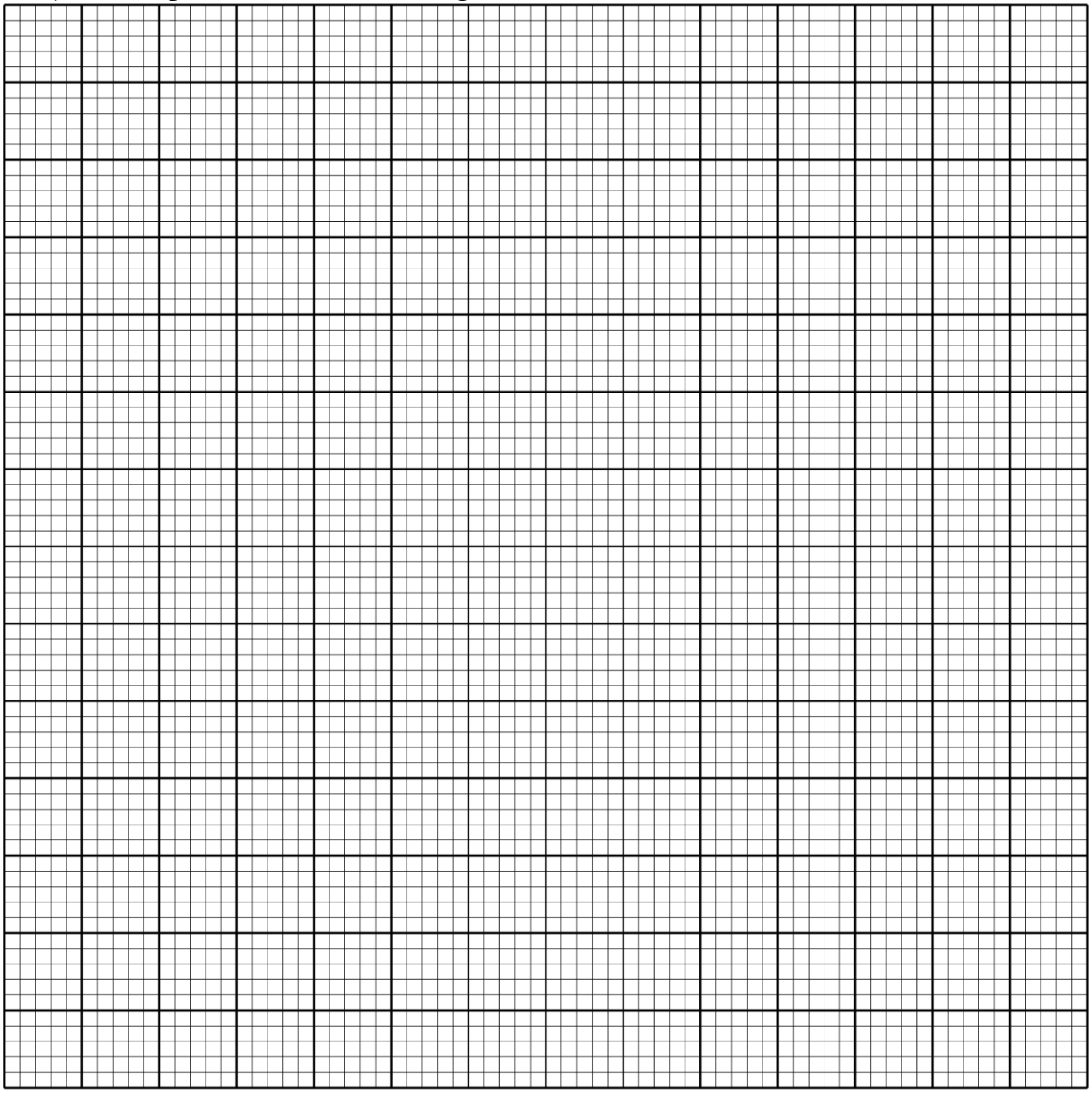
ii. Port S from island R (1 mark)

c) Find the distance between island P and R (2 marks)

d) A warship T is such that it is equidistant from the islands P, S and R. by construction locate the position of T. (2 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)

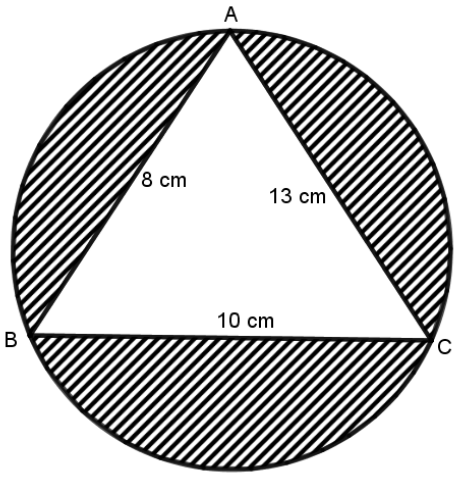
ii. Describe fully the transformation **T**. (2 marks)

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. $AB = 8\ cm, BC = 10\ cm$ and $AC = 13cm$



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)

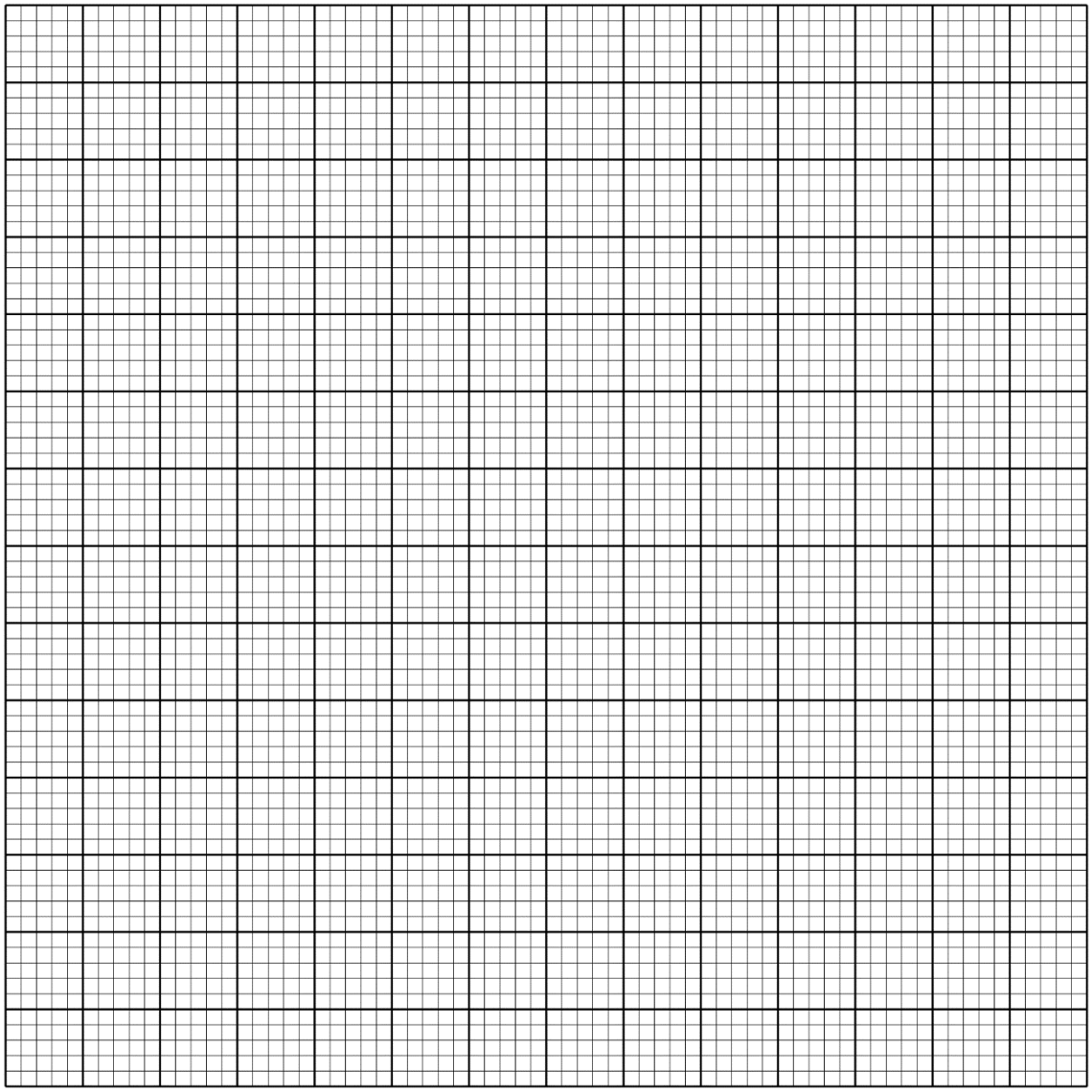
21. (a) Complete the table below for the function $y = x^3 - 5x^2 + 2x + 9$ for $-2 \leq x \leq 5$

(2 marks)

x	-2	-1	0	1	2	3	4	5
y			9					

(b) On the grid provided, draw the graph of $y = x^3 - 5x^2 + 2x + 9$ for $-2 \leq x \leq 5$

(3 marks)



(c) Use the graph in (b) above to find the roots of the following equations:

i. $x^3 - 5x^2 + 2x + 9 = 0$ (2 marks)

ii. $x^3 - 5x^2 + 6x = -5$ (3 marks)

22. 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)

23. A trader bought 8 cows and 12 goats for a total of Ksh 294,000. If he had bought 1 more cow and 3 more goats he would have spent Ksh 337,500

a) Form two equations to represent the above information. (2 marks)

b) Use matrix method to determine the cost of a cow and that of a goat. (4 marks)

c) The trader sold the animals he had bought making a profit of 40% per cow and 45% per goat. Calculate the total amount of money he received. (2 marks)

d) Determine his profit in Kenya shillings. (2 marks)

24. A straight line l_1 has a gradient $-\frac{1}{2}$ and passes through the point $(-1, 3)$. Another line l_2 passes through the points Q $(1, -3)$ and R $(4, 5)$ Find:

a) (i) The equation of l_1 in the form $y = mx + c$, where m and c are constants. (2 marks)

(ii) Hence find the y intercept of line l_1 (1 mark)

b) (i) The gradient of l_2 (1 mark)

(ii) The equation of l_2 in the form $ax + by = c$, where a, b and c are integral values. (2 marks)

c) The equation of a line passing through a point $(0, 5)$ and perpendicular to l_2. (3 marks)

d) Calculate the acute angle that l_3 makes with the x-axis. (1 mark)

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Kenya Certificate of Secondary Education

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Name …… **Admission number** ……

Candidate's Signature……**Date**……

ALLIANCE BOYS HIGH SCHOOL

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

a) *Write your name and admission number in the space provided at the top of this page*
b) *This paper consists of two sections; **section I** and **section II**.*
c) *Answer **ALL** questions in section I and only **FIVE** questions in section II*
d) *Show all the steps in your calculations; giving your answers at each stage in the spaces provided below each question.*
e) *Marks may be given for correct working even if the answer is wrong.*
f) *Non-programmable silent electronic calculators and KNEC mathematical tables may be used.*
g) *This paper consists of 15 printed pages*

FOR EXAMINER'S USE ONLY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL

SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

SECTION I(50marks)

Answer all the questions in this section

1) The sum of four consecutive odd integers is less than 64. Determine the first four such integers. (3 marks)

2) Solve the equation (3marks)

$$\frac{2}{t-1} - \frac{1}{t+2} = \frac{1}{t}$$

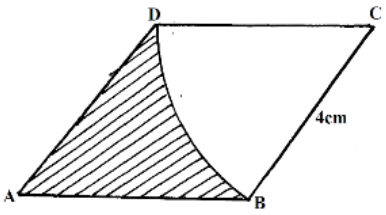
3) Moses has twenty shillings more than Jane. After he spends a quarter of his money and Jane ⅕ of hers, they find that Jane has 10 shillings more than Moses. How much money did both have? (4 marks)

4) The sum of interior angles of two regular polygons of side n-1 and n are in the ratio 4:5. Calculate;

(i) The size of interior angle of the polygon with side (n-1) (2 marks)

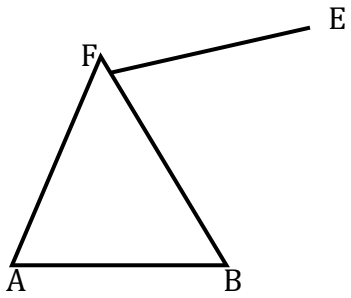
(ii) The size of exterior angle of the polygon with side (n-1) (1 mark)

5) The figure below is a rhombus ABCD of sides 4cm. BD is an arc of circle center C. Given that $\angle ABC = 138^0$. Find the area of shaded region correct to 3 significant figures. (Take $\pi=\frac{22}{7}$) (3 marks)



6) Find the greatest common factor of x^3y^2 and $4xy^4$. Hence factorise completely the expression $x^3y^2 - 4xy^4$. (3 Marks)

7) The figure below is a part of the sketch of a triangular prism ABCDEF.



Complete the sketch by drawing the hidden edges using broken lines. (3 marks)

8) Without using calculator, solve for n in the equation $1 - \left(\frac{1}{3}\right)^n = \frac{242}{243}$ (3marks)

9) Given that $OA = \begin{pmatrix} -2 \\ 10 \end{pmatrix}$ and $OB = \begin{pmatrix} x \\ -2 \end{pmatrix}$ and that the magnitude of AB is 13 units, find the possible values of x. (3marks)

10) Ali travelled a distance of 5km from village A to village B in direction of N60^{0}E. He then changed direction and travelled a distance of 4km in the direction of 135^0 to village C.

a) Using a scale of 1cm to represent 1.0 km represent the information on an accurate diagram.

(2marks)

b) Using scale drawing in (a) above determine

(i) The distance between A and C (1mk)

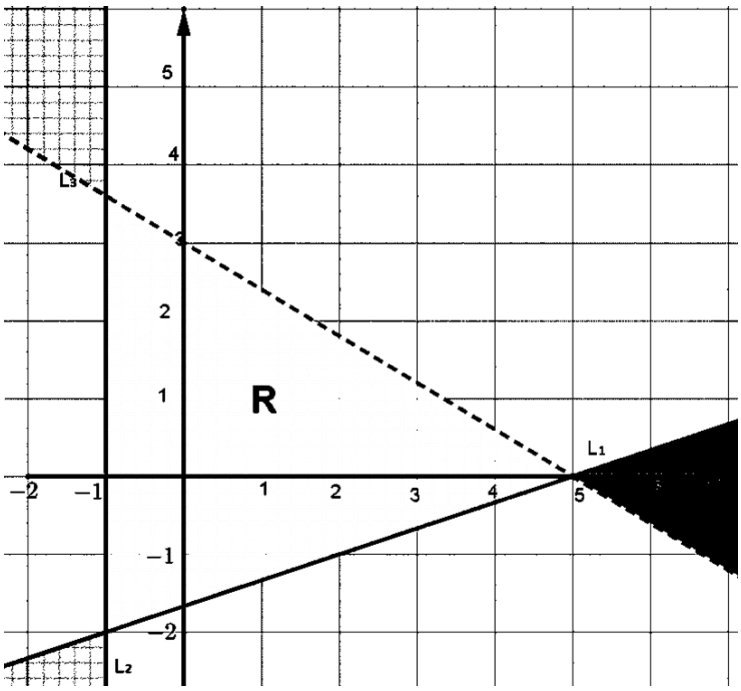
(ii) The bearing of A from C (1mk)

11) Three numbers p,q and r are such that $p^3 \times q^2 \times r = 2250$. Find p, q and r.

(3 marks)

12) A bus starts off from Kitale at 9.00 a.m and travels towards Kakamega at a speed of 60km/hr. At 9.50 a.m, a matatu leaves Kakamega and travels towards Kitale at a speed of 60Km/h. If the distance between the two towns is 150km, how far from Kitale will the two vehicles meet? (3marks)

13) Find the inequalities that satisfy the region R shown in the figure below. (3 marks)



14) A dealer sells a certain spare part for Kshs 650, making a profit of 30%. The manufacturer reduces the price to the dealer by Kshs 50 and the dealer reduces his selling price by the same amount. Find the dealer's new percentage profit.

(3marks)

15) A taxi travelling at 20m/s accelerates uniformly and in 4 seconds, its velocity is 30m/s. it maintains this velocity for another 5 seconds before decelerating uniformly to rest after 3 seconds. Calculate the total distance travelled by the taxi during the journey.

(3marks)

16) The length of a rectangle is $(x + 3)$ cm. If the width of the rectangle is two thirds its length and the perimeter is 40 cm, find its width. (3 marks)

SECTION II

Answer only five questions in this section

17. A sales agents earns a basic salary of Kshs. 20,000 per month. In addition, he is entitled for a commission for sales in excess of Kshs. 200,000 as follows:

Sales	Commission
0-200,000	0%
200,001-300,000	1.5%
300,001-400,000	3.0%
400,001-500,000	4.5%
Above 500,000	6.0%

(a) On the month of April 2019, her total sales were Kshs. 558,200. Determine his total earnings that month. (4marks)

(b) On the month of May 2020, his sales increase in the ratio 6:5, Calculate his total earnings on May 2020 to the nearest shilling. (3marks)

(c) On the month of June 2020 his total earnings were Kshs. 39,800. Calculate the difference in his total sales in months of May and June. (3marks)

18. (a)A man standing 20m away from a building notices that the angles of elevation of the top and bottom of a flagpole mounted at the top of the building are 64^0 and 62^0 respectively. Calculate to 1d.p. the height of the flagpole.

(4marks)

b) The angles of elevation of the top of a tree from P and Q which are 30m apart are 22^0 and 32^0 respectively. Given that the two points are on the same side of the tree and on a Straight line, determine the height of the tree. (6marks)

19. Two security personnel were together at a road junction. Each had a walkie talkie. The maximum distance at which one could communicate with the other was 2.5km. One of the personnel walked due East at 3.2km/h while the other walked due North at 2.4km/h. The personnel who headed east travelled for x km while the one who headed North travelled for y km before they were unable to communicate.

