

MATHEMATICS PP1 2024 KCSE MOCK

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NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

121/1

MATHEMATICS Paper 1

FORM 4

Time: 2 ½ Hours

SET 1 QUESTION PAPER

Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

1. Write your name, stream, admission number and index number in the spaces provided above.
2. The paper contains two sections, Section I and II
3. Answer all questions in section I and **ONLY** any **FIVE** questions from section II.
4. All answers and working must be shown on the question paper in the spaces below each question
5. Show all steps in your calculations, giving answers at each stage
6. Marks may be given for each correct working even if the answer is wrong
7. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.

FOR EXAMINERS 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

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This paper consists of 16 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.

SECTION I (50 MARKS)

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Answer all questions in this Section

1. Evaluate : $\frac{\sqrt{\frac{1}{9} \text{ of } 2\frac{1}{3} + \frac{2}{3} \left(\frac{5}{3} - \frac{3}{2} \right)}}{\frac{2}{5} \text{ of } 3\frac{1}{3} \div \frac{1}{3}}$ (3 mks)

2. Simplify completely
(3 mks)

$$\frac{12x^2 - 11xy + 2y^2}{18x^3 - 8xy^2}$$

3. Use the exchange rates below to answer this question.

	Buying	Selling
1 US dollar	63.00	63.20
1 UK £	125.30	125.95

Abwanja, a tourist arriving in Kenya from Britain had 9600 UK Sterling pounds (£). He converted the pounds to Kenya shillings at a commission of 5%. While in Kenya, he spent $\frac{3}{4}$ of this money. He changed the balance to US dollars after his stay. If he was not charged any commission for this last transaction, calculate to the nearest US dollars, the amount he received. (3 mks)

4. Solve for x in the following equation. (3mks)

$$4^x (8^{x-1}) = \tan 45^\circ$$

5. The sum of interior angles of two regular polygons of sides; n and n + 2 are in the ratio 3:4. Calculate the sum of the interior angles of the polygon with n sides. (3mks)

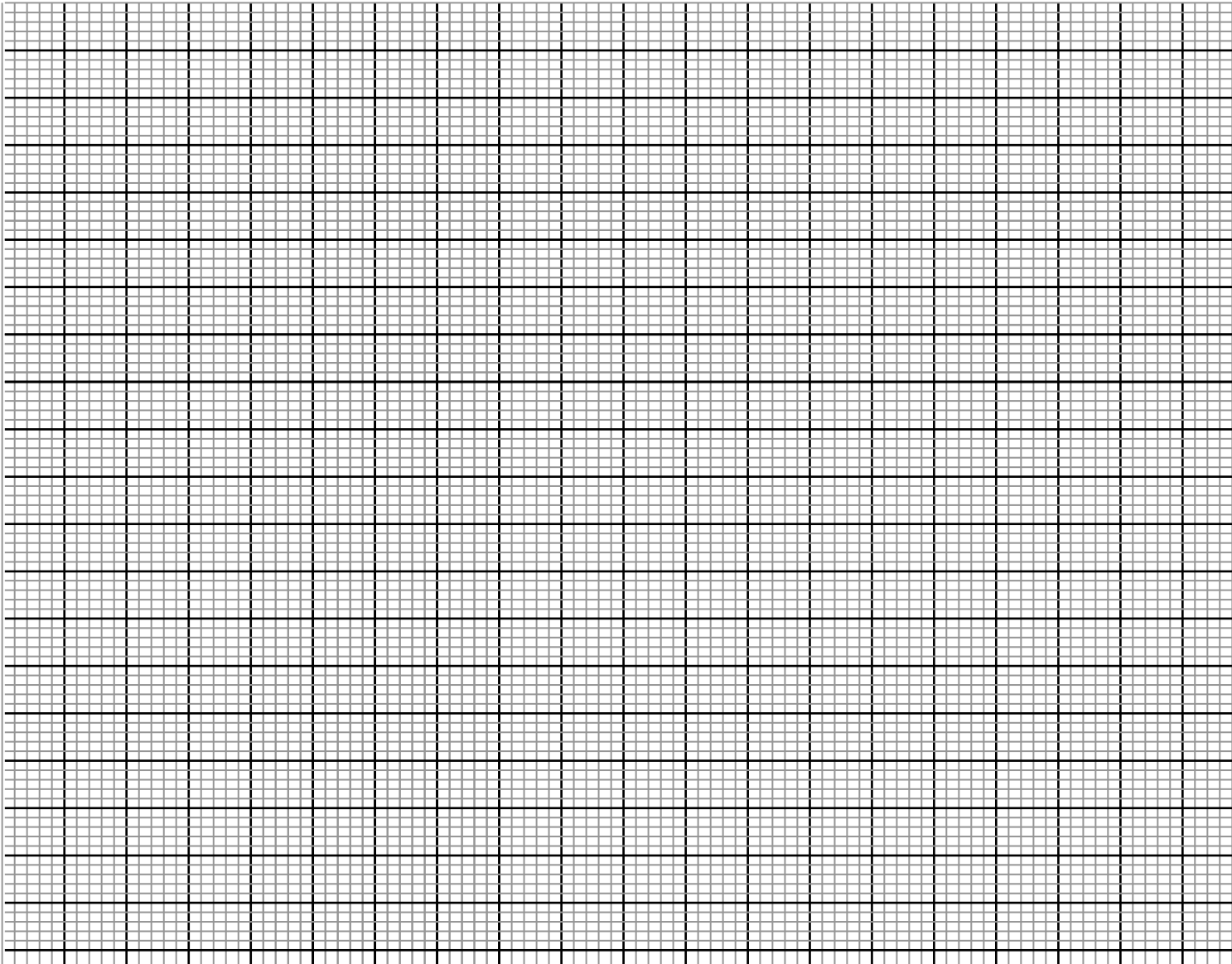
6. Use logarithms to evaluate the following correct to 4 decimal places.

$$\sqrt[4]{\frac{2 \times 1.764^{-2} \times 0.324}{5.42}}$$

(3mks)

7. By shading, show the region defined by the following linear inequalities (3mks)

$$2y < x + 4; 4y \geq -x - 4; x \leq 2$$



8. Find the equation of locus of points equidistant from points A (6, 5) and B (-2, 3) in the form

$$y = mx + c$$

(3mks)

9. The GCD of three numbers is 6 and their LCM is 900. If two of the numbers are 36 and 60, find the least possible third number. (3mks)

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10. Use the tables of squares, cube roots and reciprocals to evaluate (3mks)

$$\frac{\sqrt[3]{0.008}}{0.375} - \frac{10}{37.5^2}$$

11. Solve the following pair of simultaneous equations using substitution method(3mks)

$$4x + 3y - 475 = 0$$

$$2x + 5y - 325 = 0$$

12. Given that $\sin \theta = 0.8$ and θ is an acute angle, find without using tables or calculators

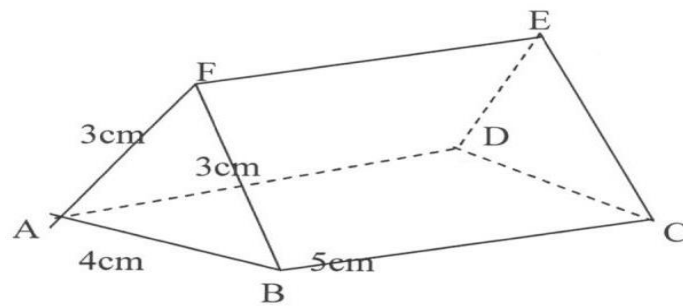
(a) $\tan \theta$ (2mks)

(b) $\cos(180 - \theta)$

(1mk)

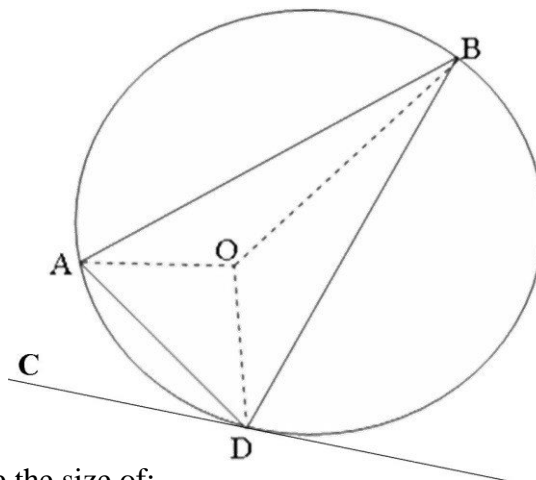
13. The figure below is a triangular prism of uniform cross-section in which $AF = FB = 3\text{cm}$,

$AB = 4\text{cm}$ and $BC = 5\text{cm}$. Draw a clearly labeled net of the prism. (3mks)



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. (3mks)

15. In the circle below, O is the centre, angle $DAB = 87^\circ$, minor Arc AB is twice minor arc AD. CD is a tangent to the circle at D.



Giving reasons, Calculate the size of;

- (i) Angle AOB. (2mks)

- (ii) Angle ADT 2 (2mks)

16. A sector of a circle of radius 42cm subtends an angle of 120° at the centre of the circle. The sector is folded into an inverted right cone. Calculate

(i) The radius of the cone (3mks)

(ii) To one decimal place the vertical height of the cone (1mk)

SECTION II: 50 MARKS

Answer any FIVE questions in this section

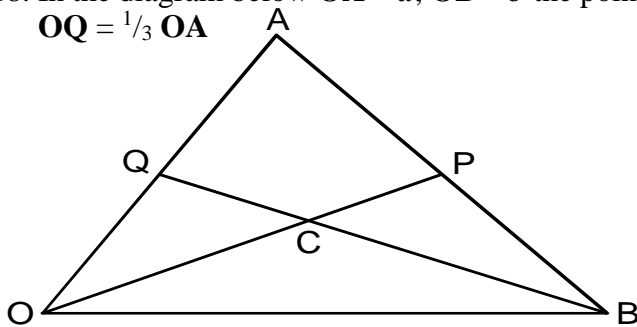
17. A bus and a Nissan left Nairobi for Eldoret, a distance of 340 km at 7.00 a.m. The bus travelled at 100km/h while the Nissan travelled at 120km/h. After 30 minutes, the Nissan had a puncture which took 30 minutes to mend.

(a) Find how far from Nairobi did the Nissan caught up with the bus (5mks)

(b) At what time of the day did the Nissan catch up with the bus? (2mks)

(c) Find the time at which the bus reached Eldoret (3mks)

18. In the diagram below $\mathbf{OA} = \mathbf{a}$, $\mathbf{OB} = \mathbf{b}$ the points P and Q are such that $\mathbf{AP} = \frac{2}{3} \mathbf{AB}$, $\mathbf{OQ} = \frac{1}{3} \mathbf{OA}$



(a) Express \mathbf{OP} and \mathbf{BQ} in terms of \mathbf{a} and \mathbf{b} (2 mks)

(b) If $\mathbf{OC} = h\mathbf{OP}$ and $\mathbf{BC} = k\mathbf{BQ}$, Express OC in two different way and hence

(i) Deduce the value of h and k . (5 mks)

(ii) Express vector OC in terms of \mathbf{a} and \mathbf{b} only. (2 mks)

(iii) State the ratio in which C divides BQ (1 mk)