(a) Draw a sketch to represent the relative positions of the policemen. (1 mark)

(b) (i) From the information above form two simultaneous equations in form of x and y. (2 marks)

(ii) Find the value of x and y. (5 marks)

(iii) Calculate the time in minutes taken before the security personnel were unable to communicate. (2 mark

20. ABCD is a rectangle with A as the point (-3,1).

(a) If AB is parallel to the line$3y - x = 4$, find the equation of line AB.

(2 marks)

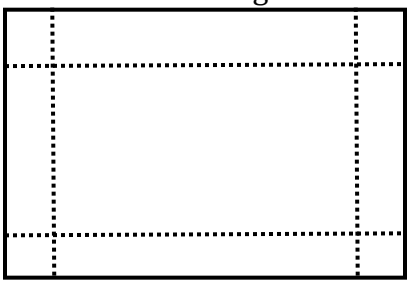
(b) Find the equation of line AD. (2marks)

(d) If C has coordinates (2,6), find the equations of the line BC and CD in the form $\frac{x}{a}+\frac{y}{b} = 1$

(4marks)

(e) Find the coordinates of B (2marks)

21. The figure below shows a rectangular sheet of metal whose length is twice its width.



An open rectangular tank is made by cutting equal squares of length 60 cm from each of its four corners and folding along the dotted lines shown in the figure above. Given that the

capacity of the tank so formed is 1920 litres and the width of the metal sheet used was x cm;

a) (i) Express the volume of the tank formed in terms of **x** cm. (3 marks)

(ii) Hence or otherwise obtain the length and width of the sheet of metal that was used. (3 marks)

b) If the cost of the metal sheet per m^2 is Kshs 1000 and labour cost for making the tank is 300 per hour. Find the selling price of the tank in order to make a 30% profit if it took 6 hours to make the tank. (4 marks)

22. a) The ratio of Juma's and Akinyi's earnings was 5: 3. Juma's earnings rose to Ksh 8 400 after an increase of 12%. Calculate the percentage increase in Akinyi's earnings given that the sum of their earnings was Ksh. 14 100 (6 marks)

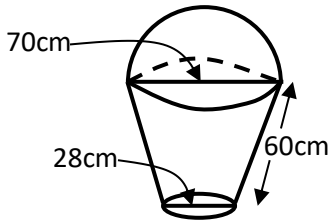
(b) Juma and Akinyi contributed all the new earnings to buy maize at Ksh 1 175 per bag. The maize was then sold at ksh 1 762.50 per bag. The two shared all the money from the sales of the maize in the ratio of their contributions. Calculate the amount that Akinyi got. (4 marks)

23. a) Given that $\mathbf{A} = \begin{pmatrix} 3 & 4 \\ 2 & 3 \end{pmatrix}$ find inverse of $\mathbf{A}$ (1mark)

b) Two colleges, Utalii and Huduma purchased beans and rice . Utalii bought 90 bags of beans and 120 bags of rice for a total of sh 360 000 . Huduma bought 200 bags of beans and 300 bags of rice for a total of sh 850 000. Use the inverse of **A** obtained in (a) above to find the price of one bag of each item. (6marks)

c) The price of beans later decreased in the ratio 4: 5 while that of rice increased by 20 %. A businessman bought 20 bags of beans and 30 bags 0f rice. How much did he pay? (3marks)

24. The figure below shows a model of a solid in the shape of a frustum of a cone with a hemispherical top.



The diameter of the hemispherical top is 70cm and is equal to the diameter of the top of the frustum. The frustum has a base diameter of 28cm and a slant height of 60cm.

(a) Calculate the area of the hemispherical surface. (1mark)

(b) Calculate the slant height of the cone from which the frustum was cut. (4marks)

(c) Calculate the total surface area of the model. (5 marks)

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KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

Name …… **Admission number** ……

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ALLIANCE GIRLS HIGH SCHOOL

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

a) *Write your name and admission number in the space provided at the top of this page*

b) *This paper consists of two sections;* ***section I*** *and* ***section II****.*

c) *Answer* ***ALL*** *questions in section I and only* ***FIVE*** *questions in section II*

d) *Show all the steps in your calculations; giving your answers at each stage in the spaces provided below each question.*

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g) *This paper consists of 15 printed pages*

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL

SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

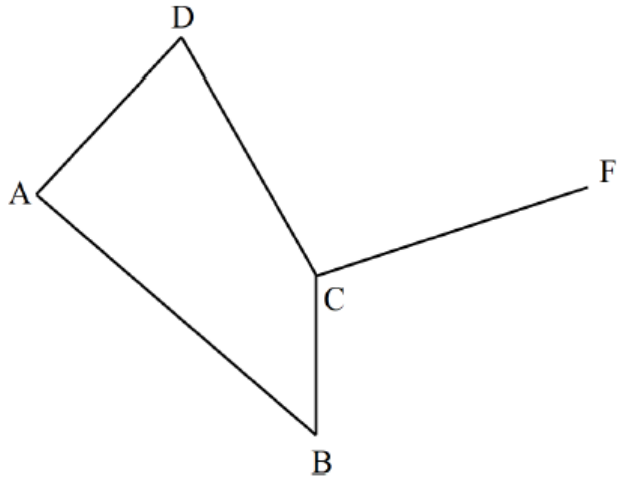
SECTION I (50 Marks)
Answer all the questions in this section

1. 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)

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

3. 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)

4. The figure below represents a sketch of the cross – section of a solid ABCDEFGH and its edge CF. Complete the sketch of the solid showing the hidden edges using dotted lines.
(3 marks)



5. 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)

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

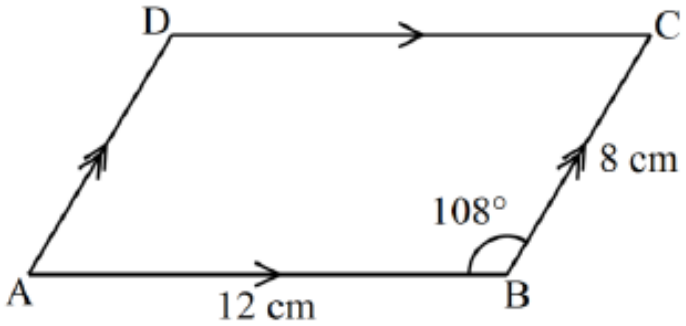
7. Using a ruler and a pair of compasses only, construct a trapezium ABCD in which $AB = 5\ cm$, $AD = 6\ cm, DC = 10\ cm, \angle BAD = 105°$ and AB is parallel to DC. Draw a perpendicular from B to DC hence measure the height of the trapezium. (4 marks)

8. Given that $\tilde{\boldsymbol{a}} = 2p - ¾\, q$ where $p = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ and $q = \begin{pmatrix} 16 \\ 4 \end{pmatrix}$ Find column vector $\tilde{a}$. (2 marks)

9. 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)

10. In the figure below, ABCD is a parallelogram in which AB = 12 cm, BC = 8 cm and angle ABC = 108°.



Calculate the area of the parallelogram correct to 3 significant figures. (3 marks)

11. Without using mathematical tables or a calculator evaluate. (3 marks)

$$\frac{\tan 30^o \ \tan\ 60^o}{\sin 60^o \cos 30°}$$

12. Given that $M = \begin{pmatrix} 4 & 5 \\ 2 & 3 \end{pmatrix}$ and $N = \begin{pmatrix} -2 & 3 \\ 1 & -1 \end{pmatrix}$, find $M^{-1}N$ (3 marks)

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

14. Use logarithms to evaluate. (3 marks)

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

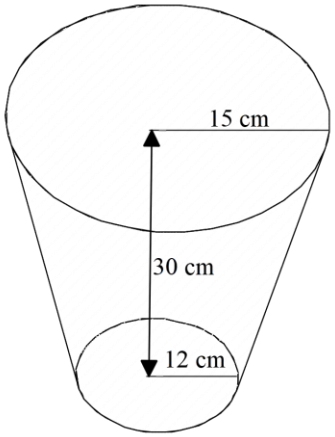
15. Dr. June needs to import a car from Japan that costs US dollars (USD) 5 000 outside Kenya. He intends to buy the car through an agent who deals in Japanese Yen (JPY). The agent charges a 20% commission on the price of the car and a further 80 325 JPY for shipping the car to Kenya. Find the amount in Kenya shillings that Dr. June will need to send to the agent to get the car given that 1 USD = Ksh. 120 and 1USD = 135 JPY (3 marks)

16. In a right angled triangle, the two sides enclosing the right angle measure $(3x - 2)$cm and $(x + 2)$ cm. If the area of the triangle is 17.5 cm^2, find the length of these two sides.
(3 marks)

SECTION II (50 Marks)

Answer any Five questions only in this section

17. The diagram below shows a frustum which represents a bucket with an open end diameter of 30 cm and bottom diameter 24 cm.



The bucket is 30cm deep. (Use π = 3.142)

(a) Calculate the capacity of the tank in litres. (5 marks)

(b) The bucket is used to fill an empty cylindrical tank of diameter 1.4m and height 1.2m.

i. Calculate the capacity of the tank in litres. (3 marks)

ii. Determine the number of buckets that must be drawn in order to fill the tank. (2 marks)

18. Three islands P, Q, R and S are on an ocean such that island Q is 400Km on a bearing of $030°$ from island P. Island R is 520 km and a bearing of $120°$ from island Q. A port S is sighted 750 km due South of island Q.

a) Taking a scale of 1cm to represent 100Km, give a scale drawing showing the relative positions of $P, Q, R \text{ and } S$. (4 marks)

b) Use the scale drawing to find the bearing of:

i. Island R from island P (1 mark)

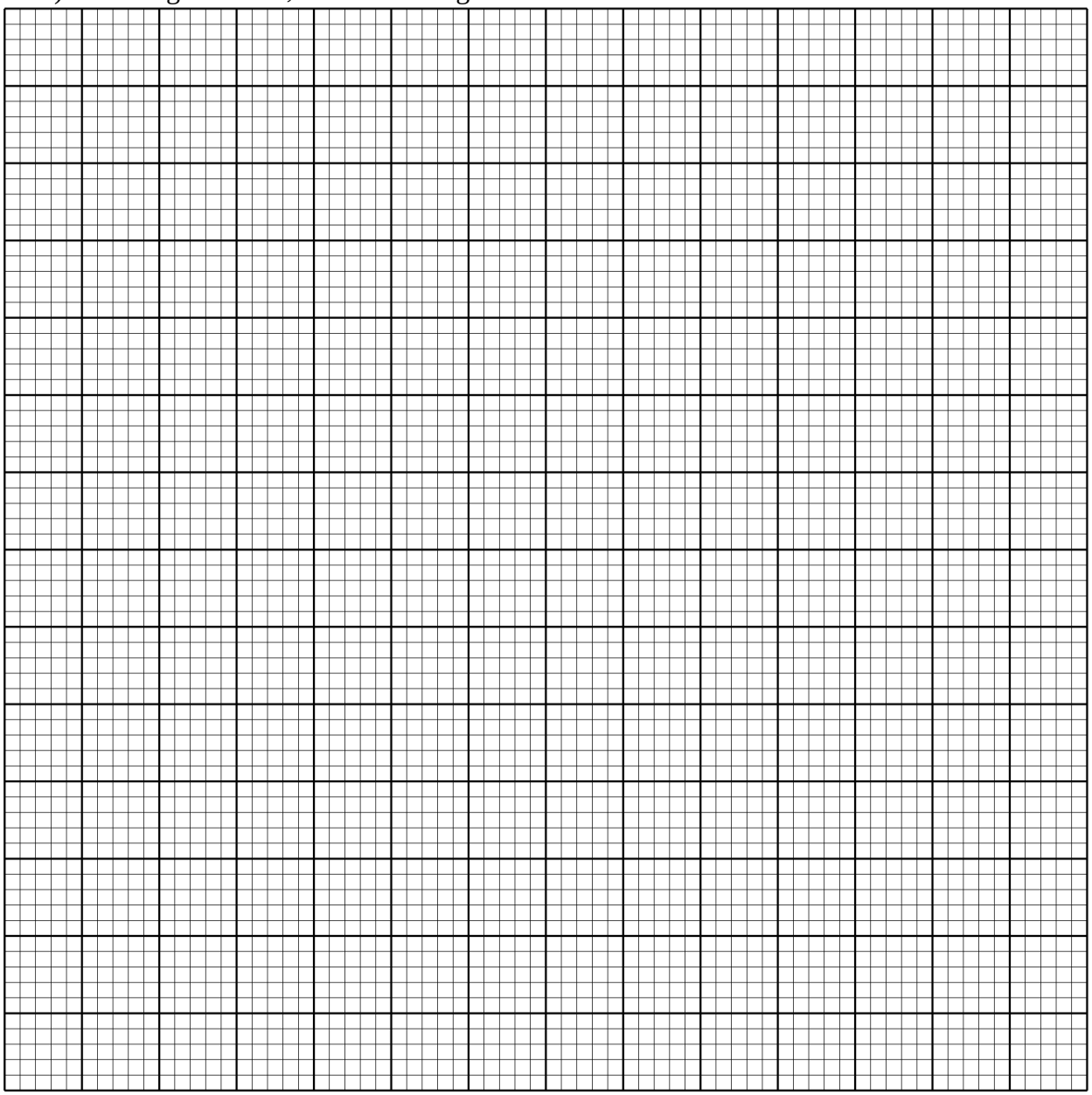
ii. Port S from island R (1 mark)

c) Find the distance between island P and R (2 marks)

d) A warship T is such that it is equidistant from the islands P, S and R. by construction locate the position of T. (2 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)

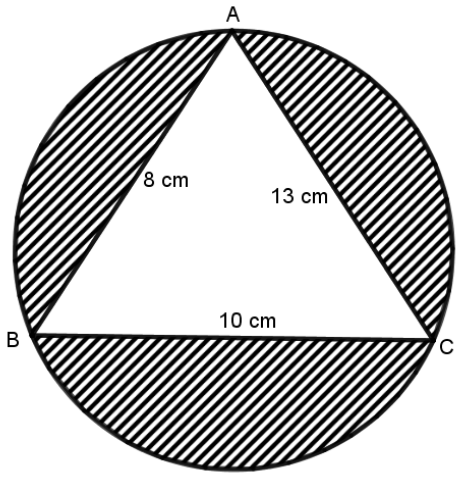
ii. Describe fully the transformation **T**. (2 marks)

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. $AB = 8\ cm, BC = 10\ cm$ and $AC = 13cm$



Calculate

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

(b) Angle BAC (2 marks)

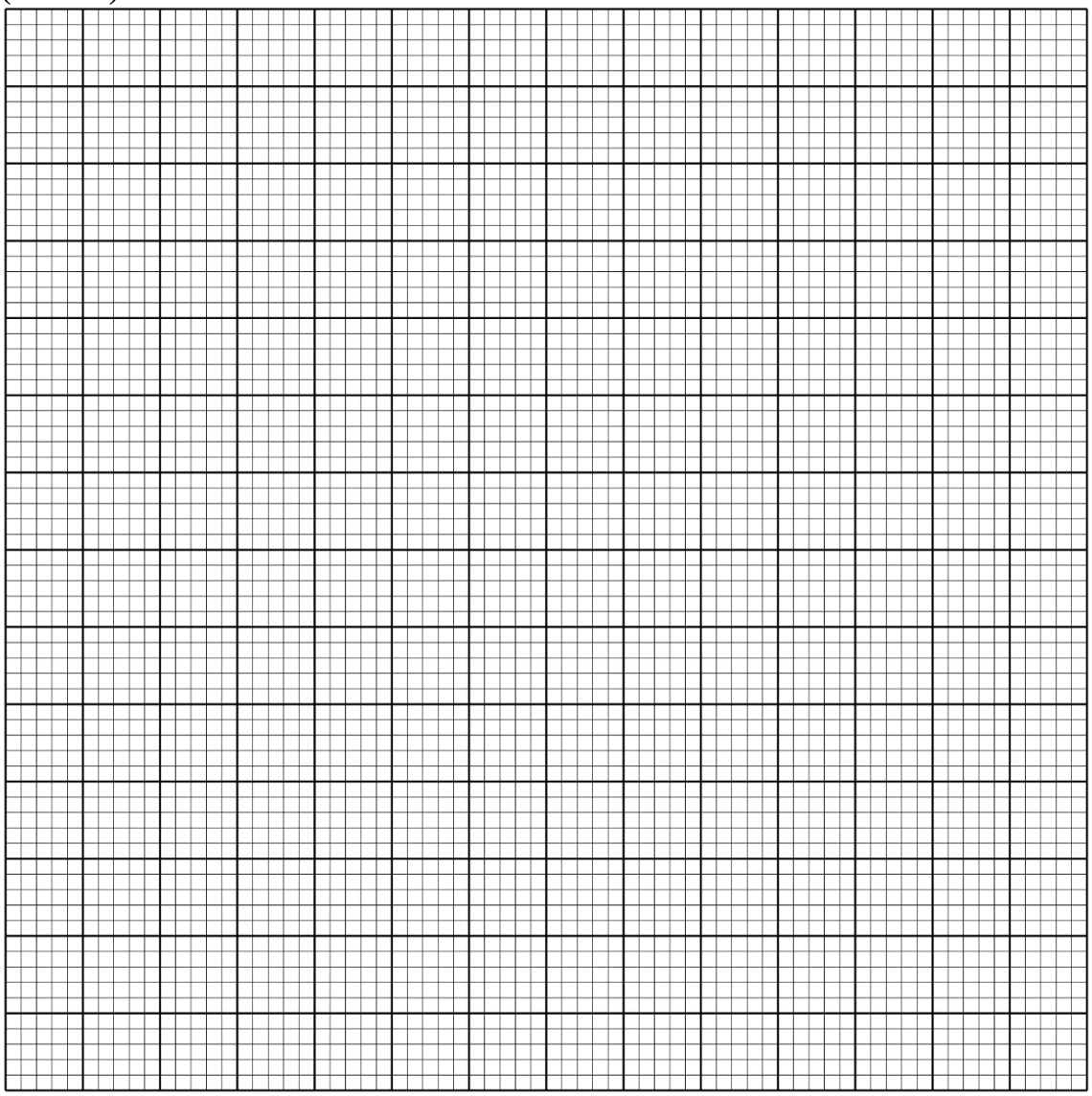
(c) The radius of the circle. (2 marks)

(d) Area of the shaded region. (3 marks)

21. (a) Complete the table below for the function $y = x^3 - 5x^2 + 2x + 9$ for $-2 \leq x \leq 5$
(2 marks)

x	-2	-1	0	1	2	3	4	5
y			9					

(b) On the grid provided, draw the graph of $y = x^3 - 5x^2 + 2x + 9$ for $-2 \leq x \leq 5$
(3 marks)



(c) Use the graph in (b) above to find the roots of the following equations:

i. $x^3 - 5x^2 + 2x + 9 = 0$ (2 marks)

ii. $x^3 - 5x^2 + 6x = -5$ (3 marks)

22. 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)

23. A trader bought 8 cows and 12 goats for a total of Ksh 294,000. If he had bought 1 more cow and 3 more goats he would have spent Ksh 337,500

a) Form two equations to represent the above information. (2 marks)

b) Use matrix method to determine the cost of a cow and that of a goat. (4 marks)

c) The trader sold the animals he had bought making a profit of 40% per cow and 45% per goat. Calculate the total amount of money he received. (2 marks)

d) Determine his profit in Kenya shillings. (2 marks)

24. A straight line l_1 has a gradient $-\frac{1}{2}$ and passes through the point $(-1, 3)$. Another line l_2 passes through the points Q $(1, -3)$ and R $(4, 5)$ Find:

a) (i) The equation of l_1 in the form $y = mx + c$, where m and c are constants. (2 marks)

(ii) Hence find the y intercept of line l_1 (1 mark)

b) (i) The gradient of l_2 (1 mark)

(ii) The equation of l_2 in the form $ax + by = c$, where a, b and c are integral values. (2 marks)

c) The equation of a line passing through a point $(0, 5)$ and perpendicular to l_2. (3 marks)

d) Calculate the acute angle that l_3 makes with the x-axis. (1 mark)

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Candidate's Signature……**Date**……

FRIENDS SCHOOL KAMUSINGA TRIAL 1

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

a) *Write your name and admission number in the space provided at the top of this page*
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SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

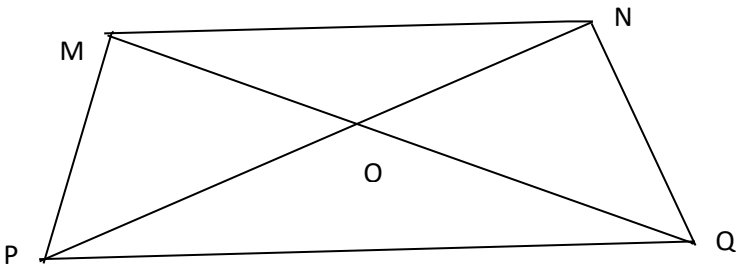
Grand total

Section I (50 marks)

Answer all the questions in this section

1. Use logarithms to evaluate $\dfrac{0.6845^{2} \times 0.08416^{\frac{1}{2}}}{0.005937}$. **(4 marks)**

2. In the figure below PQ is parallel to MN. PQ = (y + 3) cm, MN = y cm, PN = 7.5 cm and NO = 6 cm. Find the value of y. **(3 marks)**



3. The straight line through the points D (6, 3) and E (3, -2) meets the y-axis at the point F. Determine the coordinates of F. **(3 marks)**

4. Solve for x and y in:
$3^{2x-y} = 27$ and $4^{x} \div 16^{y} = 1$ **(3 marks)**

5. A sphere has surface area 18 cm^2. Find its density if the sphere has a mass of 100 gm. **(3 marks)**

6. The length of an enlarged photograph is (4x + 4) cm whilst that of the original is (x + 1) cm. Find the width of the original photograph if the enlarged one is 32 cm wide.
(3 marks)

7. Simplify: $\frac{2-10x+12x^2}{36x^2+3-21x}$. **(4 marks)**

8. Two upright poles AC and BD stand on a horizontal ground with C and D as their bases. E is a point equidistant from C and D such that CED is a straight line, angle AEB = 90^o, ED = 5 m, BE = 6 m and AC = 3m. Calculate BD and AB. **(3 marks)**

9. A number n is such that when it is divided by 27 and 30 or 45, the remainder is always 3. Find the smallest value of n. **(2 marks)**

10. The sum of interior angles of two regular polygons of sides, n-1 and n are in the ratio 2:3. Calculate

i) The value of n. **(2 marks)**

ii) The interior angle of each polygon. **(2 marks)**

11. If $\log_7 2 = 0.356$ and $\log_7 3 = 0.566$, find the value of $2\log_7\left(\frac{7}{15}\right) + \log_7\left(\frac{25}{12}\right) - 2\log_7\left(\frac{7}{3}\right)$.

(3 marks)

12. A 60 m by 80 m parking lot is torn up to install a sidewalk of uniform width around its perimeter. The new area of the parking lot is two thirds of the old area. How wide is the sidewalk?

(4 marks)

13. The cost of a camera outside Kenya is US$ 1000. James intends to buy one such camera through an agent who deals in Japanese Yen. The agent charged him 5% commission on the price of the camera and further 1260 Japanese Yen as importation tax. How many Kenya Shillings will he need to send to the agent to obtain the camera at the following exchange rates?

1 US$ = 105.00 Yen

1 US$ = Kshs. 93.33 **(3 marks)**

14. If 7, p, q, r and 9072 are the first five terms of a geometric progression, find the positive values of p, q and r. **(3 marks)**

15. The formula $c = \frac{5}{9}(f - 32)$ can be used to convert Fahrenheit temperature, F, to Celsius temperatures C. For what Fahrenheit temperatures is the Celsius temperature lower than 45°C?

(2 marks)

16. The position vectors of A and B are $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ -5 \end{pmatrix}$ respectively. A point P, divides the line AB such that -2AP=7PB. Find the position vector of the point P. **(3 marks)**

SECTION II (50 MARKS)

Answer any five questions in this section

17. Patients who attended a clinic in one week were grouped by age as shown in the table below.

Age x years	$0 \leq x < 5$	$5 \leq x < 15$	$15 \leq x < 25$	$25 \leq x < 45$	$45 \leq x < 75$
No of patients	14	42	59	70	15

a) Estimate

i) Mean age. **(3 marks)**

ii) Median age. **(3 marks)**

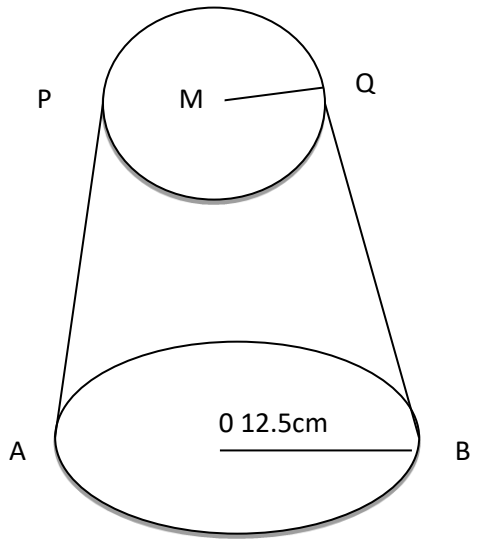
b) Calculate the semi-interquartile distribution range. **(4 marks)**

18.a) Using a ruler and pair of compasses only, construct triangle ABC in which AB = 9cm, AC = 8cm and angle BAC = 60^0. **(2 marks)**

(b) On the same side of AB as C, draw the locus of a point such that angle APB = 60^0 **(3 marks)**

c) A region T is within the triangle ABC such that AT > 4cm and angle ACT ≥ angle BCT. Show the region T by shading it. **(5 marks)**

19.(a) PQCB shows a frustum of a cone. The radius of the top and bottom circular parts of the frustum are 7.5cm and 12.5cm respectively, centres M and O are 10cm part.



a) Calculate the

i) Slant length QB of the frustum correct to 2 decimal places. **(1 mark)**

ii) The volume of frustum **(3 marks)**

iii) The vertex angle of the cone from which the frustrum was made. **(2 marks)**

b) If the frustum is of solid metal and is melted down and recast into a solid cylinder having a radius of 10.5cm, calculate.

i) The height of cylinder correct to 3 decimal places. **(2 marks)**

ii) The surface area of the cylinder **(2 marks)**

20(a) Richard is a coffee farmer. In the year 2010 he produced 1200 bags of coffee. In the year 2011 his yield dropped by 28% due to drought. In the year 2012 his yield increased by 10% over that of 2011. Each bag of coffee has a mass of 65 kg. In the year 2010 he was paid sh. 14,600 per tonne. In the years after 2010 the price per tonne increased each year by 13%.

i) Calculate his earnings from coffee for each of these three years. **(5 marks)**

ii) Calculate his total income from coffee for the three years. **(1 marks)**

b) solve for n by factorization in $4p^{2n} - 5p^{n} + 1=0$. **(4 marks)**

21.(a) A train of length 100m travelling at 12 m/s passes a second train of length 140m travelling in the same direction at a speed of 9 m/s. Calculate the time taken for the train to pass completely.
(3 marks)

(b) X and Y cycle to school 10 km away. X cycles at 1.5 km/h faster than Y and arrives 10 minutes before Y. Determine the speeds at which the two cycle. **(4 marks)**

c) A train leaves town A and travels towards B at 48 km/h. At the same time, another train leaves town B and travels towards A at a speed of 52 km/h. If the two towns are 500 km apart, find how far apart the trains are after traveling for 45 minutes. **(3 marks)**

22.a) A farmer has 120 metres of fencing with which to enclose a rectangular sheep-pen, using an existing wall for one side. Find the maximum area that he can enclose?
(5 marks)

b) A particle moves along the x-axis in such a way that its distance, x cm from the origin after, t seconds is given by the formula: $x = 27t - 2t^2$.
Find

i) Its velocity and acceleration after 6.75 seconds. **(2 marks)**

ii) How long does it take for the velocity to be reduced from 15 cm/s to 9 cm/s? **(5 marks)**

23. At airport X, a building 20m high is 200m from the end of the main runway and in line with it. Assuming that a plane takes off at the end of the runway and climbs in a straight line

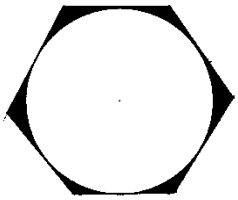
a) Determine the minimum angle of ascent. **(2 marks)**

b) If the angle of ascent is 10^o and the plane leaves the ground 40m before the end of the runway, by how much will it clear the top of the building? **(3 marks)**

c) Determine the least possible distance from the end of the runway when the angle of ascent is 4^o.
(3 marks)

d) Calculate the angle of ascent if the plane lifts of the ground 30 m before the end of the runway, makes a 15 m clear of the top of the building. **(2 marks)**

24.a) In the figure below, a circle is inscribed in a regular hexagon. The circle is of radius 8 cm.



Calculate the area of the shaded region. **(5 marks)**

b) An arithmetic progression has the first term a and common difference d.

i) Write down the third, ninth and twenty fifth terms of the progression. **(1 mark)**

ii) The arithmetic progression above is such that it is increasing and that the third, ninth and the twenty fifth terms form the first three consecutive terms of a geometric progression. The sum of the seventh and twice the sixth term of the arithmetic progression is 78. Calculate the first term and the common difference of the AP.
(4 marks)

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Candidate's Signature……**Date**……

KAPSABET BOYS HIGH SCHOOL TRIAL 1

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

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Grand total

SECTION II

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SECTION I (50 Marks)

Answers all the questions in this section in the space provided.

1. Evaluate without using tables or calculators (3marks)

$$\frac{\sqrt{45}\times(2.04)^2}{2.89\times\sqrt{0.05}}$$

2. Momanyi spent one eight of his February Salary on farming, half on school fees and two thirds of the remainder on food. Calculate his February salary and the amount he spend on school fees if he spent sh. 3200 on food. (3marks)

3. Makau, Wanjiru and Kemboi start a race at 9.03 a.m in the same direction to run round a circular course. Makau makes the circuit in 252 seconds, Wanjiru in 308 seconds and Kemboi in 198 seconds. If they start from the same point, at what time will they next be all at the starting point together? (3marks)

4. Use squares square roots and reciprocal tables to evaluate (3marks)

$$3.045^2+\frac{1}{\sqrt{49.24}}$$

5. Simplify the expression

$$\frac{9t^2-25a^2}{6t^2+19at+15a^2}$$

(3marks)

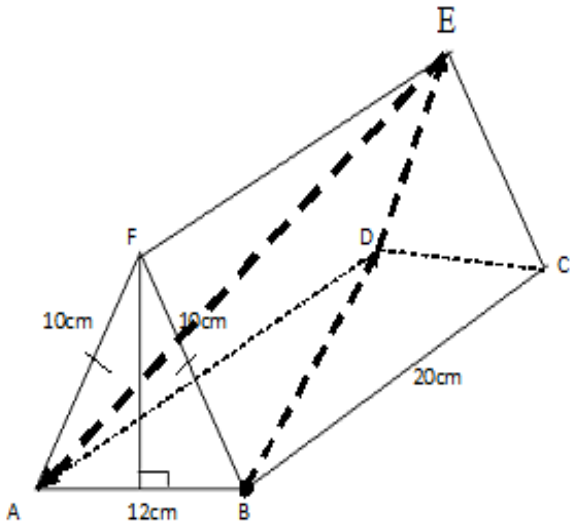
6. A square based brass plate is 2mm high and has a mass of 1.05kg. The density of the brass is 8.4g/cm^3. Calculate the length of the plate in centimeters. (3 marks)

7. The currency exchange rates of a given bank in Kenya are as follows;

Currency	Buying	Selling
1 sterling pound	135.50	135.97
1 US dollar	72.23	72.65

A tourist arrived in Kenya with 5,000 US dollars which he converted to Kenya shillings upon arrival. He spent ksh.214, 500 and converted the remaining to sterling pounds. How many pounds did he receive? (3marks)

8. The figure below shows a simple tent.AF=FB=10cm, AB=12cm and BC=FE=AD=20cm. On the tent, a tight rope is tied as shown on the diagram from BD, DE and EA. Draw the net of the tent and show the path of the rope on the net using the scale $1cm$ rep. $5cm$ (3marks)

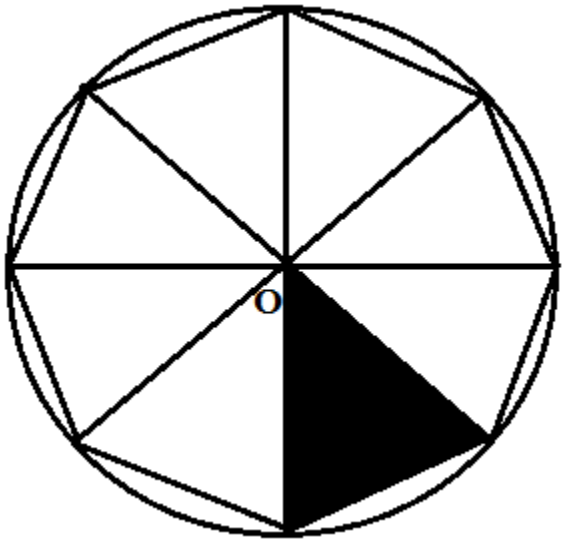


9. Mrs Wekesa paid shs 12500 for a wrist watch after the shopkeeper gave her a discount of 2%. If the shopkeeper made a profit of 20%.calculate the price the shopkeeper bought from the manufacturer. (3marks)

10. Solve for x in $\left(\frac{4}{9}\right)^{x} \times (8)^{1-x} = 486$ (4marks)

11. Find the equation of a perpendicular bisector of line PQ if the coordinates of P and Q are (-2,6) and (4,-2) respectively, in the form $y = mx + c$ (3marks)

12. Complete the figure below by adding the correct missing features if it has a rotational symmetry of order 4 about O. (3marks)

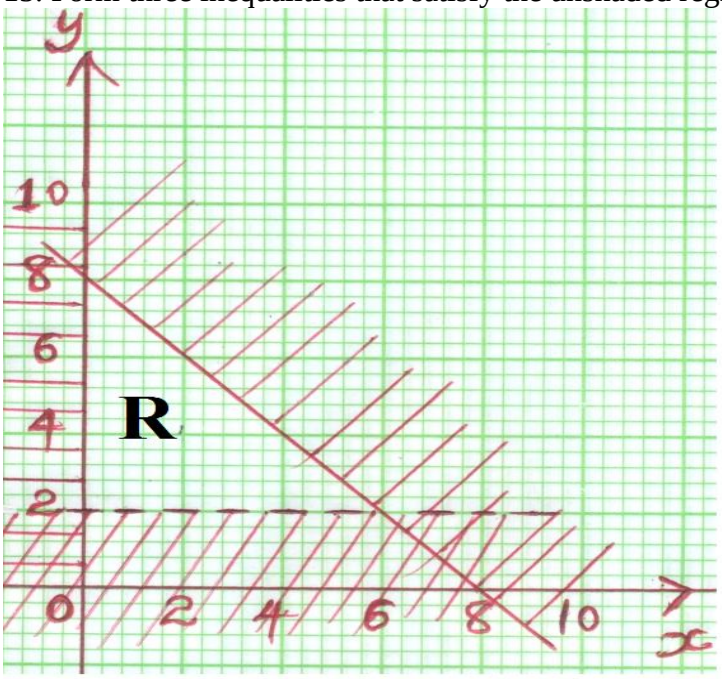


13. The volumes of two similar cylindrical containers are $27cm^3$ and $125\ cm^3$ respectively. Given that the height of the smaller container is 12cm, find the height of the larger container.
(3marks)

14. Without using calculator or mathematical tables, simplify (4marks)

$$\frac{\cos 30 - \sin 45}{\sin^2 30 + \tan^2 45}$$

15. Form three inequalities that satisfy the unshaded region R. (3marks)



16**.** A railway line and a road are parallel to each other on a flat and level section of land. A 5 metre long car moving at a speed of 110kmh^{-1} starts overtaking a train which is 495 metres and moving at 80kmh^{-1} .How long will it take the car to completely overtake the train?