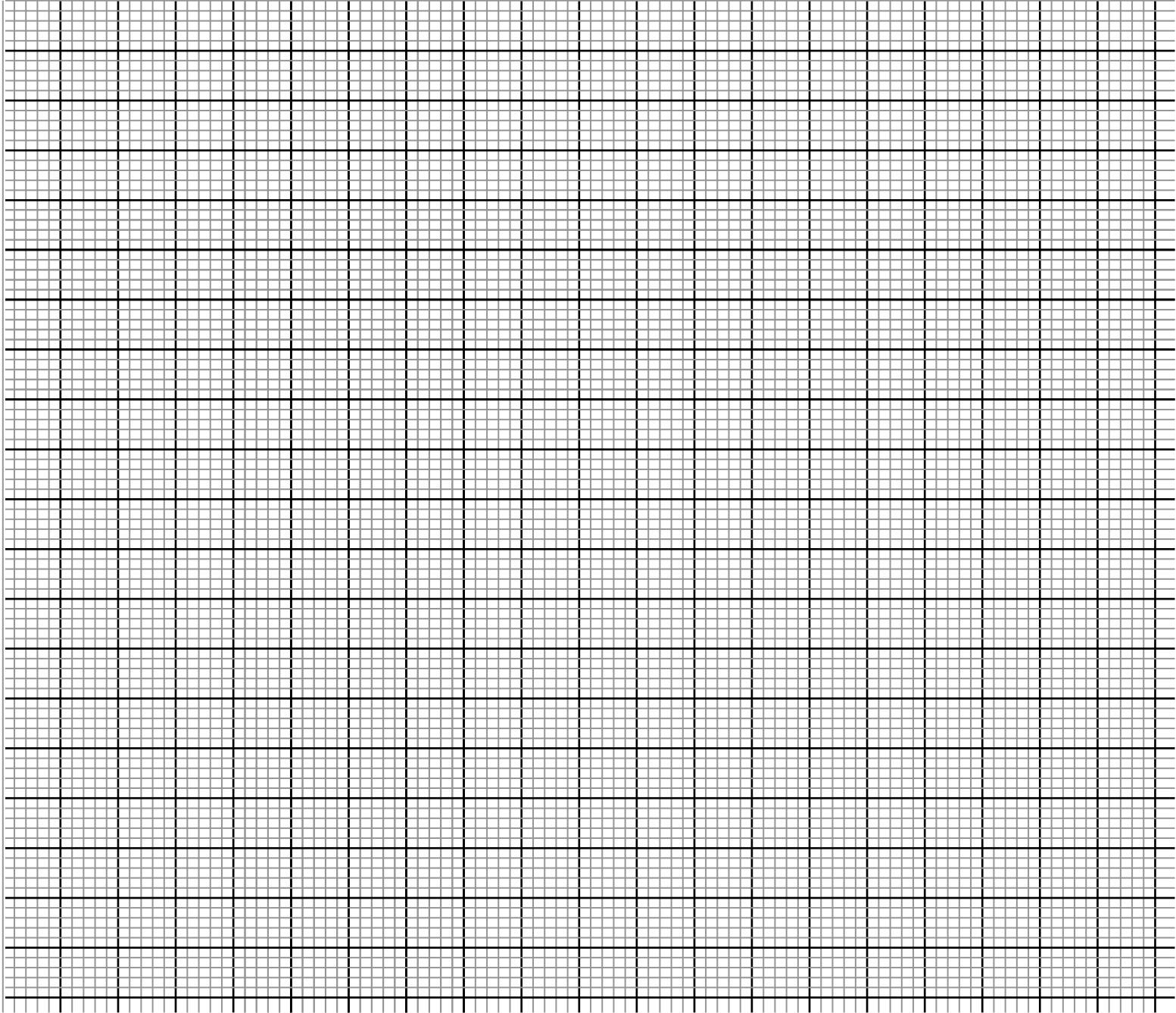
19. The table below shows the marks scored in a Mathematics examination.

(a) Calculate the mean mark

(3mks)

Marks	Frequency				
5 – 14	2				
15 – 34	22				
35 – 54	50				
55 – 84	24				
85 – 94	2				

(b) Draw a histogram to represent the above information (4mks)



(c) Using the histogram, find the median mark

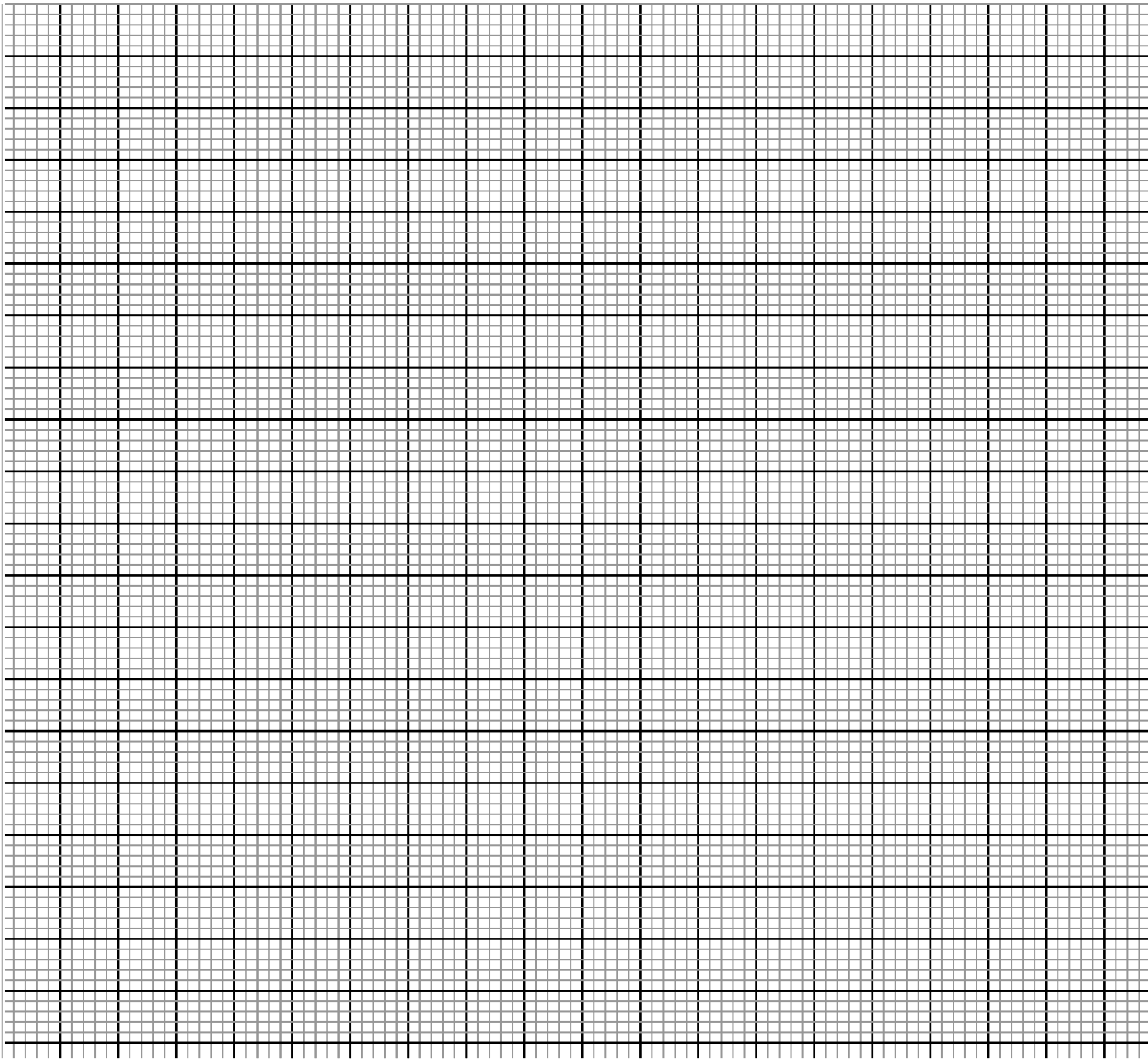
(3mks)

20. Given the quadratic function $y = 3x^2 + 4x - 2$

a) Complete the table below for values of x ranging $-4 \leq x \leq 3$.
(2mks)

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

b) Using the grid provided draw the graph of $y = 3x^2 + 4x - 2$ for $-4 \leq x \leq 3$ (3mks)



c) Using the graph, find the solution to the equations.

i) $3x^2 + 4x - 2 = 0$

(2mks)

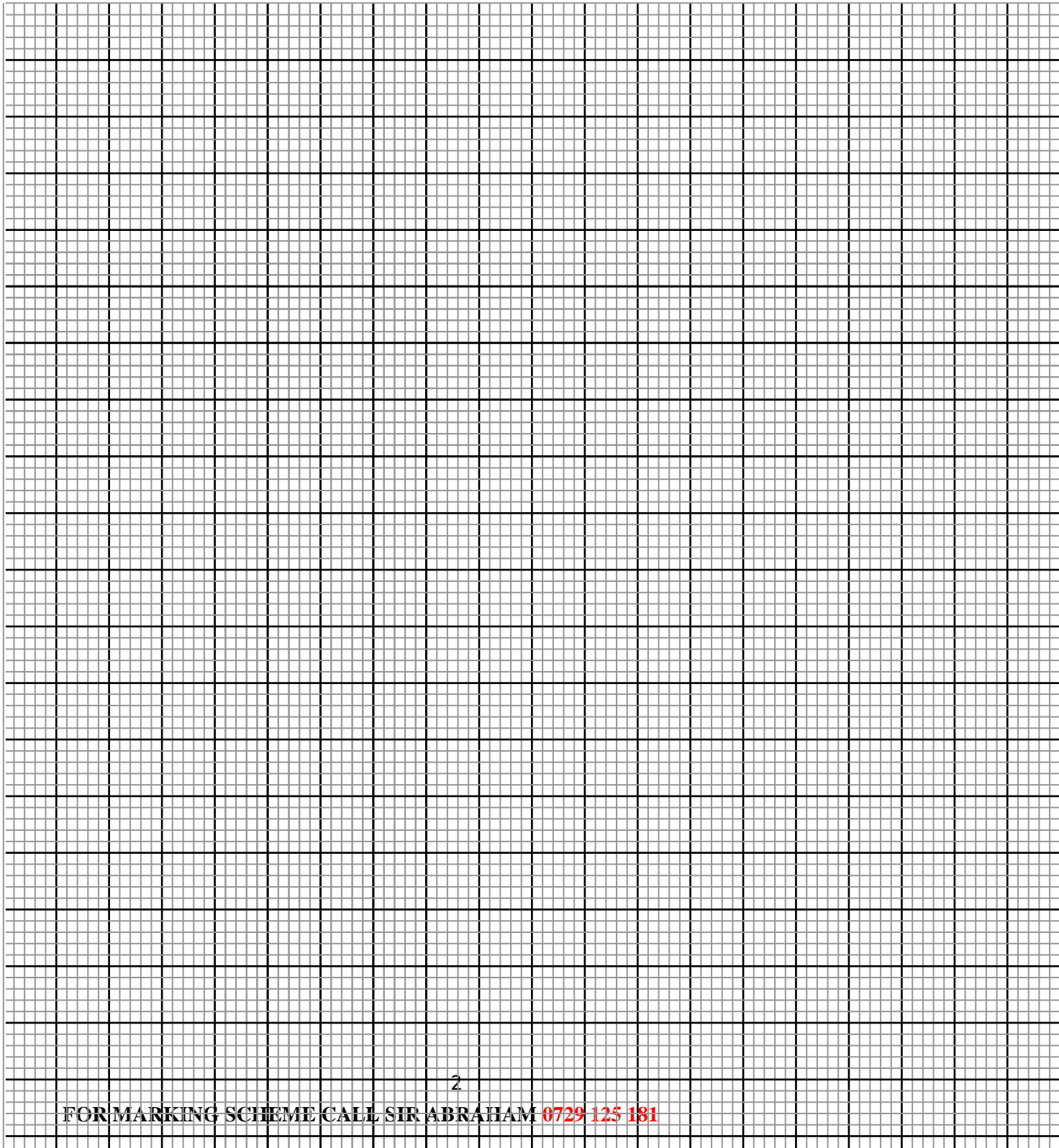
ii) $3x^2 + 7x + 2 = 0$

(3mks)

21. A triangle ABC has vertices A(2,1), B(5,2) and C(0,4).

(a) On the grid provided plot the triangle ABC.

(2 mks)



(b) $A^1B^1C^1$ is the image of ABC under a translation $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$. Plot $A^1B^1C^1$ and state its coordinates. (2mks)

(c) Plot $A^{11}B^{11}C^{11}$ the image of $A^1B^1C^1$ under a rotation about the origin through a negative quarter turn. State its coordinates. (3 mks)

(d) $A^{111}B^{111}C^{111}$ is the image of $A^{11}B^{11}C^{11}$ under a reflection on the line $y = 0$. Plot $A^{111}B^{111}C^{111}$ and state its coordinates. (3 mks)

22. Two Airstrips P and Q are such that Q is 500km due East of P. Two warplanes M and N

Leave from P and Q respectively at the same time. Warplane M moves at 360km/h on a bearing of 030° . Warplane N moves at a speed of 240km/h on a bearing of 315° .

The two warplanes landed at Police camps A and B respectively after 90 minutes.