(3marks)

SECTION II (50 Marks)

Answers only **five** questions from this section in the spaces provided.

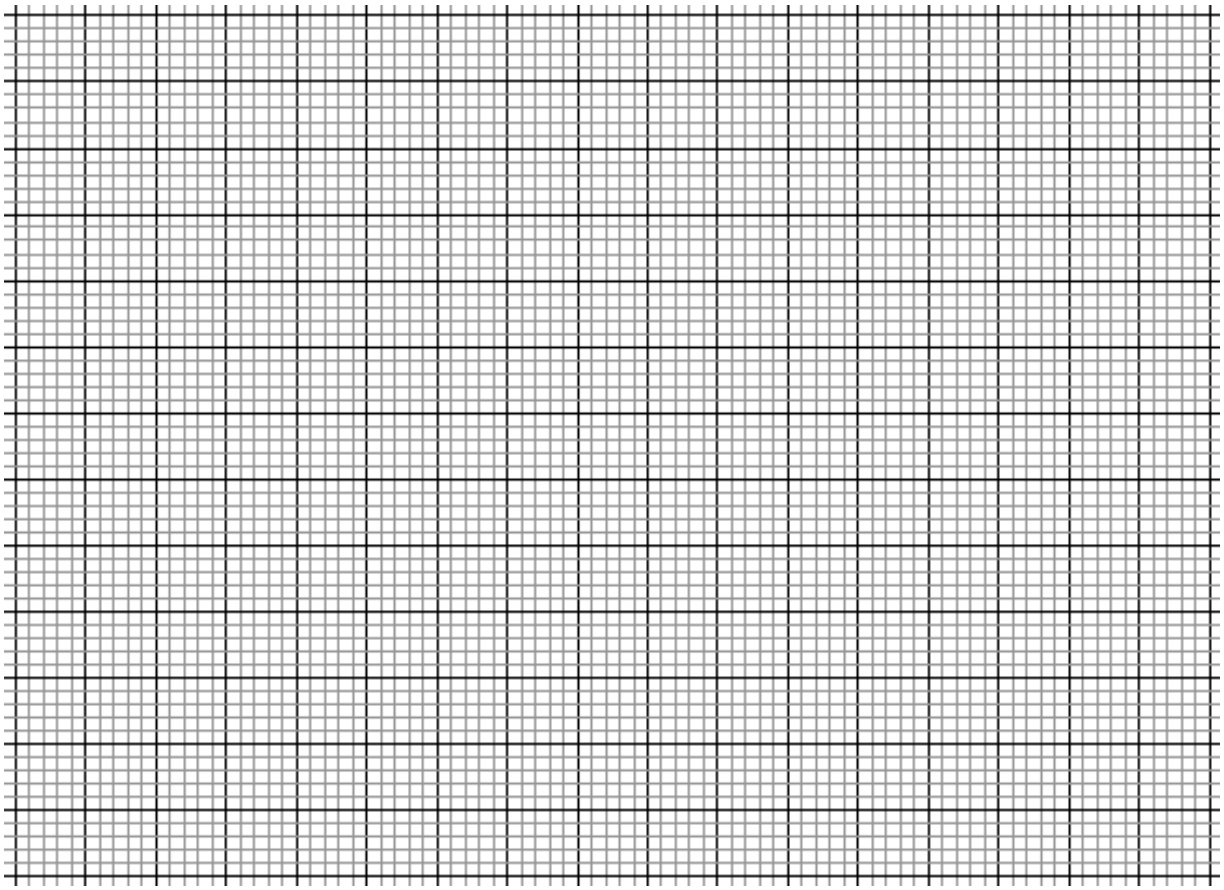
17. The vertices of a parallelogram are O (0,0), A(5,0),B(8,3) and C(3,3)

Plot on the same axes

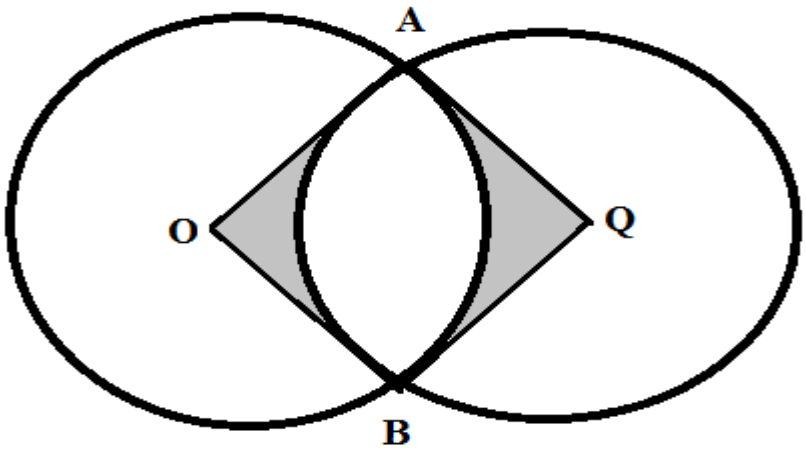
i) Parallelogram O'A'B'C', the image of OABC under reflection in the line x=4 (4marks)

ii) Parallelogram O''A''B''C'' the image of O'A'B'C' under a transformation described by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. Describe the transformation. (4marks)

iii) Parallelogram O'''A'''B'''C''', the image of O''A''B''C'' under the enlargement, centre (0,0) and scale factor $\frac{1}{2}$ (2marks)



18. Two circles with centres O and Q and radii 8cm intersect at points A and B as shown below.



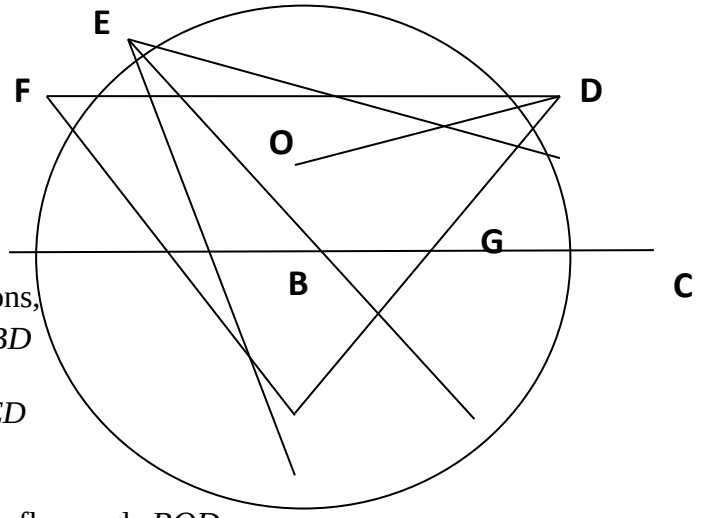
Given that the distance between O and Q is 12cm and that the line AB meets OQ at X, find:

(a) the length of the chord AB. (3marks)

(b) the reflex angle AOB. (3marks)

(c) the area of the shaded region. $\pi = 3.142$ (4marks)

19. In the figure below, EG is the diameter of the circle centre O. Points B, G, D, E and F are on the circumference of the circle. $\angle BFD = 50^0$, $\angle BEO = 25^0$ and line ABC is a tangent to the circle at B



Giving reasons,

(a) $\angle CBD$ (2marks)

(b) $\angle BED$ (2marks)

(c) The reflex angle BOD (2marks)

(d) $\angle EBA$ (2marks)

(e) $\angle BGD$ (2marks)

20. OAB is a triangle in which **OA= a, OB= b**, M is a point on OA such that OM:MA=2:3 and N is another point on AB such that AN:NB = 1:2. Lines ON and MB intersect at X.

a) Express the following vectors in terms of **a** and **b**

i) **AB** (1mark)

ii) **ON** (1mark)

iii) **BM** (1mark)

b) If **OX**=k **ON** and **BX**=h **BM**, express **ON** in two different ways. Hence or otherwise find the value of h and k (6marks)

c) Determine the ratio OX: XN (1mark)

21. Every Sunday Alex drives a distance of 80km on a bearing of 074^0 to pick up his brother John to go to church. The church is 75km from John's house on a bearing of **S**50^0**E**. After church they drive a distance of 100km on a bearing of 260^0 to check on their father before Alex drives to John's home to drop him off then proceeds to his house.

(a) Using a scale of 1cm to represent 10km, show the relative positions of these places. (4 marks)

(b) Use your diagram to determine:

(i) the true bearing of Alex's home from their father's house. (1 mark)

(ii) the compass bearing of the father's home from John's home. (1 mark)

(iii) the distance between John's home and the father's home. (2 marks)

(iv) the total distance Alex travels every Sunday. (2 marks)

22. The data below shows the sample of age distribution of some of the people who reside in a Yoruba village in years.

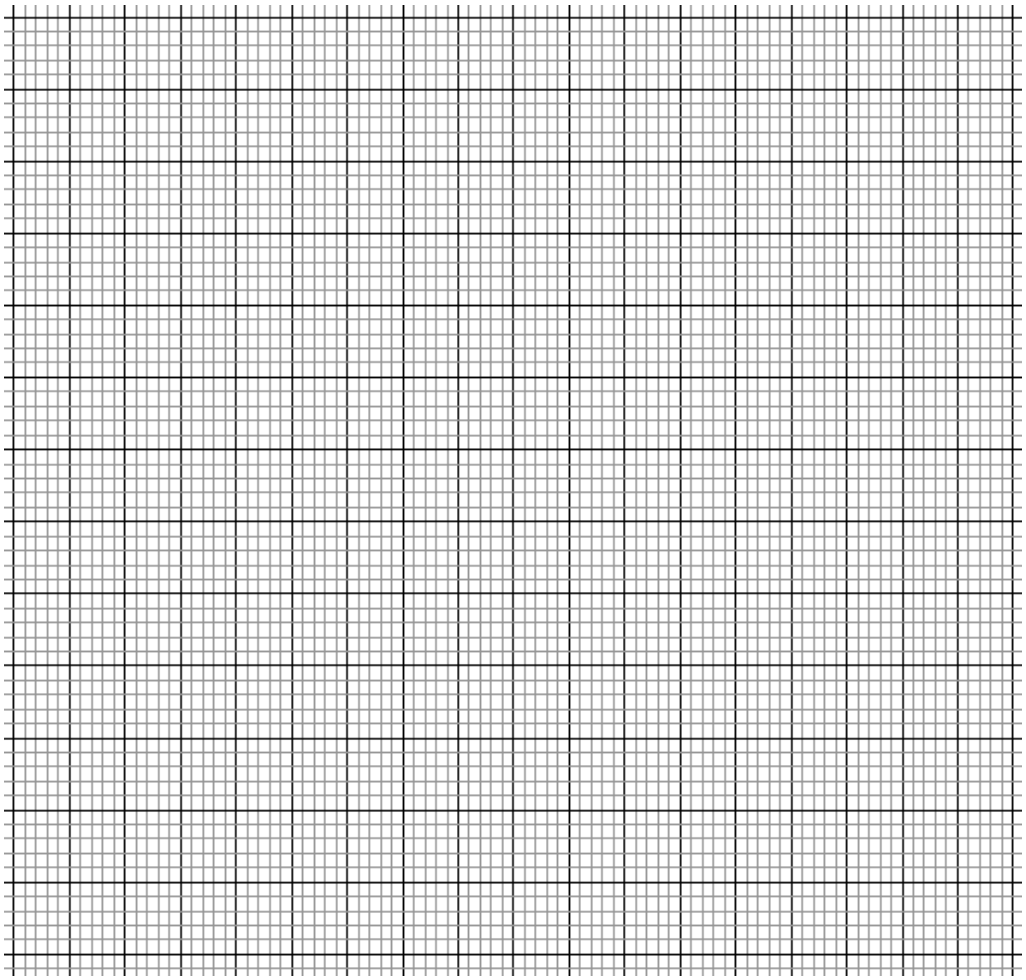
Age group	Number of persons in age group
1 - 5	4
6 - 10	12
11 - 20	9
21 - 30	6
31 - 50	18
51 - 55	4
56 - 65	2

(a) Complete the frequency distribution table above and hence

(i) Calculate the mean. (3marks)

(ii) Calculate the median. (2marks)

(b) Draw a frequency polygon from the given data on the grid below (5marks)

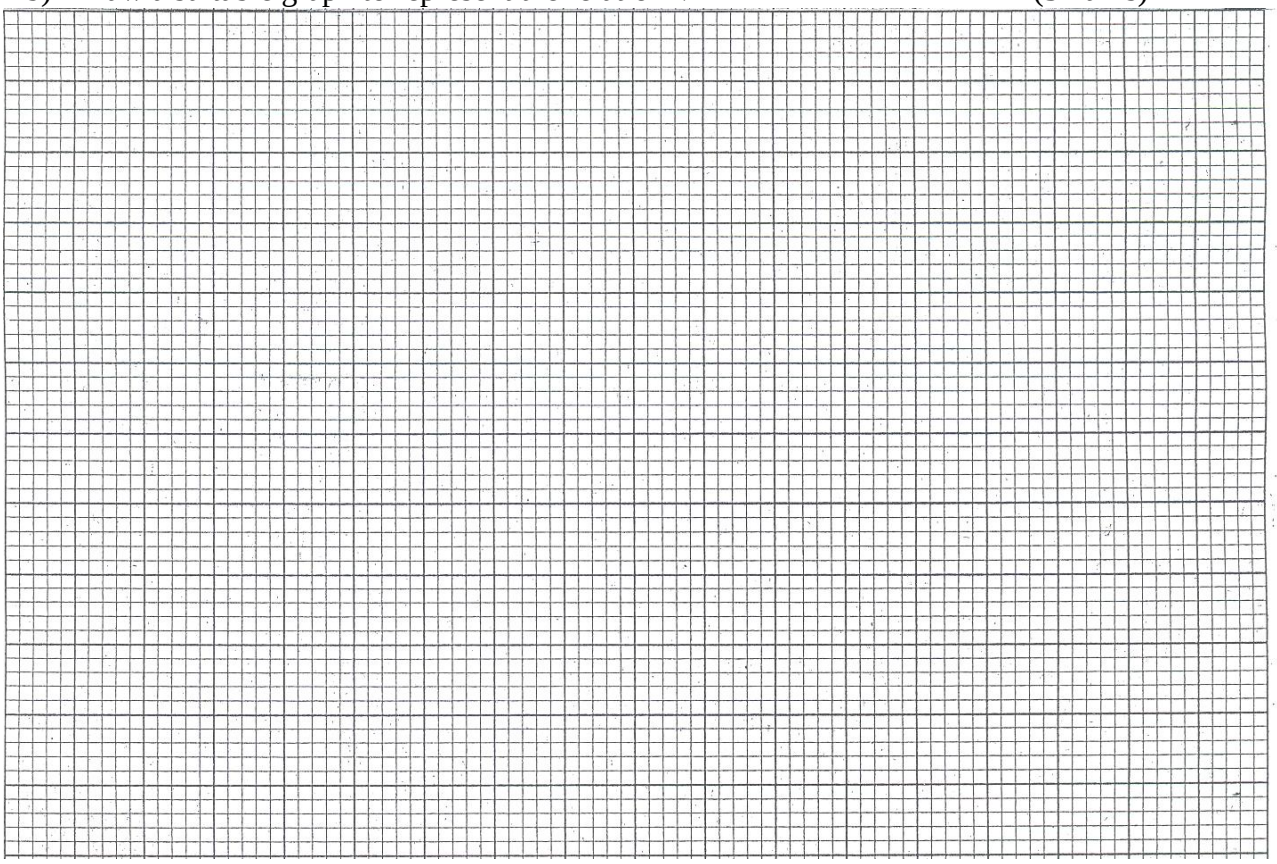


23. Two variables x and V are known to satisfy the relation $V = Kx^n$ where k and n are constants. The table below shows data collected from an experiment.

x	3.01	3.98	5.01	6.02	7.08	8.94
V	10.5	101	989	9600	95000	854000

a) Write down the function $V = Kx^n$ in linear form and make a suitable table of values correct to one decimal place. (3marks)

b) Draw a suitable graph to represent the relation $V = Kx^n$ (3marks)



24. A particle moves in a straight line. It passes through point O at $t = 0$ with velocity $V = -4m/s$. The acceleration $a\ m/s^2$ of the particle at time *t* seconds after passing through O is given by $a = 10t + 1$

(a) Express the velocity V of the particle at time *t* seconds in terms of *t*. (3marks)

b) Find V when $t = 3$ (1mark)

c) Determine the value of *t* when the particle is momentarily at rest (3marks)

d) Calculate the distance covered by the particle between $t = 2$ and $t = 4$ (3marks)

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Kenya Certificate of Secondary Education

KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

Name …… **Admission number** ……

Candidate's Signature……**Date**……

KENYA HIGH SCHOOL TRIAL 1

121/1
MATHEMATICS
PAPER 1

INSTRUCTIONS TO CANDIDATES

a) *Write your name and admission number in the space provided at the top of this page*
b) *This paper consists of two sections;* ***section I*** *and* ***section II****.*
c) *Answer* ***ALL*** *questions in section I and only* ***FIVE*** *questions in section II*
d) *Show all the steps in your calculations; giving your answers at each stage in the spaces provided below each question.*
e) *Marks may be given for correct working even if the answer is wrong.*
f) *Non-programmable silent electronic calculators and KNEC mathematical tables may be used.*
g) *This paper consists of 15 printed pages*

FOR EXAMINER'S USE ONLY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL

SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

SECTION I (50 MARKS)

1. Solve for x.

$$\frac{x-1}{1} = \frac{1}{2x-3}$$

(3 marks)

2. A man left $^1/_5$ of his estate to his wife and $^2/_3$ of the remainder to be divided equally to each of his two sons. The rest was to be shared in the same ratio among his six cousins. If each cousin got

sh 60,000, how much money did the son got. (4 marks)

3. Solve for x in the equation:

$5^{3y+3} + 5^{3y-1} = 125.2$ (4 marks)

4. The average lap time for 3 athletes in a long distance race is 36 seconds, 40 seconds and 48 seconds respectively. If they all start the race at the same time, find the number of times the slowest runner will have been overlapped by the fastest runner at the time they all cross the starting point together again.

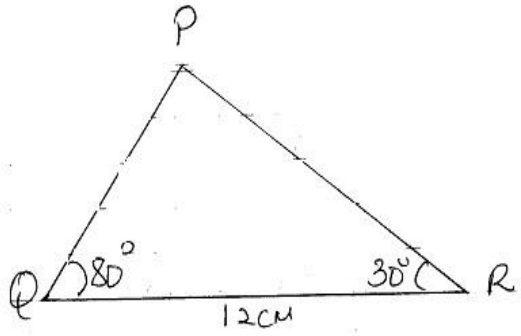
(3 marks)

5. Simplify the expression

$$\frac{3x^2 - 4xy + y^2}{18x^2 - 2y^2}$$

(3 marks)

6. In a triangle PQR below, QR = 12cm, $\angle PQR = 80^o$ and $\angle PRQ = 30^o$



Calculate, correct to 4 significant figures, the area of triangle PQR. (3 marks)

7. Mr. Wanyonyi travelled by train from Butere to Nairobi. The train left Butere on a Sunday 2350 hours and travelled for 7 hours 15 minutes to reach Nakuru. After 45 minutes stop in Nakuru, the train took 5 hours 40 minutes to reach Nairobi. Find the time, in the 12-hour system and the day Mr. Wanyonyi arrived in Nairobi. (3 marks)

8. Find the reciprocal of 0.005041 hence evaluate $\frac{3}{0.005041}$ (2 marks)

9. Line BC below is a side of triangle ABC and also a side of a Parallelogram BCDE

Using a ruler and a pair of compasses only, construct:

(i) The triangle ABC given that $\angle ABC = 120^o$ and AB = 6cm (1cm)

(ii) (ii) the parallelogram BCDE whose area is equal to that of the triangle ABC and point E is on line AB

(3 marks)

10.Given that $4\mathbf{p} - 3\mathbf{q} = \begin{pmatrix} 10 \\ 5 \end{pmatrix}$ and $\mathbf{p} + 2\mathbf{q} = \begin{pmatrix} -14 \\ 15 \end{pmatrix}$; find the value of **p** and **q** (4 marks)

11. A Kenyan bank buys and sells foreign currencies using the rates shown below.

	Buying (Ksh)	Selling (Ksh)
1 Euro	86.25	86.97
100 Japanese Yen	66.51	67.26

A Japanese travelling from France arrives in Kenya with 5000 Euros, which he converts to Kenya Shillings at the bank while in Kenya he spent a total of Ksh. 289,850 and then converted the remaining Kenya shillings to Japanese Yen at the bank.
Calculate the amount of Japanese that he received. (3 marks)

12 From a viewing tower 40 metres above the ground, the angle of depression of an object on the ground is 36^o and the angle of elevation of an aircraft vertically above the object is 48^o. Calculate the height of the aircraft above the objet on the ground. (3 marks)

13 The interior angle of a regular polygon with 3x sides exceeds the interior angle of another regular polygon having x sides by 40^o. Determine the value of x (3 marks)

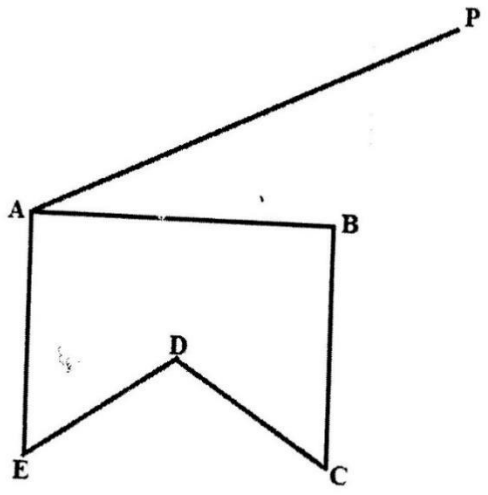
14 The mass of two similar cans is 960g and 15000g. If the total surface area of the smaller can is 144cm^2, determine the surface area of the larger can. (3 marks)

15 The table below show the mean marks in a mathematics test of two classes

Class	Number of students	Mean mark
A	45	62
B	43	65

Calculate, correct to 2 decimal places, the mean mark of the classes. (2 marks)

16 The figure below ABCDE is a cross-section of a solid. The solid has a uniform cross-section. Given that AP is an edge of the solid, complete the sketch showing the hidden edges with a broken line.
(3 marks)



6

SECTION II (50 MARKS)

Answer only five questions in this section in the spaces provided.

17 Two lines L_1:$2y - 3x = 6 = 0$ and $L_2 = 3y + x - 20 = 0$ intersect at a point A.

a) Find the coordinates of A (3 marks)

b) A third line L_4 is perpendicular to L_2 at point A. Find the equation of L_3 in the form $y = mx + c$, where m and c are constants. (3 marks)

c) Another line L4 is parallel to L_1 and passes through (-2, 3). Find the x and y intercepts of L_4 (4 marks)

18 One day Mr. Makori bought some oranges worth Ksh 45, on another day of the same week his wife Mrs.Makori spent the same amount of Money but bought the oranges at a discount of 75 cents per orange

a) If Mr.Makori bought an orange at Kshs x, write down and simplify an expression for the total number of oranges bought by the two in the week. (3 marks)

b) If Mrs.Makori bought 2 oranges more than her husband, find how much each spent on an orange. (5 marks)

c) Find the number of oranges bought by the two. (2 marks)

19 Give points P, Q, R, V and T lie on the same plane, Point Q is 53km on the bearing of 055^o of P, Point R lies 162^o of Q at a distance if 58km. Given that point T is west of P and 114km from R and V is directly South of P and S40^oE from T.

a) Using a scale of 1:1,000,000, show the above information in a scale drawing. (3 marks)

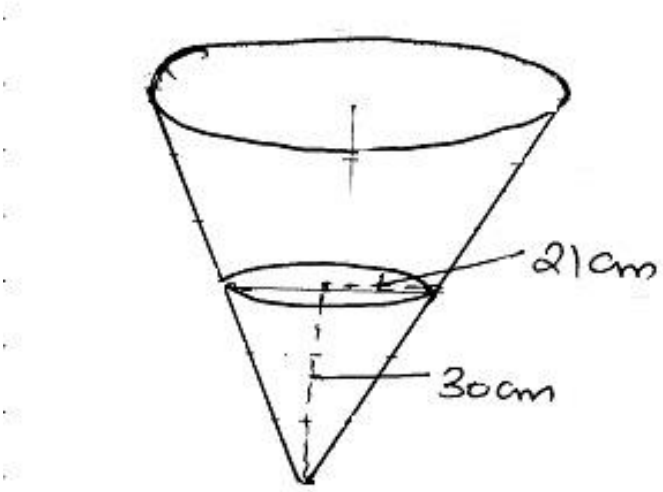
b) From the scale drawing determine

i) The distance in km of point V from R (2 marks)

ii) The bearing of V from Q. (2 marks)

iii) Calculate the area enclosed by the points PQRVT in squares kilometers. (3 marks)

20 The figure below represents a conical vessel which stands vertically. The vessels contain water to a dept of 30cm. the radius of the water surface in the vessel is 21cm (Take $\pi = {}^{22}/_{7}$)



(a). Calculate the volume of the water in the vessel in cm^3. (2 marks)

(b) When a metal sphere is completely submerged in the water, the level of the water in the vessel rises by 6cm. calculate:

(i) the radius of the new water surface in the vessel. (2 marks)

(ii) the volume of the metal sphere in cm^3 (3 marks)

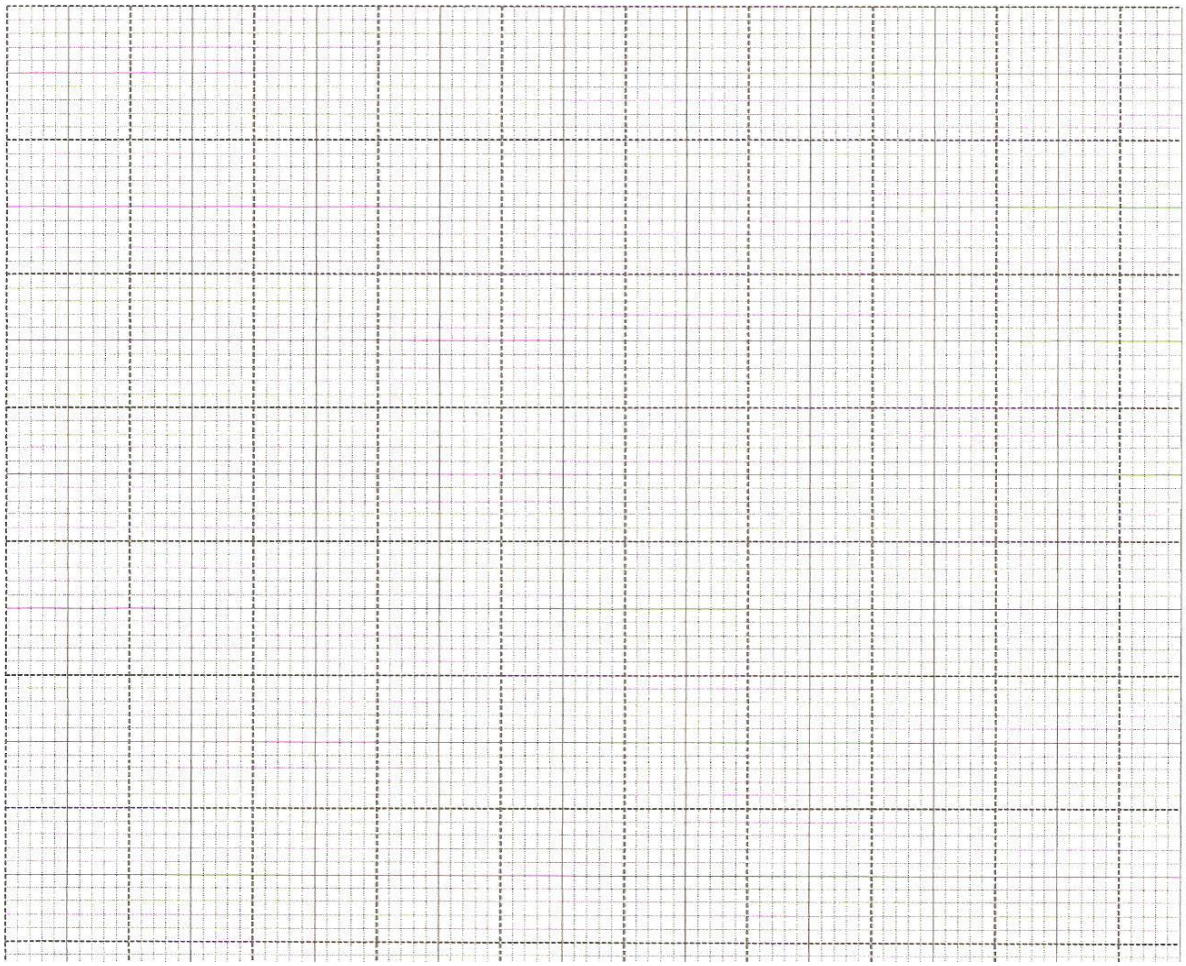
(iii). the radius of the sphere (3 marks)

21 The mases to the nearest kilogram of some student were recorded in table below

Mass (kg)	41-50	51-55	56-65	66-70	71-85
Frequency	8	12	16	10	6
Height of rectangle					0.2

a). Complete the table above to 1 decimal (2 marks)

b) on the grid provided below, draw a histogram to represent the above information (3 marks)



c) Use the histogram to

i) State the class in which the median mark lies. (1 mark)

ii) Estimate the median mark (2 marks)

iii) The percentage number of students with masses of at least 74kg. (2 marks)

22 a) Given that A=$\begin{pmatrix} 3+3x, & 6 \\ x+7, & 2x+2 \end{pmatrix}$ is a singular matrix, find the values of x (3 marks)

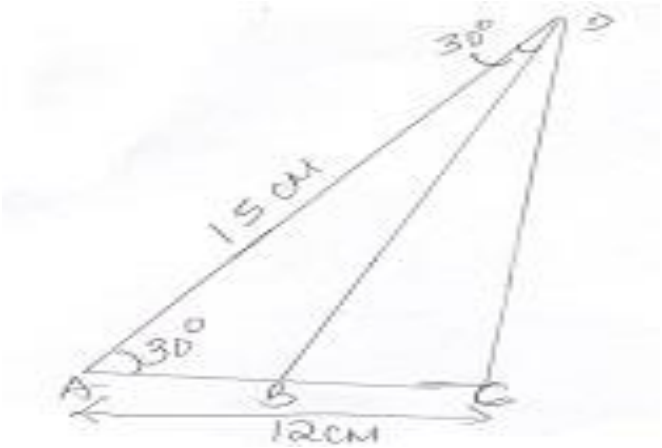
(b) John bought 3 exercise books and 5 pens for a total of Ksh 200. If John had bought 2 exercise books and 4 pens, he would have spent Ksh 60 less. Taking e to represent the price of an exercise.

i) Form two expressions to represent the above information. (2 marks)

ii) Use matrix method to find the price of an exercise book and that of a pen. (3 marks)

iii) A teacher of a class of 45 students bought 3 exercise books and 2 pens for each student. Calculate the total amount of money the teacher paid for the books and the pens. (2 marks)

23. In the figure below, AC = 12cm, AD = 15cm and B is a point on AC ∠BAD = ∠ADB= 30^o



Calculate, correct to one decimal place: -

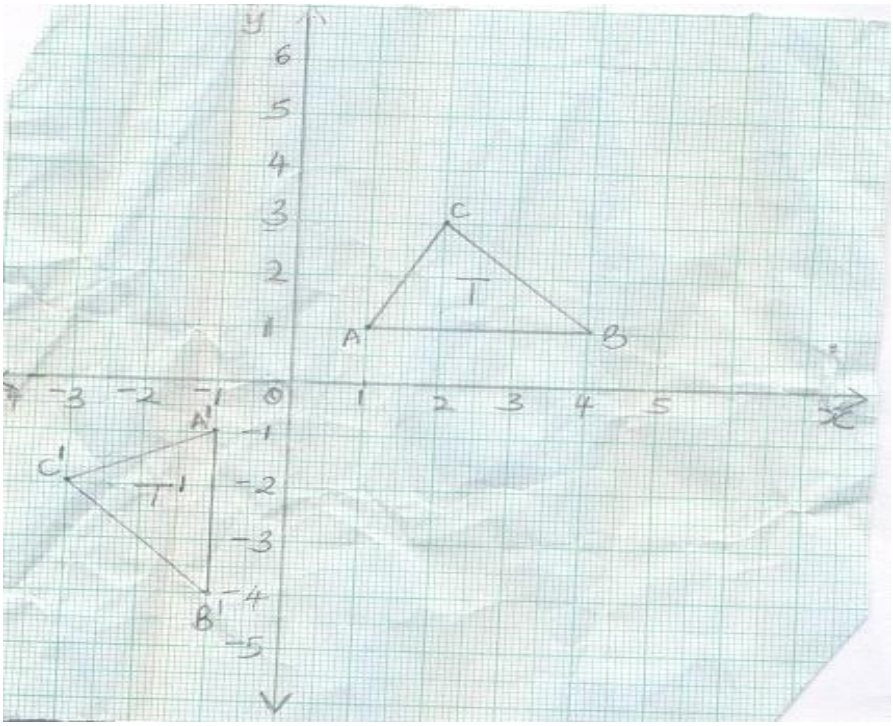
a)the length of CD (3 marks)

b)the length of AB; (3 marks)

c) the area of triangle BCD (2 marks)

d) the size of ∠BDC (2 marks)

24. On the grid below, an object T and its image T' are drawn.



a Find the equation of the mirror line that maps T onto T' (1 mark)

b (i) T' is mapped onto T" by positive quarter turn about (0,0). Draw T" (2 marks)

ii) Describe a single transformation that maps T onto T". (2 marks)

c T" is mapped onto T" by an enlargement, centre (2,0), scale factor -2. Draw T''' (2 marks)

d Given that the area of T''' is $12cm^2$, calculate the area of T. (3 marks)

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Kenya Certificate of Secondary Education

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KISII SCHOOL TRIAL 1

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

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- ***f)*** *Non-programmable silent electronic calculators and KNEC mathematical tables may be used.*
- ***g)*** *This paper consists of 15 printed pages*

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL

SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

SECTION A (50 Marks)

Answer all the questions from this section in the spaces provided

1. Use logarithm tables to evaluate **(4 marks)**

$$\sqrt[5]{\frac{3.172\times(0.008367)^{2}}{log 9}}$$

2. Solve for x and y **(3 marks)**

$3^{2x-y}= 27$

$4^{x} \div 16^{y} = 1$

3. Evaluate without using mathematical tables or calculator **(3 marks)**

$$\frac{¾ + {}^{2}/_{5} \div {}^{3}/_{5} \text{ of } 1{}^{2}/_{3}}{(1\ ¾ - {}^{5}/_{8}) \times {}^{2}/_{9}}$$