Using a scale of 1cm represent 100km

a) Show the relative positions of the two police camps A and B (6mks)

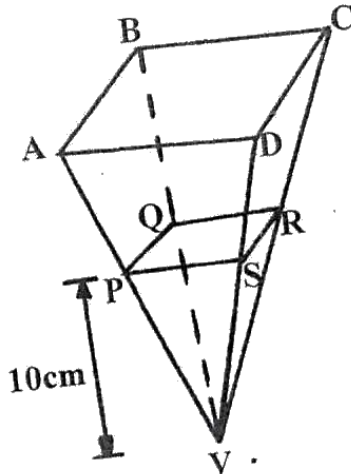
(b) Find the shortest distance between the police camps A and B. (2mks)

(c) Find the true bearing of;

i) Police camp A from B (1mk)

ii) Police camp B from A (1mk)

23. The diagram below represents square based pyramid standing vertically. $AB = 12\text{cm}$, $PQ = 4\text{cm}$ and the height of pyramid PQSV is 10cm .



- (a) If PQRSV is a solid, find the volume of material used to make it. (2mks)

- (b) Find the
 (i) height of the frustum ABCDPQRS (2mks)

- (ii) Volume of the frustum (3mks)

- (c) The liquid from a hemisphere is poured into PQRS. Find radius correct to 4 significant figures of the hemisphere if the liquid from hemisphere filled the solid completely. Use $\pi = \frac{22}{7}$ (3mks)

24. 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 the initial acceleration. (3mks)

(b) Calculate

(i) The time when the particle was momentarily at rest. (3mks)

(ii) Its displacement by the time it comes to rest momentarily. (2mks)

(c) Calculate the maximum speed attained.

(2mks)

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

**Kenya Certificate of Secondary
Education.(K.C.S.E**

**MATHEMA
TICS ALT. A
Paper 1**

SET 2 QUESTION PAPER

INSTRUCTION CANDIDATES

- a) Write your name and Admission number in the spaces provided above. b) Sign and write the date of examination in the spaces provided above. c) The paper consists of **two** sections. **Section I** and **Section II**.
- d) Answer **ALL** the questions in Section I and any **FIVE** questions in Section II.
- e) **Show all the steps in your calculations, giving your answer at each stage in the spaces provided below each question.**
- f) Marks may be given for correct working even if the answer is wrong.
- g) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used except where stated otherwise.
- h) Candidates should answer the questions in English.
- i) **This paper consists of 15 printed pages.**
- j) **Candidates must check the question paper to ascertain that all pages are printed as indicated and that no question(s) is/are missing**

FOR EXAMINER'S U S E

SECTION I

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

SECTION II

Grand Total

SECTION I (50 MARKS)**Attempt All Questions in this section**

1. Find the value of y given that (3 marks)

$$\begin{array}{r} 25\ 39\ 3\ 5 \\ \hline 3\ 5y\ 2y\ 4 \end{array} \quad 1$$

2. The length of a minute hand of a clock is 3.5cm. What will be the time if from 10.15am it sweeps through an area of 19.25cm^2 ? (4marks)

3. Use reciprocal, square and square root table to evaluate to 4 significant figures, the expression
- $$\sqrt{\frac{1}{4.346^2}}$$
- 2
4
.

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(3marks)

4. Given that $\sin(90-x) = 0.8$, where x is an acute angle, find without using mathematical table the value of $2 \tan x + \cos(90-x)$ (3marks)

5. Find the equation of the tangent and the normal to the curve $y = 2x^3 - 3x^2 - 6$ at the point (2,10) (4marks)

6. Simplify $\frac{2y^2 - 3xy + 2x^2}{x^2 - 4y^2}$ (3marks)

7. Find greatest integral value of x which satisfies

$$\frac{2x-3}{2} \geq \frac{8-3x}{5} \leq \frac{5x-6}{3}$$

(3marks)

$$2 \quad 5 \quad 3$$

8. One of the roots of the equation $x^2 + kx + 28 = 0$ is 4. Find the values of k and hence the

second root

(4marks)

9. Solve for x in the following without using a calculator or mathematical table.

$$9^x - 27^{x-1} = \tan 30^\circ$$

(3marks)

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10. A shear parallel to the x -axis maps point $(1, 2)$ onto a point $(5, 2)$. Determine the shear factors and hence state the shear matrix (invariant line is $y=0$) (3marks)
11. A solid is in the shape of a right pyramid on a square base on side 8cm and height 15cm . A frustum whose volume is a third of the pyramid is cut off. Determine the height of the frustum. (3 marks)

12. The interior angle of a regular polygon is 20° more than three times the exterior angle.
Determine the number of sides of the polygon (2marks)

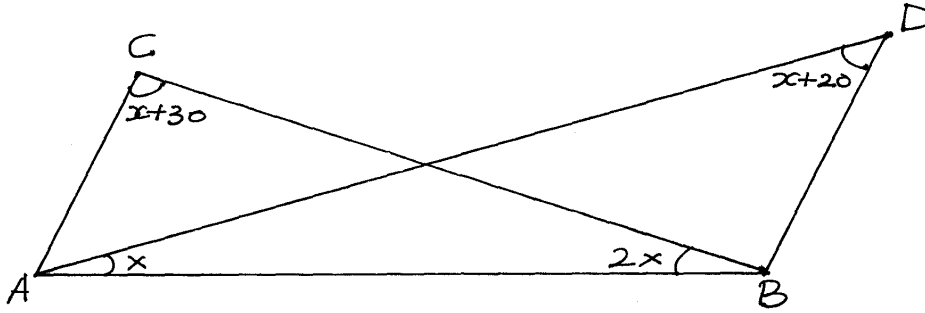
13. Three fifths of work is done on the first day. On the second day $\frac{3}{4}$ of the remainder is completed.
If the third day $\frac{7}{8}$ of what remained is done, what fraction of work still remain to be done.

(3marks)

14. A two-digit number is such that the sum of the digits is ten. If the digits are reversed, the new number formed is less than the original number by 18. Find the number (3marks)

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15. In the figure bellow, $\angle CBD = 2 \angle CAD$. Find the value of x (3marks)



16. Two boys, Ababu and Chungwa, on the same side of a tall building are 100m apart. The building and the two boys are in a straight line and the angles of elevation from the boys to the top of the building are 30° and 20° respectively calculate the height of the building. (3marks)

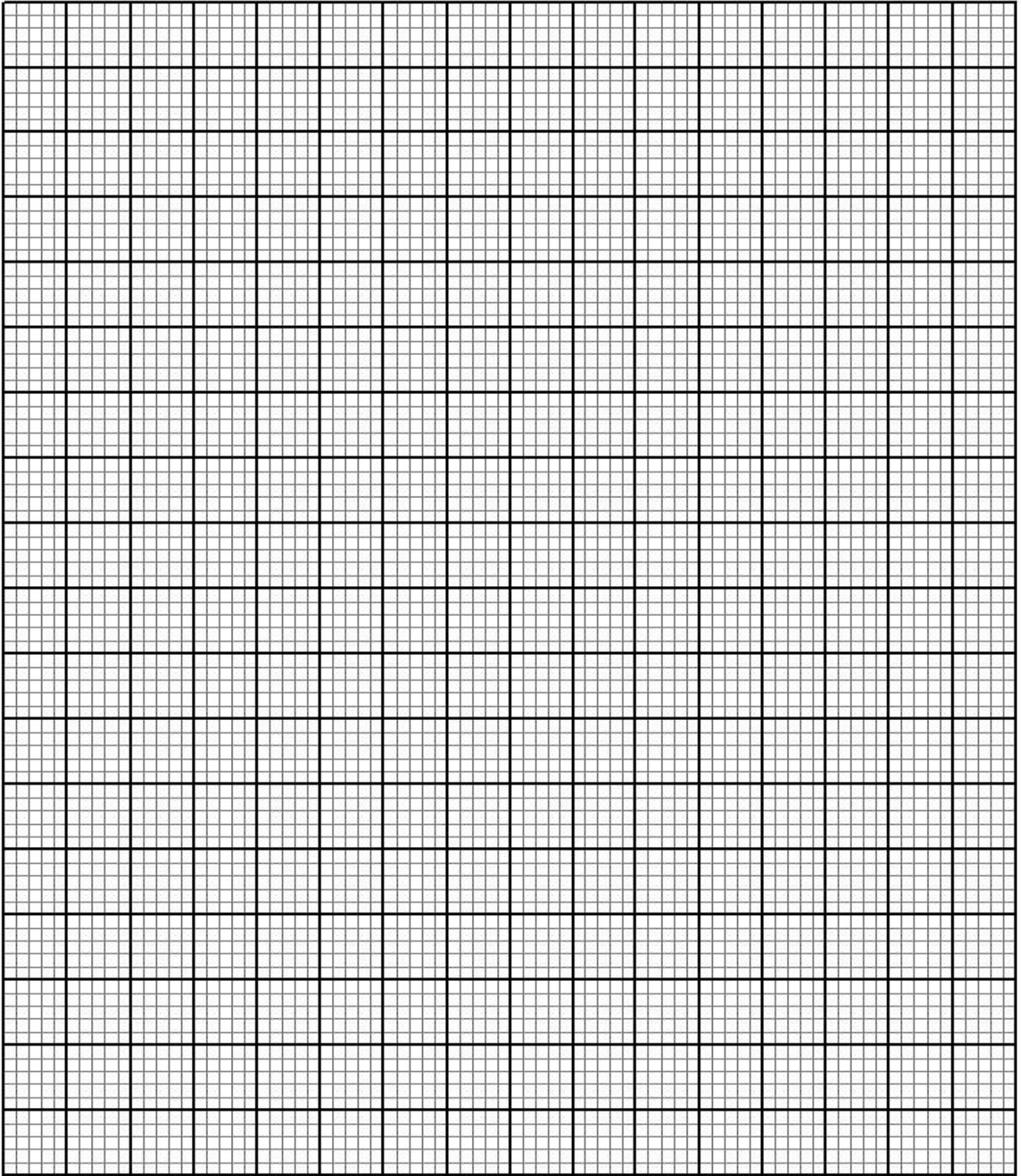
SECTION II (50 MARKS)**Attempt only five Questions from this section**

17. A business lady bought 100 quails and 80 rabbits for sh25600. If she had bought twice as many rabbits as half as many quails she would have paid sh7400 less. She sold each quail at a profit of 10% and each rabbit at a profit of 20%.
- a) Form two equations to show how much she bought the quails and the rabbits. (2marks)
- b) Using matrix method, find the cost of each animal. (5mrks)

- c) Calculate the total percentage profit she made from sale of the 100 quails and 80 rabbits.
(3marks)

18. $A(3,7)$, $B(5,5)$, $C(3,1)$, $D(1,5)$ are vertices of a quadrilateral
- a) On the grid provided below, plot ABCD on a Cartesian plan (2marks)
- b) $A^1B^1C^1D^1$ is the image of ABCD under a translation T $\begin{matrix} 6 \\ 9 \end{matrix}$ plot $A^1B^1C^1D^1$ and state its coordinates (2marks)
- 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. (3marks)
- 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 (3marks)

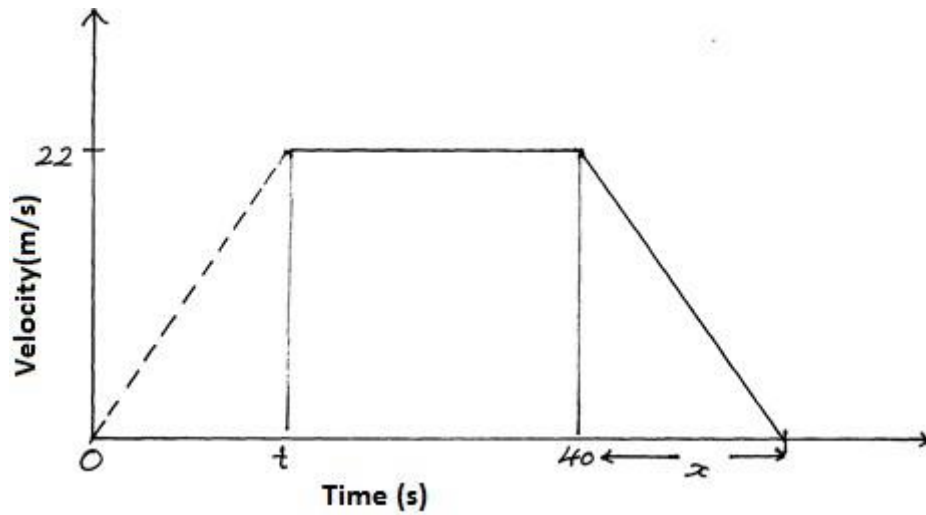
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19. The figure below shows a velocity time graph of a journey of a car. The car start from rest and accelerates at $2\frac{3}{4} \text{ m/s}^2$ for t seconds until it is 22m/s

4

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Brakes are applied bringing it uniformly to rest. The total journey is 847m long. Find.

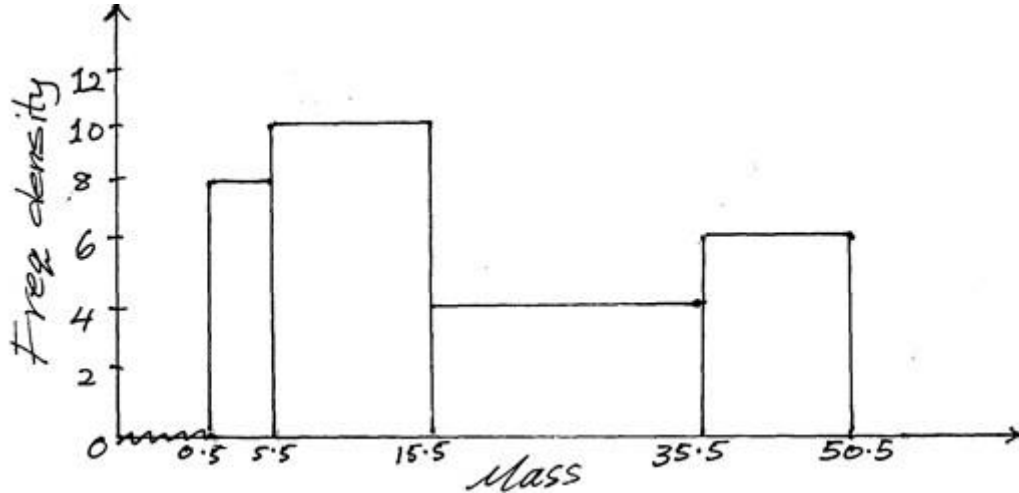
- a) The value of t , the acceleration time (2marks) b)

The distance travelled during the first t seconds. (2marks) c) The

value of x , the deceleration time (4marks)

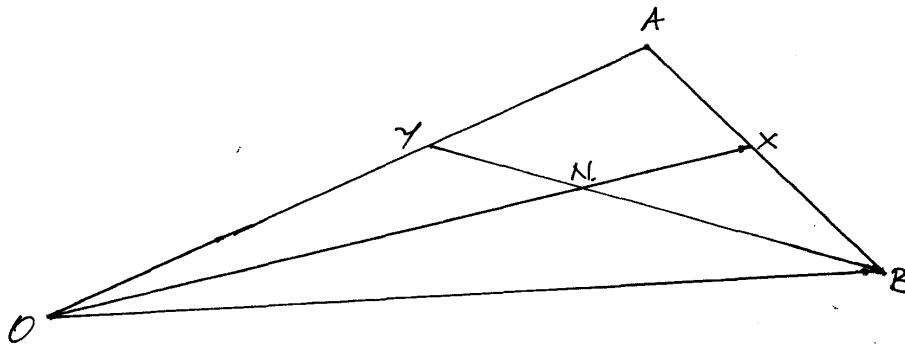
- d) The rate of deceleration (2marks)

20. The diagram below shows a histogram representing the mass of some pupil in a school.



- a) Prepare a frequency distribution table of the data (3marks)
- b) From the table above, estimate
- i) The mean mass of the pupils to 3 s.f (3marks)
- ii) The median mass (3marks)
- iii) How many pupils were 40kg and above (1marks)

21. In the figure below $\mathbf{OY:YA=1:3}$ $\mathbf{AX:XB=1:2}$ $\mathbf{OA= a}$ and $\mathbf{OB= b}$. N is the point of intersection of **BY** and **OX**



- a) Determine

i) **OX**

(2marks)

ii) **BY**

(1mark)

b) Give that $\vec{BN} = k\vec{BY}$ and $\vec{ON} = h\vec{OX}$, express \vec{ON} in two ways in terms of \vec{a}, \vec{b}, h and k

~ ~

(3marks)

c) Find the value of h and k and hence show that O, N and X are collinear

(4marks)

22. Using a ruler and a pair of compass only, construct triangle XYZ where XY is 6cm and $\angle XYZ$ is 135° and YZ=7cm (2marks)

- a) Measure XZ (1mark)

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- b) Drop a perpendicular from Z to meet line XY at K , measure ZK. (2marks)

- c) Bisect line XY and let the bisector meet line XZ at Q (1mark)
- d) Join Q to Y and measure angle XQY (2marks)

23. Four towns are situated in such that a way that town Q is 500km on a bearing of 120° from P. Town R is 240 km on a bearing of 210° from town P, while town S is due north of town Q and due east of town P

a) Draw a sketch diagram showing the relative position of P,Q,R and S (scale:1cm :100km)
(3mark)

b) Find by calculation

i) The distance QR (1mark)

ii) The distance QS

(2marks)

iii) The angle PRSQ

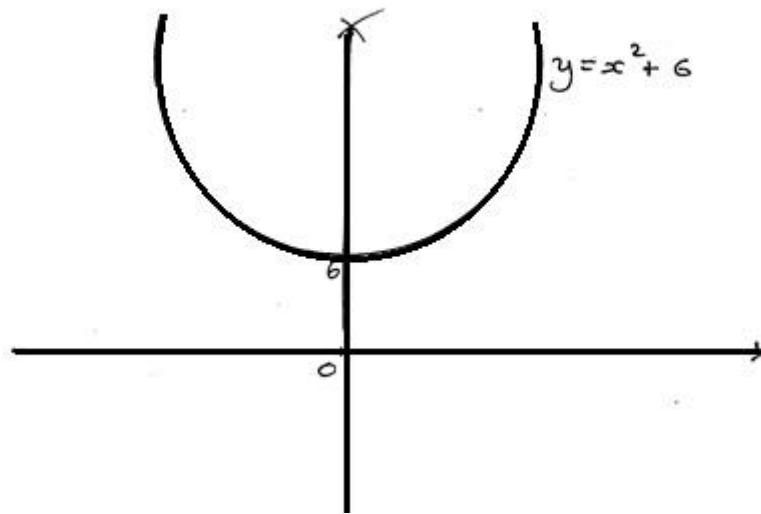
(2marks)

iv) The area of triangle PQS

(2marks)

24. The figure below shows a sketch of the graph of $y = x^2 - 6$.

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- a) Estimate the area bounded by the curve, the x-axis and the line $x = -4$ and $x = 4$ using
i) The trapezium rule with 8 sides (3marks)

ii) The mid- ordinates rule with and strips
(3marks)

b) What percentage error is caused by estimating the area of the curve using the mid ordinates rule as in a (ii) above
(4marks)

THIS IS THE LAST PRINTED PAGE!

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

121/1

MATHEMATICS PAPER 1

TIME: 2 ½ HRS

Kenya Certificate of Secondary Education (KCSE)

SET 3 QUESTION PAPER

Instructions to candidates

- a) Write your name and index number in the spaces provided above.
- b) Sign and write the date of examination in the spaces provided.
- c) This paper consists of **TWO** sections I and II.
- d) Answer ALL questions in section I and any five from section II.
- e) All answers and working must be done 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.
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- h) Non-programmable silent electronic calculation and KNEC Mathematical tables may be used.

For Examiner's use only

Section I

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Section II

17	18	19	20	21	22	23	24	Total

Grand Total

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Ensure that all the pages are printed as indicated and no questions are missing.

SECTION I (50 Marks)

Answer all questions in this section in the spaces provided

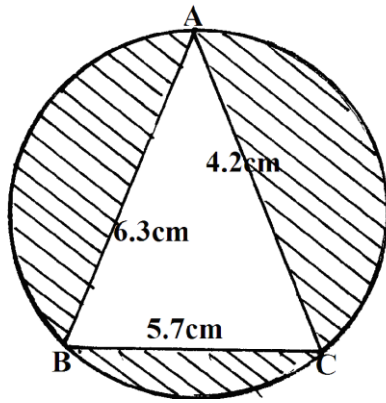
1. Without using tables or calculator, evaluate the following. (3mks)

$$\underline{-8 + (-13) \times 3 - (-5)}$$

$$-1 + (-6) \div 2 \times 2$$

2. The straight line through the points D (6, 3) and E (3, -2) meets the y – axis at point F. Find the co-ordinates of F. (3 mks)

3. The circle below whose area is 18.05cm^2 circumscribes a triangle ABC where $AB = 6.3\text{cm}$, $BC = 5.7\text{cm}$ and $AC = 4.2\text{cm}$. Find the area of the shaded part to 2 dp. (3 mks)



4. A number n is such that when it is divided by 27, 30, or 45, the remainder is always 3. Find the smallest value of n . (3 mks)

5. The actual area of an estate is 3510 hectares. The estate is represented by a rectangle measuring 2.6cm by 1.5cm on the map whose scale is 1: n . Find the value of n . (give your answer in standard form) (3 mks)

6. Find the obtuse angle the line $y - 2x = 7$ makes with the x - axis (2 mks)

7. Given the column vector $\vec{p} = \begin{pmatrix} -5 \\ 3 \end{pmatrix}$, $\vec{q} = \begin{pmatrix} 4 \\ -8 \end{pmatrix}$ and $\vec{r} = \begin{pmatrix} 6 \\ -9 \end{pmatrix}$ and $\vec{t} = 2\vec{p} - \frac{1}{2}\vec{q} + \frac{1}{3}\vec{r}$

(i) Express \vec{t} as a column vector (2mks)

(ii) Calculate the magnitude of vector \vec{t} in (i) above correct to two decimal places. (2mks)

8. Muthoni went to a shop and bought 50 packets of milk and 25 packets of salt all for Kshs.200.00. She sold the milk at a profit of 28% and the salt at a profit of 24% thereby making a net profit of Kshs.53.50. Find the cost price of a packet of milk and a packet of salt.

(3 mks)

9. The angles of elevation from two points A and B to the top of a storey building are 48° and 57° respectively. If $AB = 50\text{m}$ and the point A and B are opposite each other; Calculate;

a) The distance of point A to the building (3 mks)

b) The height of the building (1 mks)

10. Find x if $3^{2x+3} + 1 = 28$ (2 mks)

11. Simplify as simple as possible $\frac{(4x + 2y)^2 - (2y - 4x)^2}{(2x + y)^2 - (y - 2x)^2}$ (3 mks)

12. The cost of a camera outside Kenya is US\$1000. James intends to buy one camera through an agent who deals in Japanese Yen. The agent charges him a commission of 5% on the price of the camera and further 1260 Yen as importation tax. How much in Ksh. Will he need to send to the agent to obtain the camera, given that:- (3 mks)

$$1 \text{ US\$} = 105.00 \text{ Yen.}$$

$$1 \text{ US\$} = \text{Kshs.}63.00$$

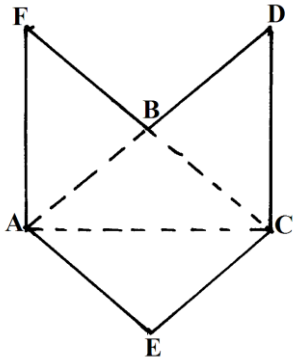
13. State all the integral values of x which satisfy the inequality

$$\frac{3x+2}{4} \leq \frac{2x+3}{5} \leq \frac{4x+15}{6} \quad (3\text{mks})$$

14 Without using a protractor, construct a triangle ABC such that angle $ABC = 135^\circ$, $AB = 4.6\text{cm}$ and $BC = 6.1\text{cm}$. Measure AC and angle ACB (4 mks)

15. Without using mathematical tables or calculators, find the volume of a container whose base is a regular hexagon of side $\sqrt{3}\text{ cm}$ and height $2\sqrt{3}\text{ cm}$ (3 mks)

16. Below is a net of a model of a three dimensional figure. The lengths $AB = BC = AC = 6.0\text{cm}$ and lengths $AF = FB = BD = CD = CE = AE = 8.0\text{cm}$.