4. A line $y = mx + 8$ makes an angle of 75.97^{0} with the x-axis, find the co-ordinates of the point where the line cuts the x-axis. **(3 marks)**

5. Find the integral values of x which satisfy the inequalities. **(3 marks)**

$$3x - 2 < 10 + x < 2 + 5x$$

6. A camera which is marked at Ksh 2400 is sold to a consumer after allowing him a 10% discount. By so doing the trader still makes a profit of 20% on the cost of the camera. Determine the cost price of the camera. **(3 marks)**

7. Solve for θ given that θ is acute and $sin\ (3\theta - 50^0) - cos\ (2\theta + 10^0) = 0$. **(2 marks)**

8. The cost of the car outside Kenya is US $ 4,800. You intend to buy one such car through an agent who deals in Japanese yen. The agent will charge 15% commission on the price of the car and further 72,220 Japanese yens for shipment of the car. How many Kenya shillings will you need to send to the agent to obtain the car, given that;

1 US $ = 117.20 Japanese yen

1 US $ = Ksh. 72.34 **(3 marks)**

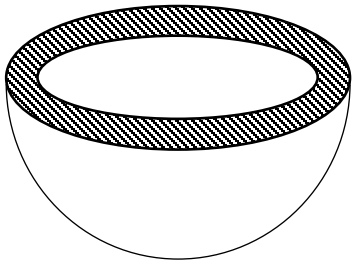
9. A container of height 90cm has a capacity of 4.5litres. What is the height of a similar container of volume $9m^3$? **(3 marks)**

10. Junior paid shs.320 for a video tape after getting a discount of 13.5%. How much should a shopkeeper have sold the tape to enable him make a profit of 5%. **(3 marks)**

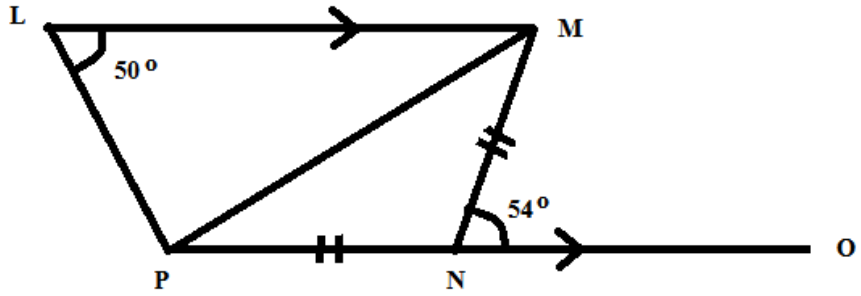
11. Three towns J, K and L are such that K is 40km on a bearing 290^0 from J. Town L is directly to the south of J. The distance between K and L is 60km. By scale drawing, find the distance of L from J. Using scale of 1:1000 000. **(4 marks)**

12. Express $0.7\dot{3}$ as fraction. **(3 marks)**

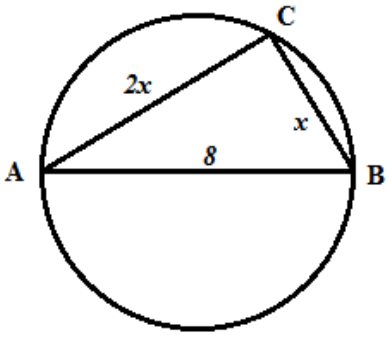
13. The figure below shows a hemispherical bowl of thickness 1.5cm. Given that the external surface area is $509cm^2$. Find the volume of the bowl. (Take $\pi = 3.142$) **(3 marks)**



14. In the figure below $\angle$ MNO = 54^0, and $\angle$PLM = 50^0, PN = NM and PO is parallel to LM. Find the value of $\angle$LPM. **(3 marks)**



15. In the figure below, AB is a diameter of the circle and AB = 8cm, BC= $x$cm and AC= $2x$cm. Calculate the length of AC to 2 significant figures. **(3 marks)**



16. The angle of elevation of the top of a storey building from point P is 23.61^0. From another point Q, six metres nearer to the base of the building, the angle of depression from the top of the building is 35^0. Calculate to 1 decimal place the height of the building. **(4 marks)**

SECTION I1 (50 MARKS)

Answer ONLY FIVE questions in this section

17. The table below shows the number of letters collected from the post office by a school messenger during a school year.

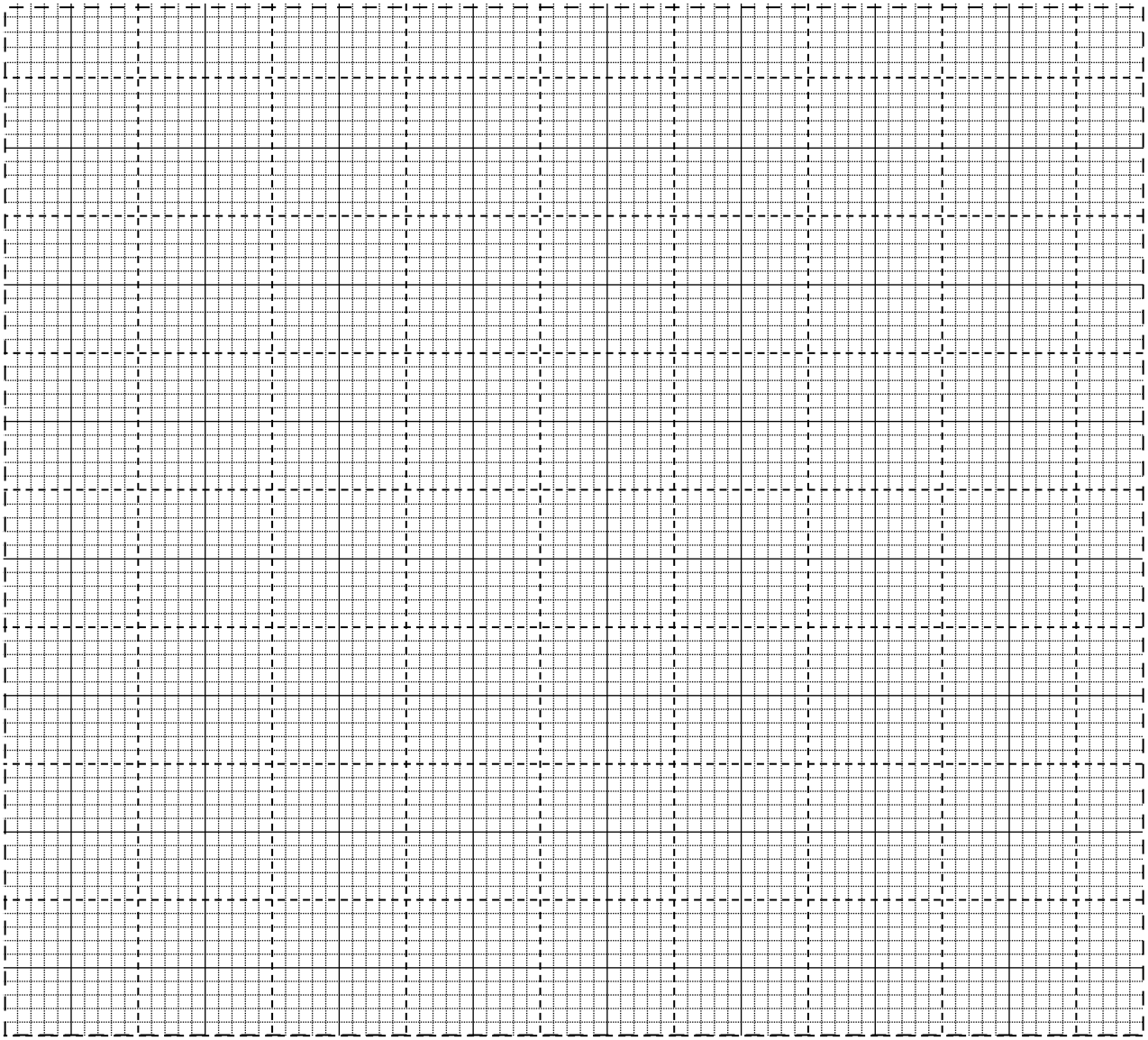
Letters per day	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45	46 – 50	51 – 55
Frequency	5	19	21	23	25	27	20	25	13	12

(i) State the modal class **(1 mark)**

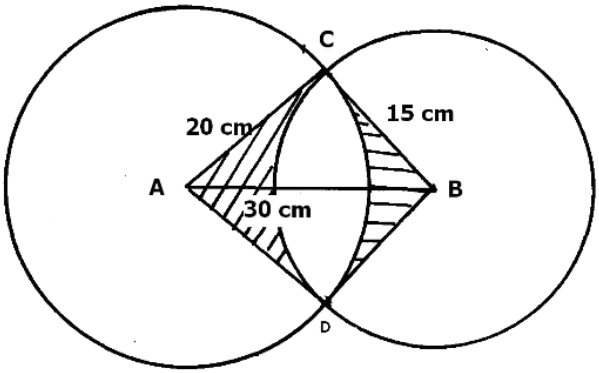
(ii) Estimate the median of this data. **(4 marks)**

(iii) Estimate the mean of this data. **(3 marks**

(iv) On the grid provided, draw a histogram to represent this data. **(2 marks)**



18. The diagram shows two intersecting circles of radii 20 cm and 15 cm such that their centres A and B are 30 cm apart.



Calculate to 2 decimal places.

a) The area of sector ACD **(3marks)**

b) The area of sector BCD **(3marks)**

c) The length of the common CD. **(2marks)**

d) The area of quadrilateral ACBD **(1mark)**

e) The shaded area. **(1mark)**

19. A certain number of people agreed to contribute equally to buy books worth sh.12000 for a school library. Five people pulled out so that others agreed to contribute an extra sh. 100 each. Their contribution enabled them to buy books worth sh 2000 more than they originally expected.

a) If the original number of people was x, write down.

i) An expression of how much each was originally to contribute. **(1mark)**

ii) Two distinct expressions of how much each contributed after the five pulled out.
(2 marks)

b) Calculate the value of x. **(3 marks)**

c) Calculate how much each person was expected to contribute originally. **(2marks)**

d) Calculate

i) The number of people who actually made the contribution and how much per person.
(2marks)

ii) The ratio of the supposed original contribution to new contribution. **(1mark)**

20. A bus left Nairobi at 7.00am and travelled towards Eldoret at an average speed of 80km/hr. At 7.45am a car left Eldoret towards Nairobi at an average speed of 120km/hr. The distance between Nairobi and Eldoret is 300km

Calculate

a) the time the bus arrived at Eldoret **(2 marks)**

b) the time of the day the two met. **(4 marks)**

c) the distance from Nairobi where the two met. **(2 marks)**

d) the distance of the bus from Eldoret when the car arrived at Nairobi. **(2 marks)**

21. The displacement h metres of a particle moving along a straight line after t seconds is given by $h=-2t^3+\frac{3}{2}t^2+3t$

a) Find its initial acceleration if it accelerates uniformly. **(3 marks)**

b) Calculate:

(i) The time when the particle was momentarily at rest **(3 marks)**

(ii) It's displacement by the time it comes to rest momentarily **(2 marks)**

c) Calculate the maximum speed attained **(2 marks)**

22. In an n-sided polygon two angles are right angles and each of the remaining angles is 150^0

a) Find the value of n hence the sum of interior angles of this polygon. **(4 marks)**

b) Name the polygon **(1 mark)**

c) Find the areas of a regular octagon of sides 4 cm o 5sf. **(5 marks)**

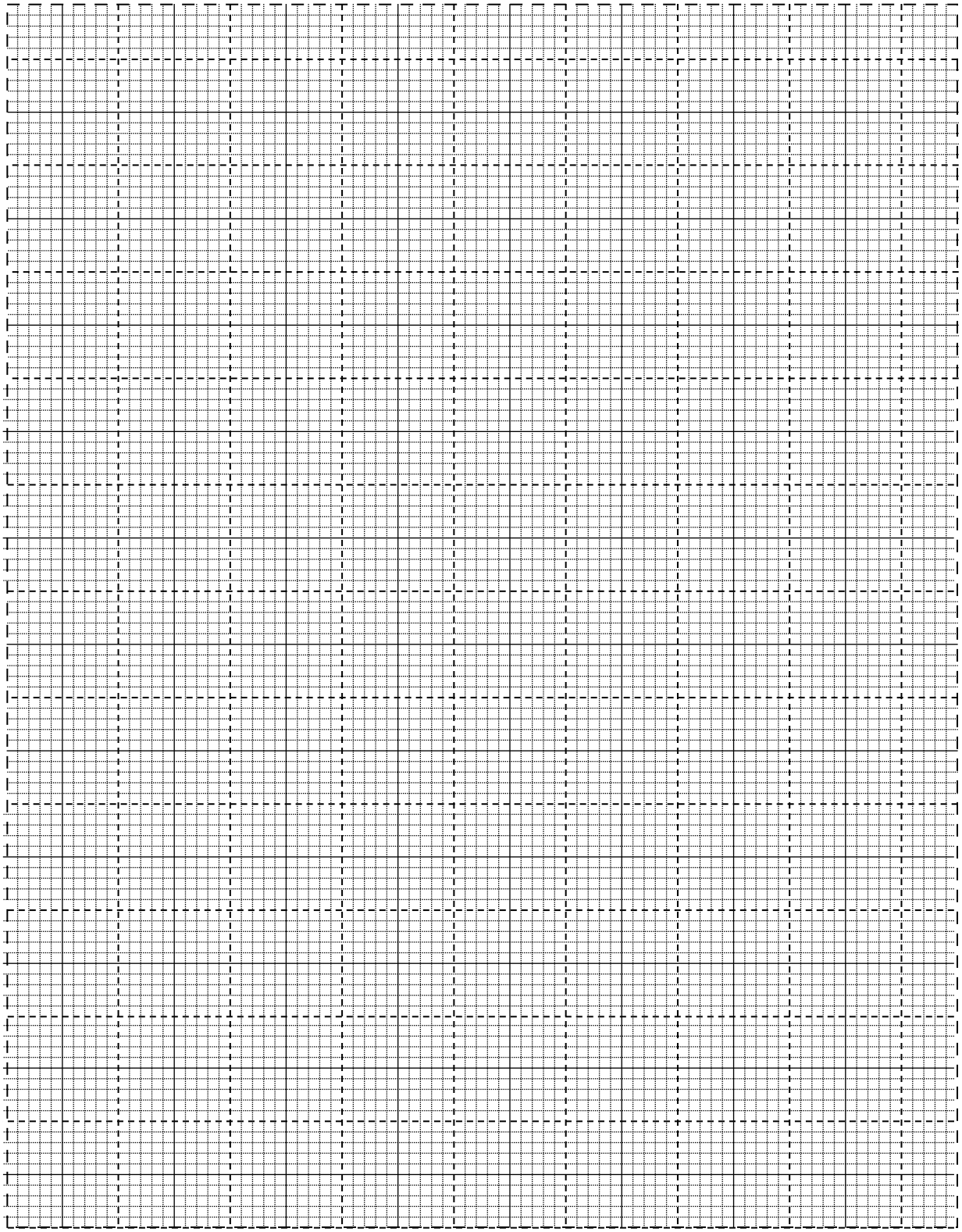
23. The cost C, of producing n items varies directly as n and partly as the inverse of n. to produce two items it costs Ksh. 135 and to produce three items it costs Ksh. 140

(a) The constant of proportionality and hence write the equation connecting C and n **(5 marks)**

(b) The cost of producing 10 items; **(2 marks)**

(c) The number of items of produced at a cost of Ksh. 756. **(3 marks)**

24. (a) On the grid provided draw triangle ABC such that A(6, -2), B(8, -2) and C(6, -1)**(2 marks)**



(b) Triangle $A^1B^1C^1$ is the image of triangle ABC under enlargement of scale factor 2 with the centre at (3, 0). Construct and label triangle $A^1B^1C^1$. State the coordinates of the triangle $A^1B^1C^1$.

(3 marks)

(c) $A^{11}B^{11}C^{11}$ is the image of $A^1B^1C^1$ under a certain rotation. If A^{11} (-2, -1), B^{11}(-2, -5) and C^{11}(0, -1), by construction, find the coordinates of the centre of rotation. **(3 marks)**

(d) Triangle $A^{11}B^{11}C^{11}$, is reflected on the line $y = -3$. Draw the triangle $A^{111}B^{111}C^{111}$ the image of triangle $A^{11}B^{11}C^{11}$ under reflection in the line.$y = -3$ **(2 marks)**

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LENANA SCHOOL TRIAL 1

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

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e) *Marks may be given for correct working even if the answer is wrong.*
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g) *This paper consists of 15 printed pages*

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL

SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

SECTION A (50 MARKS)

Answer all questions in this section

1. Simplify (3mks)

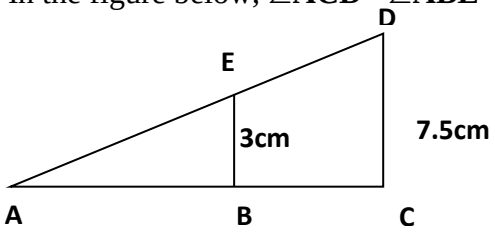
$$\left(3\frac{1}{5}-\frac{2\frac{1}{2}}{3\frac{1}{3}}\right)\div 6\frac{1}{2}$$

2. Factorise completely $10x^2 + 11xy - 6y^2$ (3mks)

3. Use logarithms to evaluate the following $\sqrt[3]{\frac{0.07893}{37.8 \times 43.81}}$ (4mks)

4. Awinja is 100m from the foot of a tower and the angle of elevation of the tower from her position is 49°. Find the height of the tower (2mks)

5. In the figure below, ∠**ACD**= ∠**ABE** = 90°. Find the area of the triangle **ABE** (3mks)



6. A square **ABCD** is such that **A**(-3,4) **C**(2,3). Equation of line **AB** is 3y-2x=18 and equation of line **CD** is *3y-2x=5*. Determine

   (a) Equation of line **BC** in the form *y=mx+c* (2mks)

   (b) Equation of line **AD** in the form *y=mx+c* (2mks)

7. Make **v** the subject of the formula $T = \frac{1}{2}m(u^2 - v^2)$ (3mks)

8. A squared brass plate is 2mm thick and has a mass of 1.05kg. The density of brass is 8.4g/cm^3. Calculate the length of the plate in centimeters. (3mks)

9. Solve the inequality $-3x + 2 < x + 6 \leq 17 - 2x$ and write down the integral values satisfying the inequality (3mks)

10. An arc subtends an angle of 0.9 radians at the centre of a circle whose radius is 13cm. Find the length of the arc (2mks)

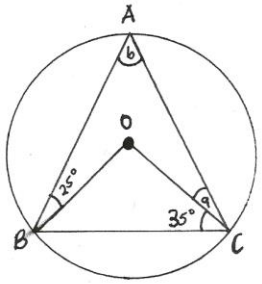
11. Simplify $\left(\frac{2x^{-3}}{5y^{2}}\right)$ (4mks)

12. At 8.50am, a matatu is traveling at 80km/h and it is 40km behind a lorry travelling at 60km/hr
    (a) After how long will the matatu overtake the lorry? (2mks)

    (b) At what time will the matatu overtake the lorry? (2mks)

13. John who runs a clothing shop bought a shirt at Ksh. 500 and marked it at Ksh. 600. A customer bought it at Ksh. 550 after engaging John in a lengthy negations process. What was the customer's percentage discount. (3mks)

14. In the following figure, **O** is the centre. Find **a** and **b** (2mks)



a_____

b_____

15. Using a pair of compasses and a ruler only construct triangle **ABC** with **ABC** = 120^{o} and measure **BC** (3mks)

16. A stool is made by shaping a tree stump into a conical frustrum of vertical height 60cm. If the top radius is 12cm and the bottom is 24cm. calculate the surface area of the stool.π=3.142 (4mks)

SECTION II (50 MARKS)

Answer any five questions in this section in the spaces provided

17. The table below shows marks obtained by 100 candidates at Mwihila Secondary in a mathematics examination.

Marks	15-24	25-34	35-44	45-54	55-64	65-74	75-84
Frequency	6	14	24	14	*x*	10	10

(i) Determine the value of **x** (2mks)

(ii) State the modal class (1mk)

(iii) Calculate the mean (3mks)

(iv) Determine the median mark. (4mks)

18. (a) In a stadium, the cost per seat during a match is Ksh. 200. The stadium is built in a such a way that the first row has five seats more than the previous one and there are thirty one rows. If during the match between AFC Leopards and Gor Mahia the stadium is 75% full, how much money is collected if every fan pays. (4mks)

(b) The 3^{rd} term of a geometric sequence is 20 and 6^{th} term is -160.

Calculate:

(i) The common ratio (2mks)

(ii) The first term (2mks)

(iii) The 8^{th} term (2mks)

19. The table below shows measurements of a farm in a fields book. **XY**=2000m

	Y	
	1800	G 100
F 200	1600	
	1200	E 300
	900	D 100
C 150	600	
	300	B 200
A 200	100	
	X	

(a) Using a scale 1cm rep 100m. Sketch the map of the farm (2mks)

(b) Calculate the area of the farm in hectares (8mks)

20. Four towns **R,T,K** and **G** are such that **T** is 84km directly to the north of **R** and **K** is on bearing of 295^{o} from **R** at a distance of 60km. **G** is on a bearing of 340^{o} from **K** and at a distance of 30km.

(a) Using the scale of 1cm to represent 10km make an accurate scale drawing to show the relative positions of the towns. (3mks)

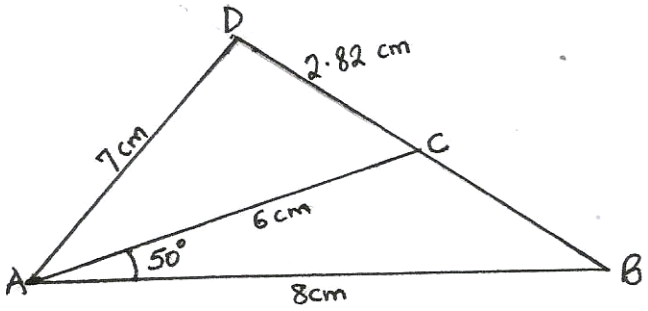
(b)Find:-

(i) The distance and the bearing of **T** from **K** (3mks)

(ii) The distance and the bearing of **G** from **T.** (3mks)

(iii) The bearing of **R** from **G** (1mk)

21. In the figure below (not drawn to scale) **AB**=8cm, **AC**=6cm, **AD**=7cm, **CD**=2.82cm and angle **CAB**=50^{o}



Calculate (to two decimal places)

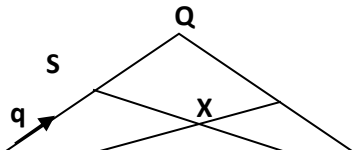
(a) The length **BC** (2mks)

(b) The size of angle **ABC** (3mks)

(c) The size of the angle **CAD** (3mks)

(d) The area of triangle **ACD** (2mks)

22. In the figure below, **PQ**=**a** and **PR**=**r**. **QM:MR**=1:2. The point **S** is the mid point of **PQ**. **X** is the intersection of **PM** and **SR**. **SX**=**hSR**, **PX** = **kPM** where **h** and **k** are constants.



Find:

(a) **QR** in terms of **q** and **r** (1mk)

(b) **PM** in terms of **q** and **r** (2mks)

(c) **SR** in terms of **q** and **r** (2mks)

(d)Express vector **SX** in two way: in terms of **h,r** and **q** and in terms of **k,r** and **q.** Hence determine the ratio in which **x** divides **SR**.

23. A particle moves a long a straight line so that after **t** seconds its distance from **O**, a fixed point on the line is **S** metres where

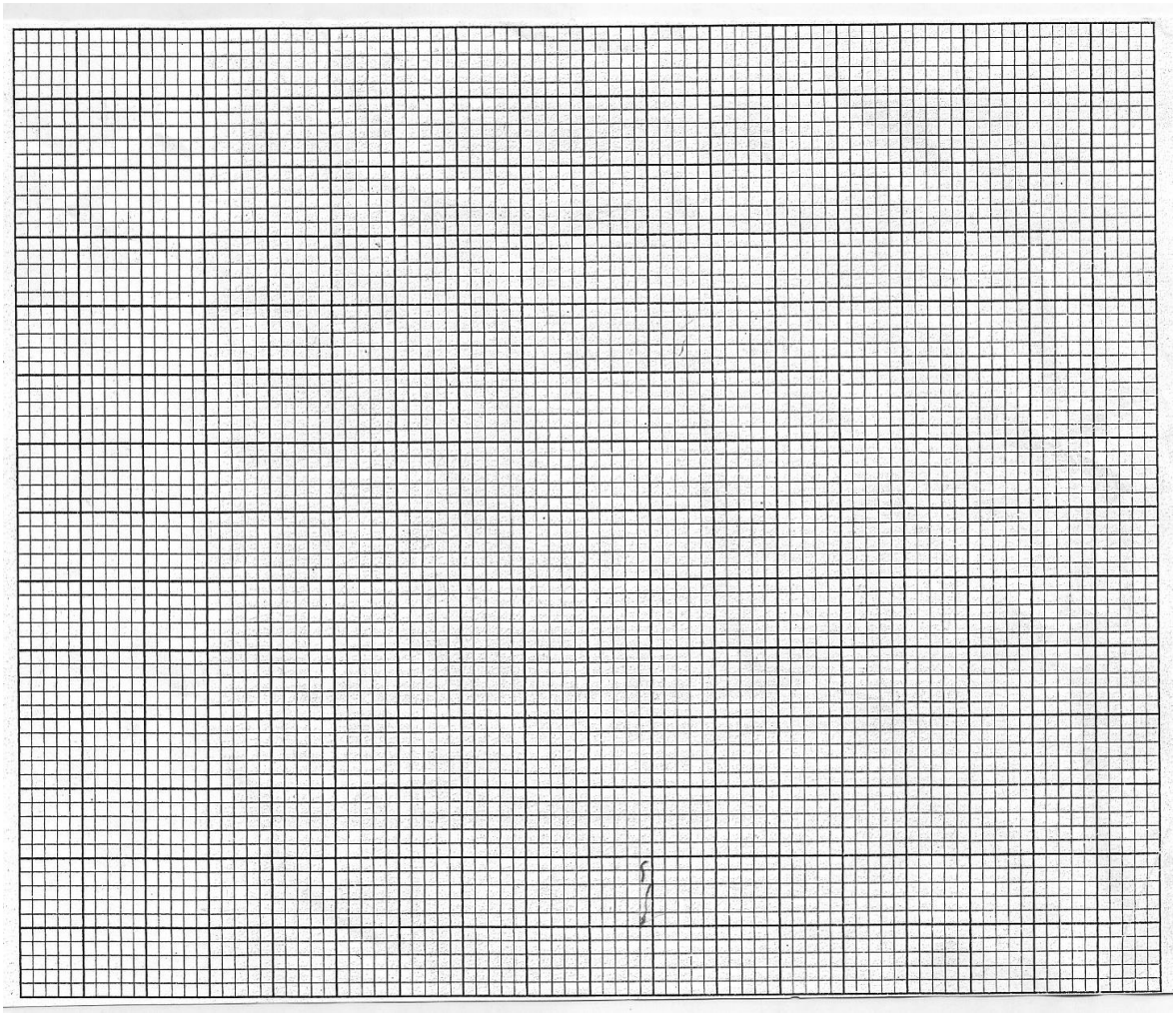
$$\mathbf{S= t^3-3t^2+2t}$$

(a) When is the particle at **O**? (4mks)

(b) What is its velocity at these times? (6mks)

24. The points **A**(2,6) **B**(1,1) **C**(3,4) and **D** (5,3) are the vertices of a quadrilateral **ABCD.**

(a) Plot points **A,B,C** and **D** on the graph provided and join them to form quadrilateral **ABCD** (2mks)



(b) Locate and write down the coordinates of **A', B', C'** and **D'** and to the image of **ABCD** under a rotation of positive 90^o centre (0,0) on the same grid (3mks)

(c) Reflect **A'B'C'D'** on the x-axis and draw the image of quadrilateral **A'' B'' C'' D''** (3mks)

(d) Draw the mirror line **MM** for the reflection of **ABCD** whose image is **A'' B'' C'' D''** (2mks)

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MOI GIRLS ELDORET INTERNAL PREMOCK

121/1

MATHEMATICS

PAPER 1

INSTRUCTIONS TO CANDIDATES

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SECTION I

17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

SECTION 1(50 MARKS)

1. Evaluate without using a calculator. (3 marks)

$$\frac{-2(+5+3)-9\ \div 3+5}{-3x-5\pm 2\times 4}$$

2. Three consecutive odd numbers add up to 369. Determine the three numbers. (2 marks)

3. The position vectors of A and B are 3i +2j – 5k and 5i + 3j + 2k respectively. If C divide AB in the ratio 3:-2, express OC in term of I, j and k. (3 marks)

4. Line L passes through P(8,6) and perpendicular to the line 3y + 2x + 6 = 0. Find the equation of line L and write it in the form y = mx + c. (3 marks)

5. The distance between points P and Q on a section of a straight road is 12km. Mukai and Mutua left points P and Q respectively at the same time and moved towards each other at 1m/sec and 1.5 m/s respectively. Calculate

a) Their relative speed (1 mark)

b) The time in hours that they took before meeting (2 marks)

6. Use tables of logarithms to evaluate $\frac{0.3}{0.0351} + \sqrt{0.4983}$ (4 marks)

7. Find the equation of the tangent which has a positive gradient too the curve
y = 3x2 – 2x + 5 at the point where y = 13 (4 marks)

8. Juma, Ali and Hassan share the profit of their business in the ratio 3: 7: 9 respectively. If Juma receives kshs 60, 000. How much profit did the hassan get. (3 marks)

9. Simplify as far possible the following $\frac{4}{4-x^2} - x + 2$ (3 marks)

10. Taps A and B can fill a water tank in 30 minutes and 25 minutes respectively while C can empty in 20 minutes. If the three taps are turned on for 18 minutes then A and C closed. How long would it take before the tank is filled? (3 marks)

11. In the triangle ABC below, show the locus P such that P is nearer to C than A, nearer to AC than to BC and less than 6 cm from A. (3 marks)

12. Solve for Ø in the equation. (3 marks)
sin (2Ø- 10) = - 0.5 for the range – 180 ° $\leq$ Ø° $\leq$ 180°

13. Solve the equation $log2(x^2 - 9) = log2^{8+1}$ (3 marks)

14. The diameter and slant height of a con are state as 9.6 cm and 5.2cm respectively. Both measurements are given to the nearest 0.1cm
Calculate the percentage error in the area. (4 marks)

15. Find the range of values of X which satisfy the following in equalities simultaneously
$4x - 9 < 6 + x$
$8 - 3x \leq x + 4$ and represent them on a number line. (3 marks)

16. The G.C.D of three numbers is 30 and their L.C.M IS 900. If two of the numbers are 150 and 60, what are other three possible third numbers? (3 marks)

SECTION II (50 MARKS)
Answer five questions only

17. .

a) Ina certain week, a business bought 18 bicycles and 16 radios for a total of kshs. 113,640. In the following week, he bought 14 bicycles and 12 radios for a total of kshs. 87,480. Using matrix method, find the price of each bicycle and each radio that he bought.

b) A trader sold an item at sh. 10,625 after allowing his customers 15% discount on the marked price of the item. In so doing he made a profit of 25%

i) Calculate the marked price of the item. (2 marks)

ii) Calculate the price at which the trader had bought the item (1 mark)

iii) If the trader had sold the item without giving a discount, calculate the percentage profit he would have made. (2 marks)

a) To clear his stock the trader decides to sell the remaining items at a loss of 10%. Calculate the price at which he sold each item. (1 marks)

18. .

a) The angle of elevation of the top of a tree from a point P on the horizontal ground 24.5°. from another point Q, five meters from P towards the base of the tree, the angle of elevation of the top of the tree is 33.2° \. Calculate to one decimal place the height of the tree.
(4 marks)

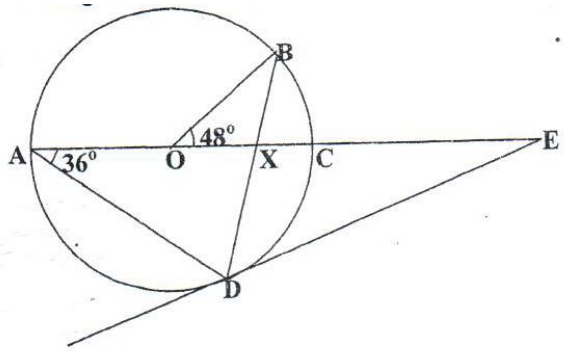
b) Four points B, C, Q and D lie on the same plane. Point B due southwest point Q. point C is 70 Km on a bearing of s 60°E from Q. point D is equidistant from B, Q and C.

I. Using the Scale: 1 cm represents 10km, construct a diagram showing the position of B, C, Q and D.
(4 marks)

II. Determine the distance between B and C (1 mark)

III. Determine the bearing of D from B. (1 mark)

19. The figure below shows a circle centre O PQRS is a cycle quadrilateral and QOS is a straight line



Giving reasons for your answers find the size of

a) Angle PRS (2 marks)

b) Angle POQ (2 marks)

c) Angle RPS (2 marks)

d) Angle PSR (2 marks)

e) Reflex angle POS (2 marks)

20. A room is constructed such that is eternal length and breadth are 7.5 cm and 5.3 m respectively. The thickness of the wall is 15cm and its height 3.3 metres. A total space of $5m^2$ is left for doors and windows on the walls.

a) Calculate the volume of:

i) The materials needed to construct the walls without the doors and windows (4 marks)

b) The blocks used in constructing the walls are 450mm by 200mm by 150mm. calculate the number of blocks needed to construct the room. (ignore the material used to join the blocks) (4 marks)

c) If each block costs sh 52.50, calculate the cost of buying the blocks. (2 marks)

21. .

a) A racing cyclist completes, the uphill section of a mountain course of 75km at an average of V km/hr. he then return to downhill along the same route an average of (v + 20) km/h. given that the differences between the timer is one hour, fro and solve an equation in V. hence

i) Find the total time taken to complete the uphill and the downhill sections of the course. (4 marks)

ii) Calculate the cyclist's average speed over the 150km. (1 mark)

b) A train moving at an average speed of 72km/hr takes 15 seconds to completely cross a bridge that is 80m long.

i) Express 72km/hr in metres per second. (2 marks)

ii) Find the length of the train in meters. (3 marks)

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121/1

MATHEMATICS

PAPER 1

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17	18	19	20	21	22	23	24	TOTAL

SECTION II

Grand total

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

SECTION I (50 Marks)

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

1. Find the value of $1.\dot{5}\dot{7} - 0.\dot{4}\dot{2}$ leaving the answer as a mixed fraction in simplified form. (3 marks)

2. Oscar refuels his car every two days; Morris refuels his car after every four days while Millicent refuels her car after every ten days. If the all refueled their cars on 20th March, on which date will they refuel their cars together again? (3 marks)

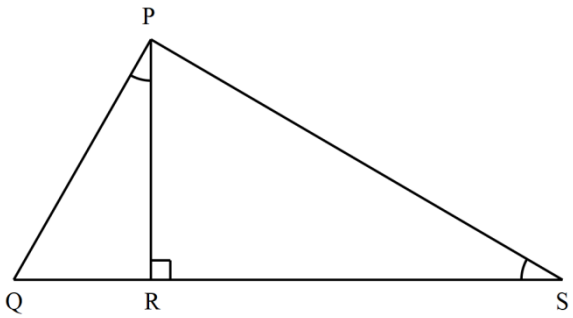
3. Use logarithms only to evaluate, correct to 4 decimal places: (4 marks)

$$\left(\frac{12.78 \sin 33.45^0}{(9.063)^2}\right)^{\frac{1}{3}}$$

4. Without using a calculator, evaluate leaving the answer as a fraction in the simplest form. (3 marks)

$$\frac{2\frac{1}{4} + \frac{3}{5} \div \frac{5}{6} \text{ of } 2\frac{2}{5}}{1\frac{7}{10}}$$