- a) Draw the solid when the net is folded by taking ABC as the base and the height 5cm. (3 mks)

- b) State the name of the figure drawn ;..... (1 mk)

SECTION II (50 Marks)

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

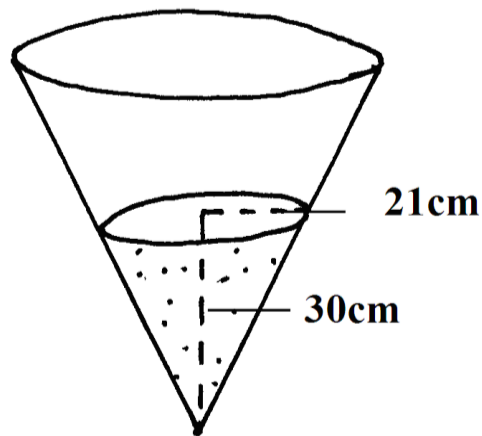
17. The distance between towns A and B is 360km. A minibus left A at 8.15am and traveled towards B at an average speed of 90km/hr. A matatu left B two and a third hours later on the same day and traveled towards A at an average speed of 110km/hr.

a) i) At what time did the two vehicles meet? (4mks)

ii) How far from A did the vehicles meet? (2mks)

b) A motorist started from his home which is between A and B at 10.30am on the same day and travelled at an average speed of 100km/hr. He arrived at B at the same time as the minibus. Calculate the distance from A to his house. (4 mks)

18. Consider the vessel below



a) Calculate the volume of water in the vessel. (Take $\pi = 3.142$) (2mks)

b) When a metallic hemisphere is completely submerged in the water, the level of the water rose by 6cm. Calculate:

i) the radius of the new water surface. (2mks)

ii) the volume of the metallic hemisphere (to 2 d.p.) (3mks)

iii) the diameter of the hemisphere (to 1 d.p) (3 mks)

19. The American government hired two planes to airlift football fans to Qatar for the World cup tournament. Each plane took $10\frac{1}{2}$ hours to reach the destination.

Boeing 747 has carrying capacity of 300 people and consumes fuel at 120 litres per minute. It makes 5 trips at full capacity. Boeing 740 has carrying capacity of 140 people and consumes fuel at 200 liters per minute. It makes 8 trips at full capacity. If the government sponsored the fans one way at a cost of 800 dollars per fan, and the fans pay for the return ticket. Calculate:

(a) The total number of fans airlifted to Qatar. (1mk)

(b) The total cost of fuel used if one litre costs 0.3 dollars. (5mks)

(c) The total collection in dollars made by each plane. (2mks)

(d) The net profit made by each plane. (2mks)

20. The following data shows the length of trees grown in Mau Forest measured to the nearest cm by

a research team. Use the given data to answer the given questions.

230 240 250 253 260 253 274 238 263 260 231 284
 257 260 275 271 257 267 255 265 241 256 256 257
 260 262 234 259 263 244 254 248 281 240 247 236
 256 282 242 246 277 238 250 279 252 269 284 271
 249 273

(a) Arrange the data in a frequency distribution table with a class interval of five and starting with the class of 230 – 234,... (6mks)

(b) Using the frequency distribution in (a) above and 257 as an assumed mean, find:-

(i) Mean of the data. (2mks)

(ii) The standard deviation of the data. (2mks)

21. Using a ruler and a pair of compasses only, draw a triangle ABC such that $AB = 5\text{cm}$,

$BC = 8\text{cm}$ and $\angle ABC = 60^\circ$. Measure AC and $\angle ACB$. (5mks)

- a) Locate point O in triangle ABC such that $OA = OB = OC$. Using O as the center and radius OA draw a circle (3mks)
- b) Construct a perpendicular from A to BC to meet BC at D. Measure AD, hence find the area of triangle ABC. (2mks)

22. Three brick layers have to lay a total of 5400 bricks. The average number of bricks they can lay in an hour are in the ratio 5:6:9. If the slowest man lays 60 bricks in an hour. Calculate;

- (a) How many bricks each of the other two men lay in an hour. (4mks)

(b) How many of the bricks each man will lay to complete the work if they are all employed for the same number of hours. (6mks)

23. Four towns P, Q, R and S are such that town Q is 120km due east of town P. Town R is 160km due North of town Q. Town S is on a bearing of 330° from P and on a bearing 300° from R. use a ruler and a pair of compasses only for all your constructions.

- a. Using a scale of 1cm to represent 50km, construct a scale drawing showing the positions P, Q, R and S. (6mks)

- b. Use the scale to determine
- i. The distance from town S to town P. (1mk)
 - ii. The distance from town S to town R. (1mk)
 - iii. The bearing of town S from town Q. (2mks)

24. A carpenter constructed a closed wooden box with internal measurements 1.5m long 0.8m wide and 0.4m high. The wood used in constructing the box was 1.0cm thick and had a density of 0.6g/cm^3 .

(a) Determine the:

(i) Volume in cm^3 of the wood used in constructing the box. (4 mks)

(ii) Mass of the box in kg correct to 1 d.p (2 mks)

(b) Identical cylindrical tins of diameter 10cm height 20cm with a mass of 120g each were packed in the box. Calculate the:

(i) Maximum number of tins that were packed (2 mks)

(ii) Total mass of the box with the tins in kg. (to 1d.p) (2 mks)

THIS IS THE LAST PRINTED PAGE

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

121/1
MATHEMATICS ALT. PAPER 1
TIME: 2½ HOURS.

SET 4 QUESTION PAPER

INSTRUCTIONS TO CANDIDATES

- a) Write your *name* and *indexnumber* in the spaces provided above.
- b) Sign and write *date* of examination in the spaces provided above.
- c) This paper consists of **two** sections; **Section I** and **Section II**.
- d) Answer **All** questions in **Section I** and **only Five** questions from **section II**
- e) **All** answers and working **must** be written on the question paper in the spaces provided below each
- f) question.
- g) Show all the steps in your calculations giving answers at each stage in the spaces provided below each
- h) question.
- i) Marks may be given for correct working even if the answer is wrong.
- j) Non-programmable silent electronic calculators and KNEC Mathematical tables may be used except where stated otherwise.
- k) This paper consists of 15 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.
- m) Candidates should answer 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

GRAND TOTAL

SECTION 1 (50 MARKS)

1. Without using a calculator evaluate:-

$$\frac{-2(5 + 3) - 9 \div 3 + 5}{-3 + -16 \div -8 \times 4}$$

(3 marks)

2. Wafulauses $\frac{1}{6}$ of his land for planting maize, $\frac{1}{12}$ for beans and $\frac{4}{9}$ of the remainder for grazing.

He still has 10 hectares of unused land. Find the size of Wafula's land. (4 mks)

3. A straight line passing through point $(-3, -4)$ is perpendicular to the line whose equation is

$2y + 3x = 11$ and intersects x axis and y axis at A and B respectively. Determine the equation of the

second line and hence write down the co-ordinates of A and B. (3 mks)

4. A bus left Kitale at 8.00 a.m. and travelled towards Lodwar at an average speed of 80 km/h. At 8.30

a.m a car left Lodwar towards Kitale at an average speed of 120km/h. Given that the distance between Kitale and Lodwar is 400km. Calculate the time the two vehicles met.
(3 mks)

5. The sum of four consecutive odd integers is greater than 24. Determine the first four such integers.

(3 mks)

6. Wanyama on arrival in Kenya to play for Harambee Stars against Uganda Cranes converted 6000

Euros into Kenyan Shillings. During his stay in Kenya he spent Kshs. 260,000 and converted the

remaining amount into US Dollars before travelling back to England. Using the exchange rates

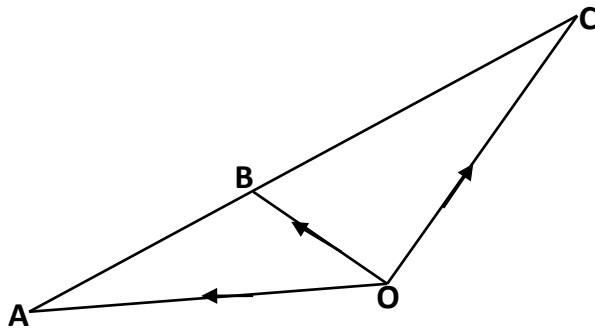
below, find how many US Dollars he got?

(4 mks)

Currency	Buying (Kshs.)	Selling (Kshs.)
1 US Dollar	96.20	96.90
1 Euro	112.32	112.83

7. In the diagram below, the position vector of points A and B with respect to point O

are $\begin{pmatrix} -6 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ respectively.



Given that B is a point on AC such that $AB = \frac{1}{2} BC$. Use vector method to determine the coordinates

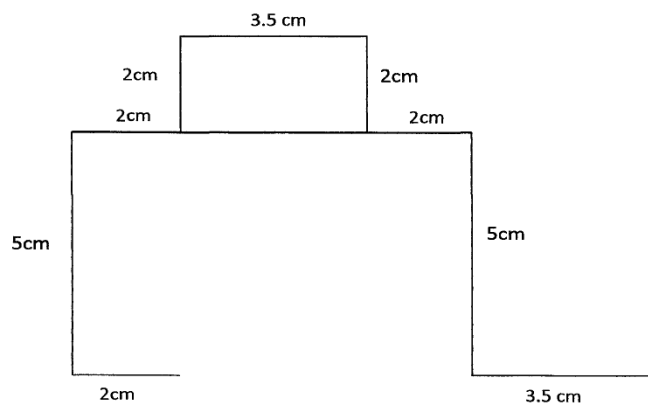
of C.

(3 mks)

8. Simplify:-

$$(8y)^{\frac{2}{3}} \times y^{\frac{1}{3}} - 6 \div 2y^{-2}$$

9. Complete the diagram below so as to make a net for a cuboid. Hence find the surface area of the cuboid. (3 mks)



10. Using a ruler and a pair of compasses **only**, construct a rhombus PQRS such that $PQ = 6$ cm and angle $PQR = 135^\circ$ hence measure the shortest diagonal. (3mks)

11. Janice, a fruit vendor obtained a total of Kshs. 6144 from her sales of oranges on Saturday at Kshs. 8.00 each. She had bought 560 more oranges to add to what had remained on Friday where she had

sold 240 more oranges than on Thursday. She had sold 750 oranges on Thursday.

Calculate the total

number of oranges Janice had bought on Thursday.

(4 mks)

12. Factorise Completely:-

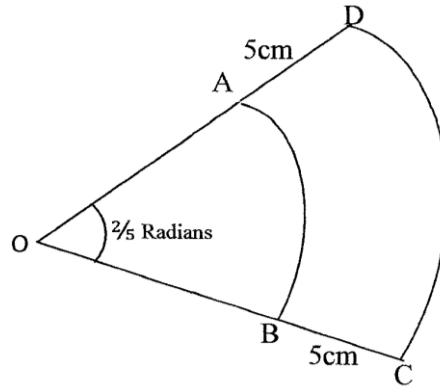
$$x^4 - 2x^2y^2 + y^4$$

(2 mks)

13. Solve for y given that y is acute and $\sin(3y - 50^\circ) - \cos(2y + 10^\circ) = 0$ (3 mks)

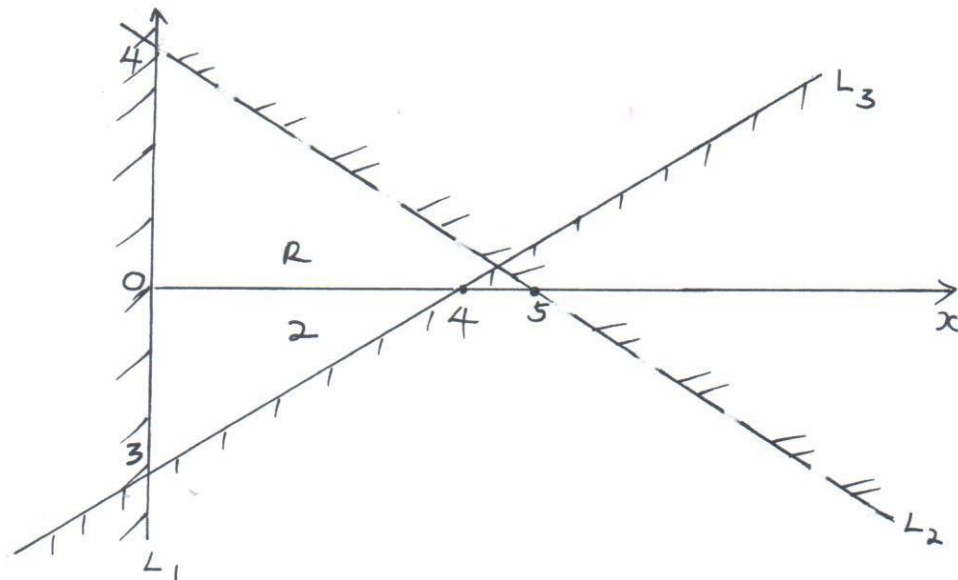
14. A solid consists of a cone and a hemisphere. The common diameter of the cone and the hemisphere is 12 cm and the slanting height of the cone is 10 cm. Calculate correct to two decimal places, the surface area of the solid. (3 mks)

15. The figure below shows two sectors in which AB and CD are arcs of concentric circles centre O. Angle AOB = $\frac{2}{5}$ radians and AD = BC = 5 cm.



Given that the perimeter of the shape ABCD is 24 cm, calculate the length of OA. (3 mks)

16. Find the inequalities that define the region R shown in the figure below. (3 marks)



SECTION II

Answer only five questions from this section

17. Nyongesa is a sales executive earning a salary of Kshs. 120,000 and a commission of 8% for the sales in excess of Kshs. 1,000,000. If in January he earned a total of Kshs. 480,000 in salaries and

commission.

(a) Determine the amount of sales he made in the month of January. (4 mks)

(b) If the total sales in the month of February increased by 18% and in the month of March dropped by 30% respectively;

Calculate:-

(i) Nyongesa's commission in the month of February. (3 mks)

(ii) His total earning in the month of March. (3 mks)

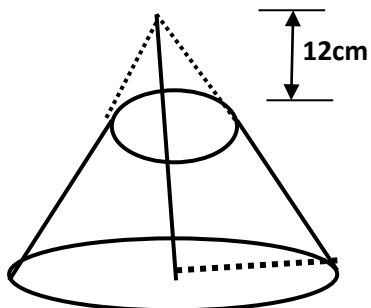
18. A sector of angle 108° is cut from a circle of radius 20 cm. It is folded to form a cone.
Calculate:

(a) The curved surface area of the cone. (2 mks)

(b) The base radius of the cone. (2 mks)

(c) The vertical height of the cone. (2 mks)

(d) If 12 cm of the cone is chopped off to form a frustrum as shown below.



Calculate the volume of the frustum formed.

(2 mks)

19. a) Find A^{-1} , the inverse of matrix $A = \begin{pmatrix} 6 & 5 \\ 4 & 7 \end{pmatrix}$

(2 mks)

b) Ibanda sells white and brown loaves of bread in his kiosk. On a certain day he sold 6 white loaves of bread and 5 brown ones for a total of Kshs. 520. The next day he sold 4 white loaves and 7 brown ones for a total of Kshs. 530.

i. Form a matrix equation to represent the above information. (1 mk)

ii. Use matrix method to find the price of a white loaf of bread and that of a brown loaf of bread. (3 mks)

c) A school canteen bought 240 white loaves of bread and 100 brown loaves of bread. A discount of 10% was allowed on each white loaf whereas a discount of 13% was allowed on each brown loaf of bread. Calculate the percentage discount on the cost of all the loaves of bread bought. (4 mks)

20. A village Q is 7 km from village P on a bearing of 045° . Village R is 5 km from village Q on a bearing of 120° and village S is 4 km from village R on a bearing of 270° .
a) Taking a scale of 1 m to represent 1 Km, locate the three villages. (3 mks)

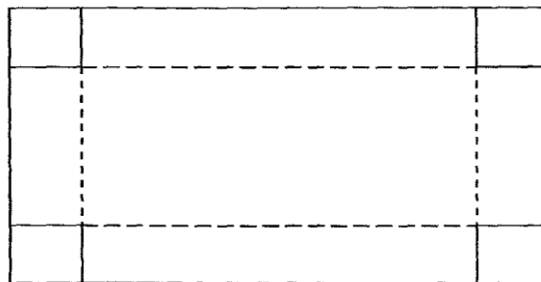
b) Use the scale drawing to find the:

i. Distance and bearing of the village R from village P. (2 mks)

ii. Distance and bearing of village P from village S. (2 mks)

iii. Area of the polygon PQRS to the nearest 4 significant figures. (3 mks)

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

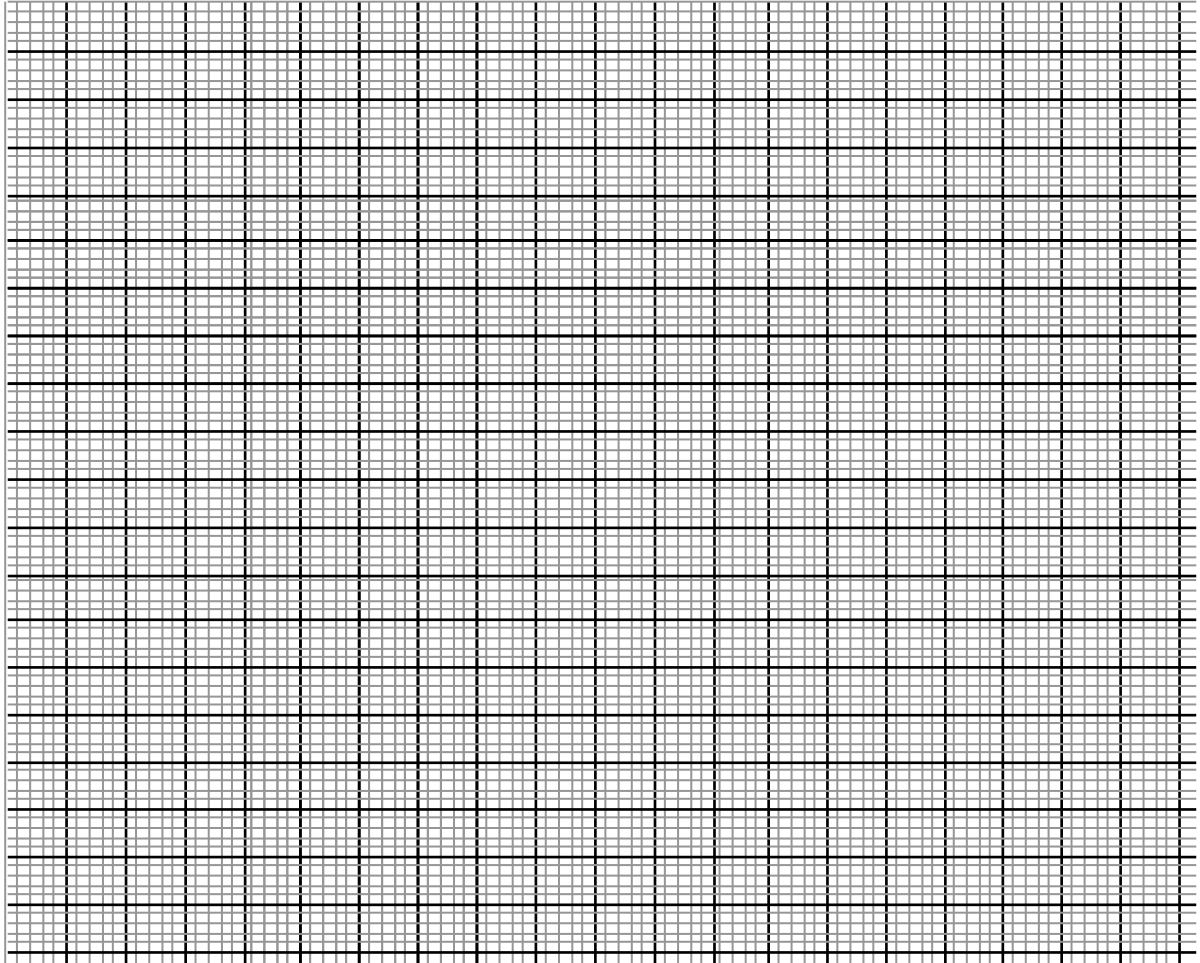
that the capacity of the tank so formed is 1920 litres and the width of the metal sheet used was x cm;

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

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

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 mks)

22. (a) On the Cartesian plane below, draw the quadrilateral PQRS with vertices P(4,6), Q(6,3), R(4,4), and S(2,3) (1 mk)



(b) Draw $P'Q'R'S'$ the image of PQRS under the transformation defined by the translation vector $T = \begin{pmatrix} -7 \\ -6 \end{pmatrix}$. Write down the coordinates of $P'Q'R'S'$. (2 mks)

(c) $P''Q''R''S''$ is the image of $P'Q'R'S'$ when reflected in the line $y = 1$. On the same plane, draw $P''Q''R''S''$. (2 mks)

(d) Draw $P'''Q'''R'''S'''$ the image $P''Q''R''S''$ when reflected in the line $y - x = 0$ (2 mks)

(e) Find by construction, the centre of the rotation that maps $P'''Q'''R'''S'''$ onto PQRS and hence determine the coordinates of the centre of the rotation and the angle of the rotation. (3 mks)

23. Andai recorded data on observation of time spent by a local university's first year bachelor of Commerce students at library as follows;-

Time spent in minutes	11 – 20	21- 30	31 – 40	41 – 50	51 - 60
Cumulative frequency	70	170	370	470	500

Calculate:

- a) The mean (6 mks)

- b) The median (4 mks)

24. (a) After t seconds, a particle moving along a straight line has a velocity of V m/s and an acceleration of $(5 - 2t)$ m/s². the particles initial velocity is 2m/s.
- (i) Express V in terms of t . (3 marks)
- (ii) Determine the velocity of the particle at the beginning of the third second. (2 marks)
- (b) Find the time taken by the particle to attain maximum velocity and the distance it covered to attain the maximum velocity. (5 marks)

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

121/1 - MATHEMATICS ALT A - PAPER 1

SET 5 QUESTION PAPER

Kenya Certificate of Secondary Education (KCSE)

INSTRUCTIONS TO CANDIDATES

- a) Write your name, index number and date in the spaces provided at the top of this page.
- b) Write name, admission number and class in the spaces provided above.
- c) This paper contains **TWO** sections: **section I** and **section II**
- d) Answer **ALL** the questions in **Section I** and only **five** questions from **section II**.
- e) **Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.**
- f) Marks may be given for correct working even if the answer is wrong.
- g) **Non-programmable** silent electronic scientific calculators and KNEC mathematical tables may be used except where stated otherwise.
- h) **This paper consists of 16 printed pages.**
- i) **Candidates should check the question paper to ascertain that all 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 1 (50 marks)

Answer all the questions in this section in the space provided

1. Evaluated:

(3mks)

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

2. Use logarithms to evaluate the following to 4 significant figures to:

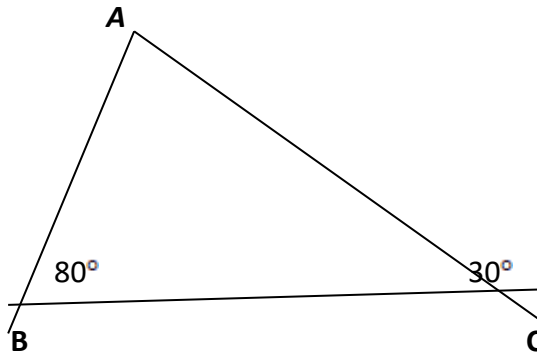
(4mks)

$$\left(\frac{95.75 \times 0.85}{4.524 + 1.234} \right)^{\frac{2}{3}}$$

3. An electrician made a loss of 30% by selling a multi plug at sh.1400.what percentage profit would he has made if he sold the multi plug at sh. 2300.