5. In the figure below angles QPR and PSR are equal. Angle PRS is a right angle. The ratio of the PR:QR=4:3

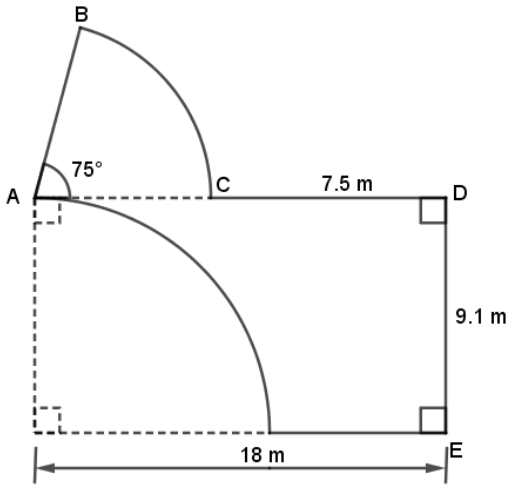


Given that the area of triangle PQR is 24 cm^2, find the area of triangle PRS. (3 marks)

6. A suit whose marked price is sh. 8,000 is sold to customer after allowing him a discount of 13%. If the trader makes a profit of 20%, find how much the trader paid for the suit. (3 marks)

7. Evans is a salesperson with Ajab Millers. He is paid on monthly basis as the agreement; basic pay of Ksh. 20,000, a commission of 2% for goods sold up to a maximum of Ksh. 200,000 and a commission of 4% for goods sold over Ksh. 200,000 in that month. In January 2023, he sold goods worth Ksh. 600,000. Calculate his total pay that month. (3 marks)

8. The figure below shows a flower garden with the dimensions shown.



Calculate the perimeter of the garden (3 marks)

9. The GCD of three numbers is 30 and their LCM is 900. Two of the numbers are 60 and 150. By expressing the GCD, LCM and the two numbers as products of their prime factors, determine the least possible value of the third number. (3 marks)

10. Solve for x in the equation (3 marks)

$$\frac{27^x \times 9^{2x}}{\left(\frac{1}{3}\right)^x} = 81$$

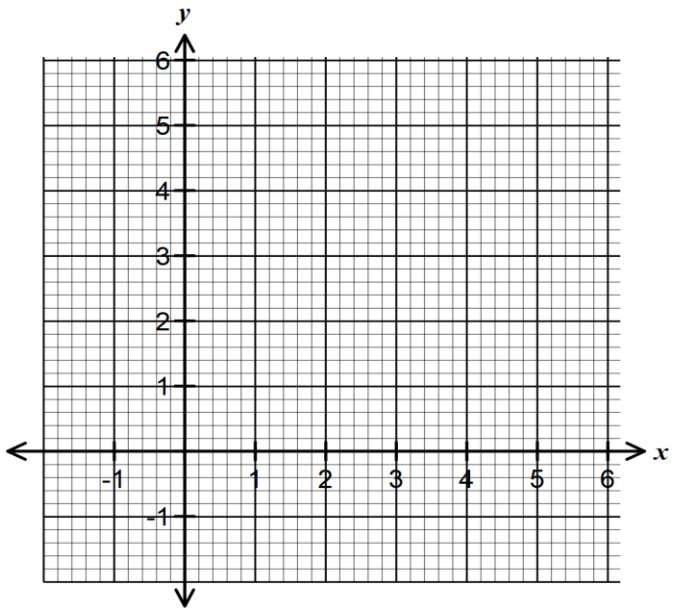
11. The sum of interior angles of two regular polygons of sides; n and $n + 2$ are in the ratio 3:4. Calculate the value of n hence find the size of each exterior angle of the polygon with n sides. (4 marks)

12. Simplify the expression: (3 marks)

$$\frac{(x+1)(4a^2 - ax)}{x^2 - 4ax - 4a + x}$$

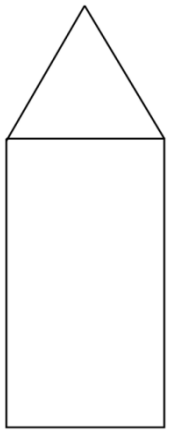
13. The sum of two consecutive even numbers is 270. Find the numbers. (2 marks)

14. On the grid provided below, draw and label the region R satisfied by the following inequalities:
$L_{1;} x \geq -1$, $L_2; 3y - x \geq -5$ and $L_3; 3x + 5y < 15$ (3 marks)



15. In a theatre group, the ratio of males to females is 2:3. On one Tuesday training, ten males members were absent and six new female members joined the group as guests for the day. If on this day the ratio of males to females was 1:3, how many regular members does the group have? (3 marks)

16. The figure below shows part of the net of a triangular prism whose cross-section is an equilateral triangle.



Complete the net of the solid. (4 marks)

SECTION II (50 Marks)

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

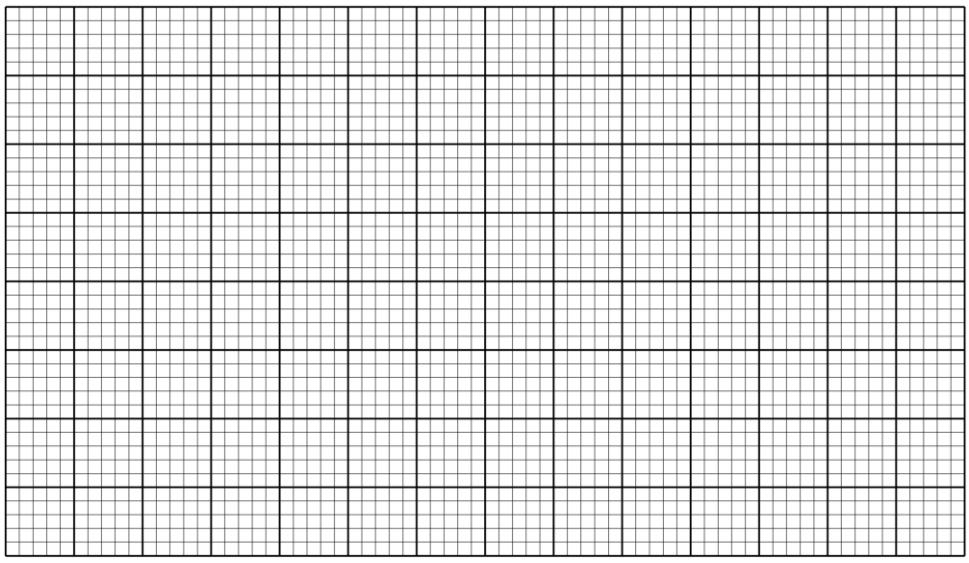
17. The table below shows the wages in US dollars earned by technical developers in an ICT firm

Amount (USD)	10 – 14	15 – 24	25 – 29	30 – 44	45 – 64
Number of workers	6	16	a	9	5

(a) Given that the mean wage is $27\frac{11}{16}$ USD, find the value of a. (4 marks)

(b) Find the median class and its frequency. (2 marks)

(c) On the grid provided, draw a histogram to represent the information. (4 marks)



18. A composite solid comprises of a frustum of a cone mounted on a hemisphere such that the diameters of the hemisphere and the bottom of the frustum both measure 30 cm. The entire solid has a vertical height of 60 cm. The radius of the top of the frustum if 10 cm.

(a) Calculate the volume of the solid correct to two decimal places. Use $\pi = \frac{22}{7}$. (7 marks)

(b) The solid is melted and recast into cubes of side 16 cm. How many such cubes are realized? (3 marks)

19. Two lines $L_1: 2y - 3x - 6 = 0$ and $L_2 = 3y + x = 20$ intersect at a point M

(a) Find the coordinates of M. (3 marks)

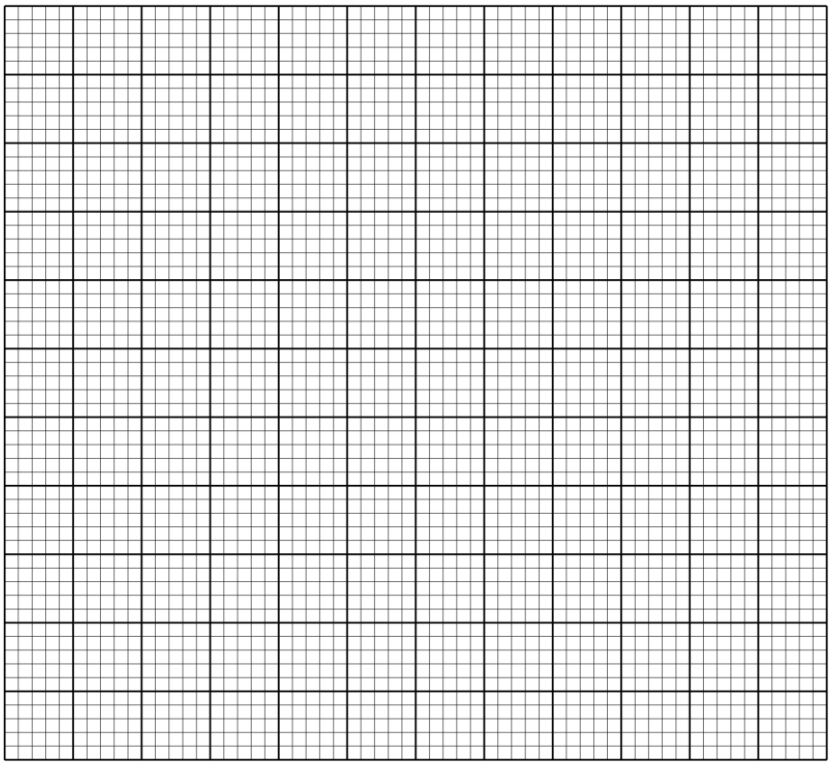
(b) A third line L_3 is perpendicular to L_2 at M. Find the equation of L_2 in the form $y = mx + c$ where m and c are constants (3 marks)

(c) Another line L_4 is parallel to L_1 and passes through $(-1, 3)$. Determine the x and y intercepts of L_4 (4 marks)

20. (a) Complete the table below for the function $y = 2x^2 + 5x - 12$ for $-6 \leq x \leq 3$. (2 marks)

x	-6	-5	-4	-3	-2	-1	0	1	2	3
y				-9			-12			

(b) On the grid provided, draw the graph of $y = 2x^2 + 5x - 12$ for $-6 \leq x \leq 3$ (3 marks)

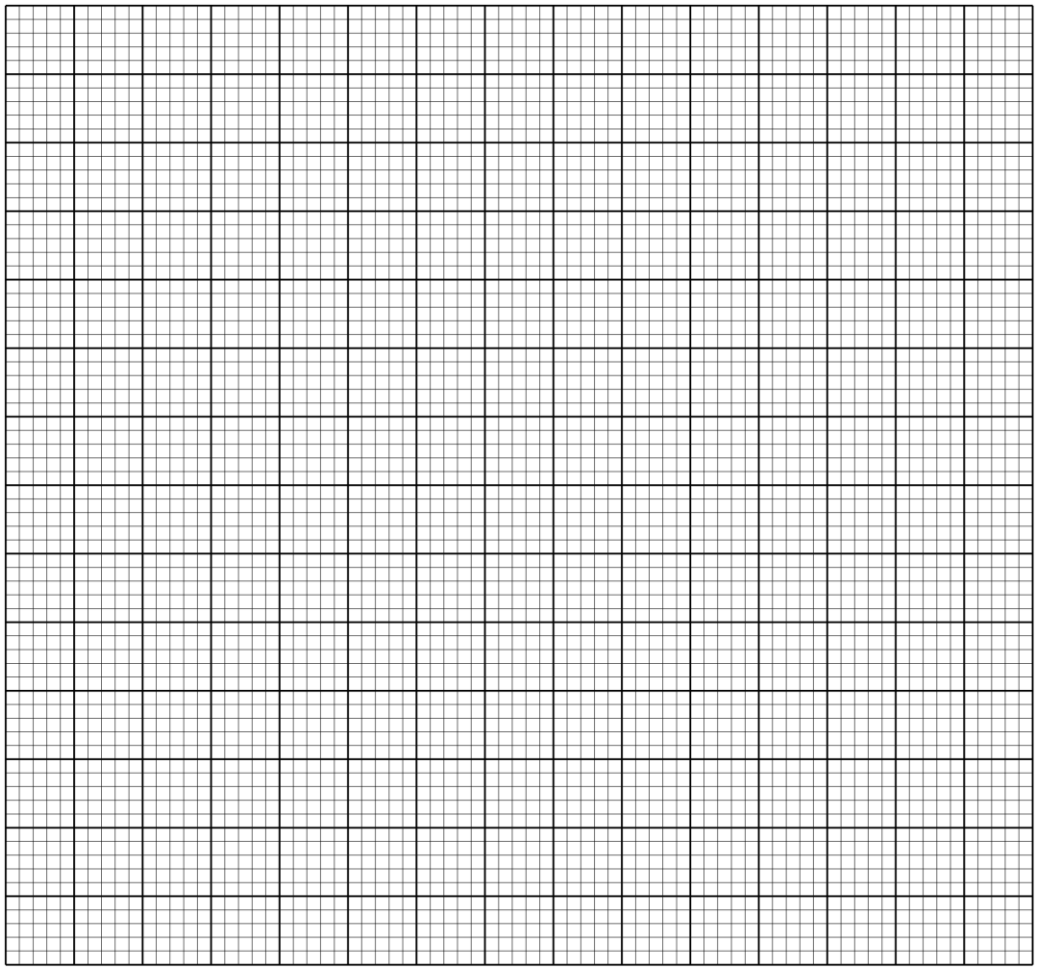


(c) Use the graph in (b) above to find the roots to the equation $2x^2 + 5x - 12 = 0$ (2 marks)

(d) By drawing a suitable line on the same axes as the graph in (b), solve the equation $x^2 + x - 6 = 0$ (3 marks)

21. On the grid provided,

(a) Draw ΔPQR in which P(2, 3), Q(1, 2) and R(4, 1). On the same axes, draw $\Delta P''Q''R''$ such that $P''(-2, 3)$, $Q''(-1, 2)$ and $R''(-4, 1)$. (2 marks)



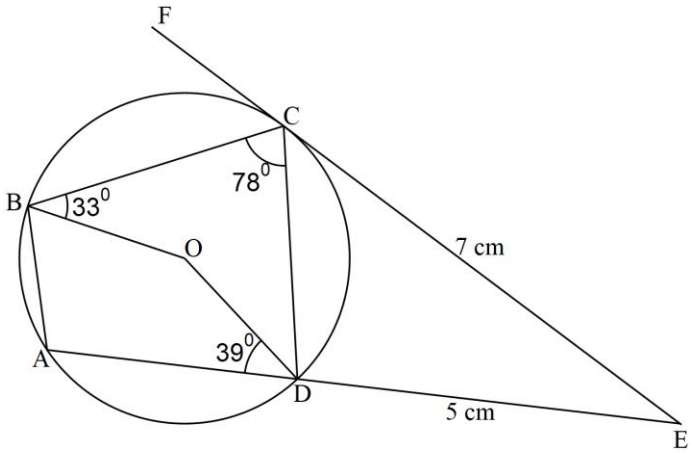
(b) On the same axes, draw $\Delta P'Q'R'$, the image of ΔPQR under a reflection in the line $y + x = 0$. (2 marks)

(c) Describe fully, a single transformation that maps $\Delta P'Q'R'$ onto $\Delta P''Q''R''$. (2 marks)

(d) Draw $\Delta P'''Q'''R'''$ such that it can be mapped onto ΔPQR by a rotation of -90^0 about (0, 0) and state its coordinates. (3 marks)

(e) State the type of congruency between $P'Q'R'$ and $\Delta P'''Q'''R'''$. (1 mark)

22. In the figure below, O is the centre of the circle, $\angle ADO=39^0$, $\angle OBC=33^0$ and $\angle ECD=45^0$. EC is a tangent to the circle at C.



(a) Calculate, giving reasons

(i) ∠CDE (2 marks)

(ii) ∠DEC (2 marks)

(iii) Reflex ∠BOD (2 marks)

(b) Given that EC=7 cm and DE = 5 cm, calculate the length of AD correct to 4 significant figures. (4 marks)

23. The distance between two towns A and B is 760 km. A bus left A at 0815 hours and traveled towards B at an average speed of 90 km/h. At 1035 hours and on the same day, a car left B and traveled towards A at an average speed of 110 km/h

(a) Calculate:

(i) the time of the day the two vehicles met; (4 marks)

(ii) the distance from A to the meeting point. (3 marks)

(b) A motorist started at her home at 1030 hours on the same day and traveled at an average speed of 120 km/h. She arrived in B at the same time as the bus. Calculate the distance from her home to B. (3 marks)

24. Mama Moraa, a cereals trader deals in two types of beans, Wairimu and Yellow Green. Wairimu costs Ksh. 4,000 per bag while Yellow Green costs Ksh. 3,500 per bag.

(a) She mixes 30 bags of Wairimu with 50 bags of Yellow Green. If she sells the mixture at a profit of 20%, calculate the selling price of one bag of the mixture. (4 marks)

(b) She now mixes Wairimu with Yellow Green in the ratio $a: b$ respectively. If the cost of the mixture is Ksh. 3,835 per bag, find the ratio $a: b$ (4 marks)

(c) Mama Moraa then mixes one bag of the mixture in part (a) with one bag of the mixture in part (b) above. Calculate the ratio of Yellow Green to Wairimu in this mixture. (2 marks)