(3mks)

4. In the triangle ABC below, $BC=9\text{cm}$, angle $ABC=80^\circ$.and angle $ACB=30^\circ$.



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

5.) Given that the exterior angle of a regular hexagon is $2x$. Find the value of x . Hence find the size of each interior angle of the hexagon. (3mks)

6. Two numbers t and s are such that $t^4 \times s^2 = 5625$. Find t and s (3mks)

7. Find the obtuse angle the line with equation $2y+5x+2=0$ makes with the x-axis. (3mks)

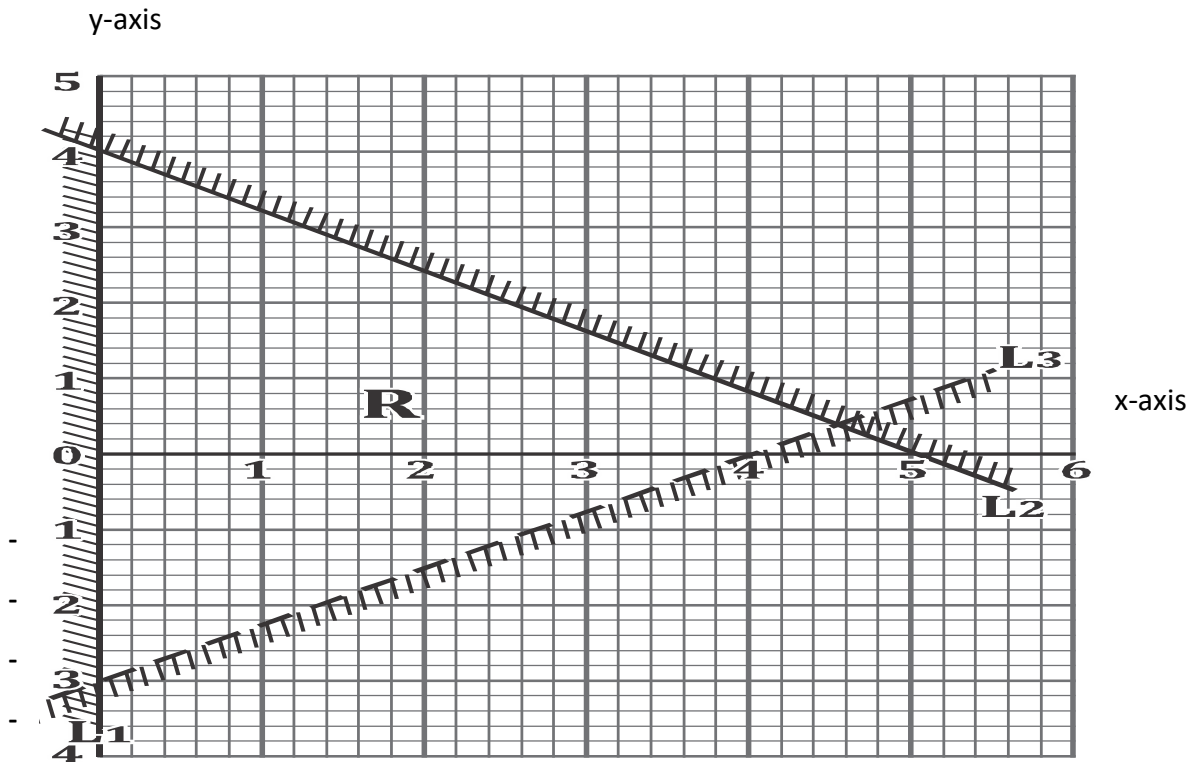
8. Simplify the expression

(3mks)

$$\frac{12x^2 + ax - 6a^2}{9x^2 - 4a^2}$$

9. A plot is in the shape of a right angled triangle. The length of the shorter side is 15m and the area is 456.8m^2 . Calculate the length of the longest side of the garden. (3mks)

10.) The diagram below shows a region R bounded by three lines L_1 , L_2 and L_3 . Form the three inequalities that satisfies the given region R (3mks)



11. A bus travelled at an average speed of 63km/h left the station at 9.15 am. A car later left the same station at 10.00am and caught up with bus at 11.45 am. Find the average speed of the car. (3mks)

12. A tourist came in Kenya and exchanged 1250 US dollars into Kenyan shillings at the rate shown below.

Buying (Kshs)	selling (Kshs)
1US dollar 105.5	110.8

He spent Ksh. 85400 after which he converted the remaining balance to US dollars. How much US dollars did he get back to the nearest dollar. (3mks)

13.a) Complete the table below for $y = x^2 + 5$ (1mk)

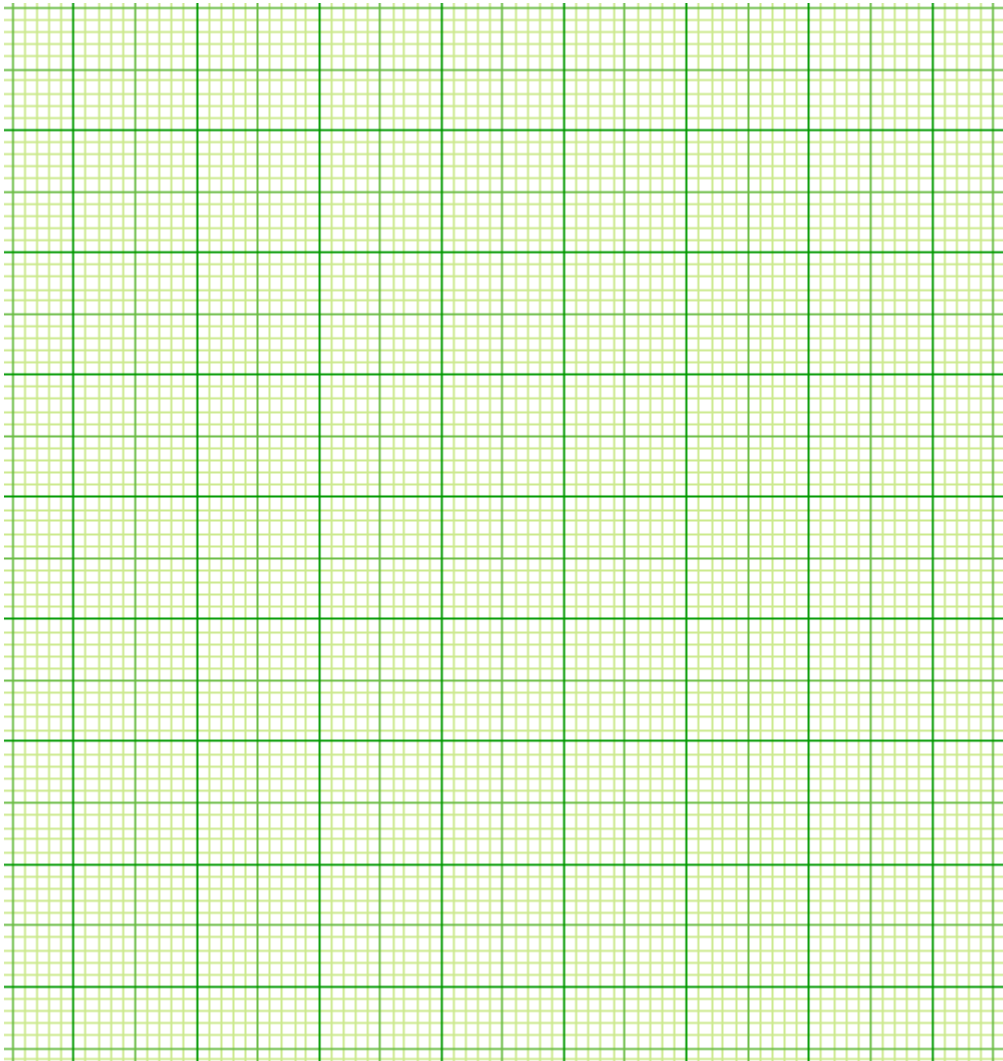
X	0	1	2	3	4	5	6
$Y = x^2 + 5$	5						

b) Use the trapezoidal rule with 7 ordinates to estimate the area bounded by the curve $y = x^2 + 5$, x-axis, y-axis and $x = 6$ (2mks)

14. Given that $\mathbf{a} = \begin{pmatrix} 6 \\ 2 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} -2 \\ -4 \end{pmatrix}$ and $3\mathbf{a} - 2\mathbf{b} + 2\mathbf{c} = \begin{pmatrix} 32 \\ 20 \end{pmatrix}$, find \mathbf{c} (3mks)

15). A triangle T with vertices A(2,4), B(6,2) and C(4,8) is mapped onto triangle T' with vertices A'(10,0), B'(8,-4) and C'(14,-2) by a rotation .

a) on the grid provided draw triangle T and its image T' (2mks)



b) Determine the centre and the angle of rotation that maps T onto T' (2mks)

16. A small cone of height 8cm is cut off from a bigger cone leaving a frustum of height the 16cm. If the volume of the smaller cone is 160cm^3 , find the volume of the frustum. (3mks)

Section II (50MKS)

Answer any five questions in this section in the space provided

17. Three businessmen, Hassan, Mutua and Wanyonyi decided to start a business. The initial capital which was needed was Ksh. 4,000,000 of which they were able to raise 30% by making contributions in the ratio 3:3:2 respectively. The rest of the amount was obtained from a bank and was to be paid back within one year with an interest of 25% in the same ratio 3:3:2. The three men were to share the profit of the business in the ratio of their contribution. During the year, the business realized a profit of ksh.4, 800,000.

a) How much of the initial amount did Wanyonyi raise? (3mks)

b) How much did Hassan pay to the bank at the end of the year? (4mks)

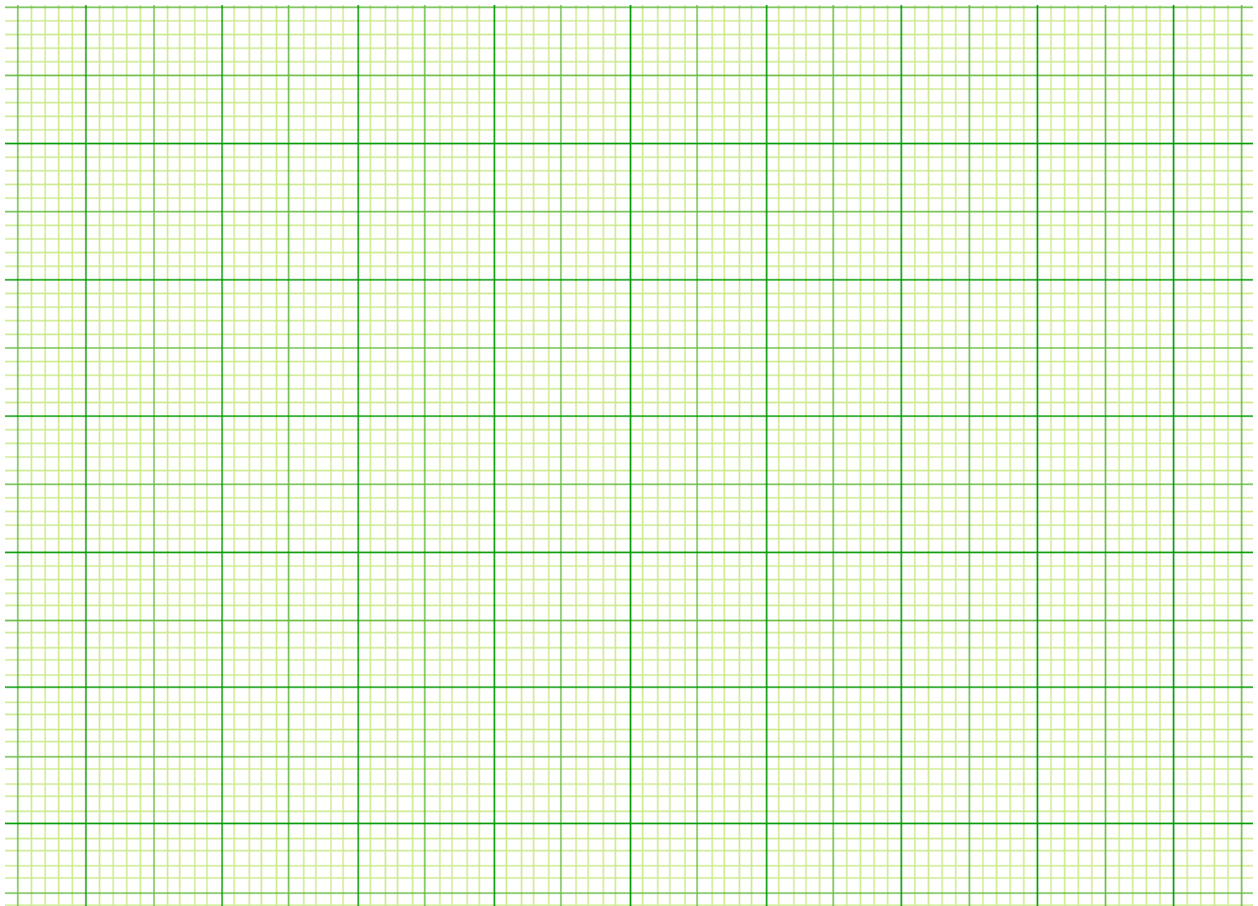
c) After paying the bank at the end of the year, how much was Mutua left with? (3mks)

18. The marks scored by 50 students in a geography examination are as follows:

60	54	40	67	53	73	37	55	62	43
44	69	39	32	45	58	48	67	39	51
46	59	40	52	61	48	23	60	59	47
65	58	74	47	40	59	68	51	50	50
71	51	26	30	38	70	46	40	51	42

- a) Prepare a frequency distribution table using a class interval of 10 starting from 21-30
(3mks)

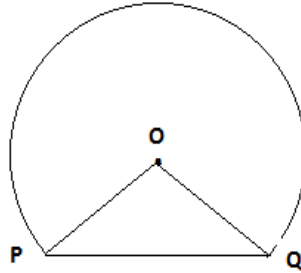
- b) Draw a histogram to represent the distribution (4mks)



c) Use your histogram to estimate the modal class (1mk)

d) Using the histogram estimate the mean of the distribution of the data. (2mk)

19. A petrol tanker has a cross-section in the shape shown below. It is used to transport petrol. Its internal length is 7m while its internal radius is 3.5 m. Obtuse angle POQ = 144° . On one of its trips, it was filled to capacity. Taking $\pi = \frac{22}{7}$



(a) Calculate the volume of petrol in the tanker in

(i) m^3 (2 marks)

(ii) litres (1mark)

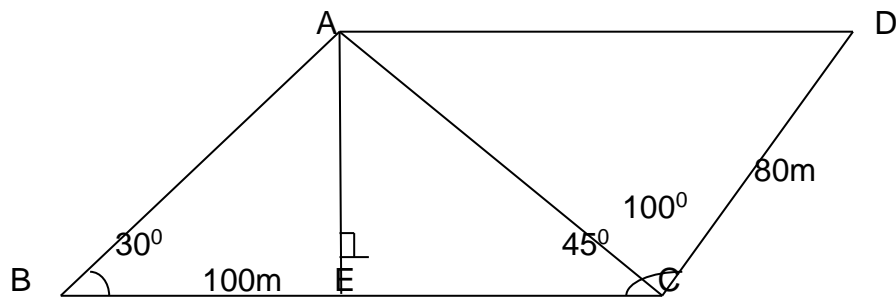
(b) In the parking lot at night, a third of the petrol was stolen.

i) How many litres of petrol was the owner left with? (2 marks)

ii) What was the mass of the remaining petrol given that one cubic metre of petrol has a mass of 700kg? (3 marks)

(iii) At the weigh bridge, any vehicle carrying excess of 50,000 Kg was charged Sh. 12.50 for every extra kilogram. How much fine did the owner of the tanker pay? (2 marks)

20. The figure below represents a quadrilateral piece of land ABCD divided into three triangular plots. The lengths BE and CD are 100m and 80m respectively. Angle ABE = 30° , ACE = 45° and $\angle ACD = 100^\circ$.



- (a) Find to four significant figures:
- (i) The length of AE. (2mks)
 - (ii) The length of AD. (2mks)
 - (iii) The perimeter of the piece of land. (3mks)
- (b) The plots are to be fenced with five strands of barbed wire leaving an entrance of 2.8m wide to each plot. The type of barbed wire to be used is sold in rolls of lengths 480m. Calculate the number of rolls of barbed wire that must be bought to complete the fencing of the plots. (3mks)

21. A straight line L_1 has a gradient $-\frac{1}{2}$ and passes through point $P(-1, 3)$. Another line L_2 passes through the points $Q(1, -3)$ and $R(4, 5)$.

Find:

(a) The equation of L_1 (2 marks)

(b) The equation of L_2 in the form $ax + by + c = 0$. (3 marks)

(c) The equation of a line passing through a point $S(0, 5)$ and is perpendicular to L_2 . (3 marks)

(d) The equation of a line through R parallel to L_1 . (2 marks)

22. a) A port B is on a bearing 080° 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° 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° 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 of 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. (a) Find the inverse of the matrix: (1mk)

$$A = \begin{pmatrix} 4 & 3 \\ 3 & 2 \end{pmatrix}$$

b) Amina bought 20 bags of oranges and 15 bags of mangoes for a total of sh. 9,500. Nafula bought 30 bags of oranges and 20 bags of mangoes for a total of sh. 13,500. If the price of a bag of oranges is X and that of mangoes is y:

j) Form two equations to represent the information above. (2mks)

ii) Hence use the matrix A^{-1} above to find the price of one bag of each item. (4mks)

(c) The price of each bag of oranges was increased by 10% and that of mangoes reduced by 10%. The businesswomen (Amina and Nafula) bought as many oranges and as many mangoes as they bought earlier. Find the total cost of oranges and mangoes that each businesswoman bought after the percentage change. (3mks)

24. The displacement, s metres, of a moving particle from a point O, after t seconds is given by, $s = t^3 - 5t^2 + 3t + 10$

a) Find s when $t=2$ (2mks)

b) Determine:

i) the velocity of the particle when $t=5$ seconds; (3mks)

ii) the value of t when the particle is momentarily at rest (3mks)

c) find the time, when the velocity of the particle is maximum (2mks)

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

121/1
MATHEMATICS
PAPER 1
2 ½ HOURS

- Kenya Certificate of Secondary Education

SET 6 QUESTION PAPER

Instructions to Candidates

1. Write your **name, Admission number and class** in the spaces provided.
2. Sign and write date of the examination in the spaces provided.
3. The paper contains **TWO sections: Section I and II**
4. Answer **ALL** questions in section I and **STRICTLY ANY FIVE** questions from section II.
5. All working and answers must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
7. Marks may be awarded for correct working even if the answer is wrong.
8. This paper consists **16 printed pages**. The candidates should check to ascertain that all the pages are printed as indicated and no question is missing.
9. **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

GRAND TOTAL

17	18	19	20	21	22	23	24	TOTAL

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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 $\frac{1}{5}$ of hers, they find that Jane has 10 shillings more than Moses. How much money did both have? (4 marks)

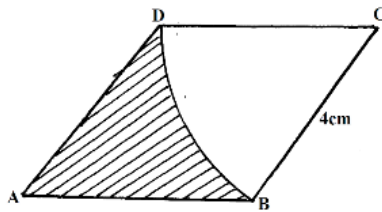
4. The sum of interior angles of two regular polygons of side $n-1$ and n are in the ratio 4:5. Calculate;

(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 $\angle ABC = 138^\circ$. Find the area of shaded region correct to 3 significant figures.

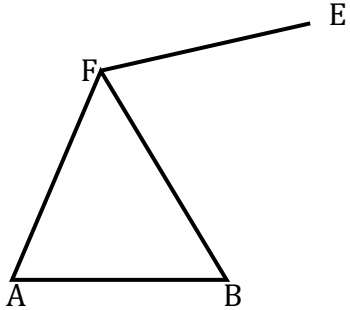
(Take $\pi = \frac{22}{7}$)



(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 $N60^{\circ}E$. He then changed direction and travelled a distance of 4km in the direction of 135° 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)

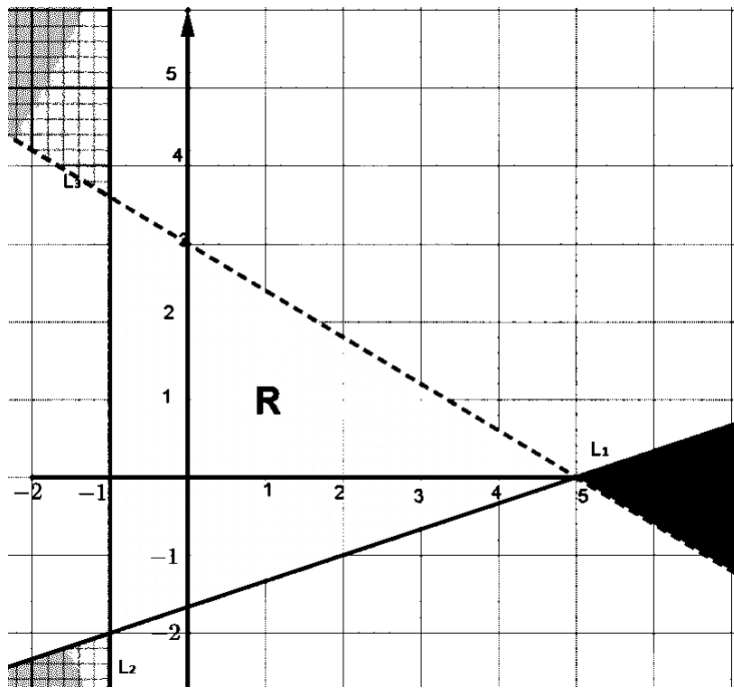
- (ii) The bearing of A from C

(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° and 62° 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° and 32° 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 marks)

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)

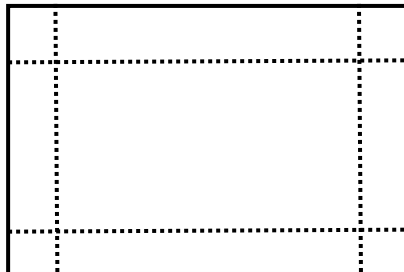
(b) Find the equation of line AD. (2marks)

(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;

c) (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)

d) 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 $A = \begin{pmatrix} 3 & 4 \\ 2 & 3 \end{pmatrix}$ find inverse of A (1mark)

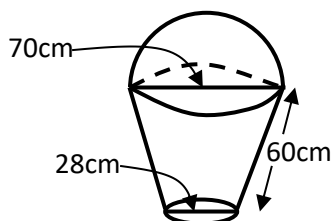
b) Two colleges, Utalii and Huduma purchased beans and rice . Utalii bought 90 bags of beans and 120 bags of rice for a total of sh 360 000 . Huduma bought 200 bags of beans and 300 bags of rice for a total of sh 850 000. Use the inverse of A obtained

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 of 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)

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

121/1
MATHEMATICS PAPER 1
2 ½ HOURS
SET 7 QUESTION PAPER
- Kenya Certificate of Secondary Education

Instructions to Candidates

1. Write your **name, Admission number and class** in the spaces provided.
2. Sign and write date of the examination in the spaces provided.
3. The paper contains **TWO sections: Section I and II**
4. Answer **ALL** questions in section I and **STRICTLY ANY FIVE** questions from section II.
5. All working and answers must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
7. Marks may be awarded for correct working even if the answer is wrong.
8. This paper consists **15 printed pages**. The candidates should check to ascertain that all the pages are printed as indicated and no question is missing.
9. **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

GRAND TOTAL

17	18	19	20	21	22	23	24	TOTAL

SECTION I(50marks)

Answer all the questions in this section

1. Without using a calculator evaluate.

(3marks)

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

2. A piece of rectangular plot measuring 27m by 16m is to be divided into smaller rectangular units leaving no remainder. Calculate the highest number of smaller units whose dimensions are each greater than 1m that can be obtained from the plot.

(3marks)

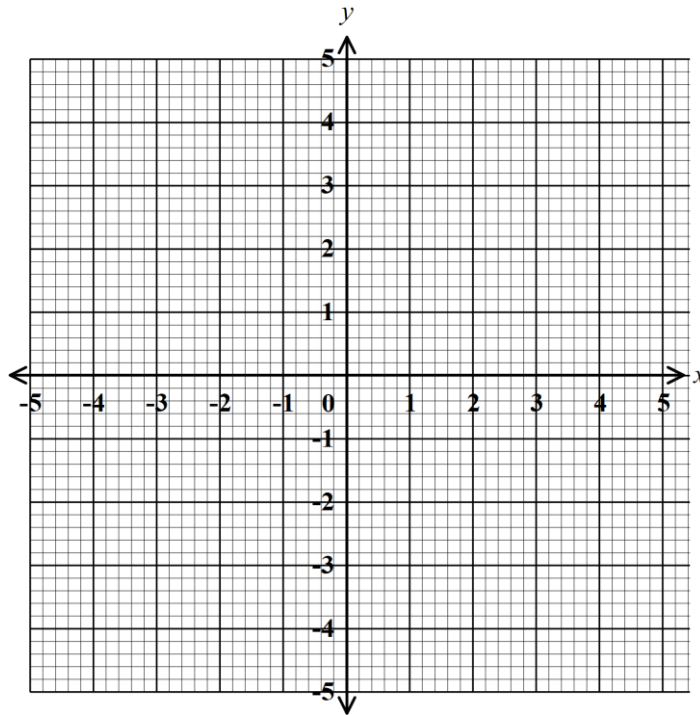
3. Given that $x=1.\dot{3}1\dot{3}$, find the **exact** value of .

(3 marks)

4. Using the grid provided below, solve the simultaneous equation (3 marks)

$$3x - 4y = 10$$

$$5x + 7y = 3$$



5. Write the following ratios in ascending order 2:3, 15:16, 7:6, 13:15 (3 marks)

6. Under an enlargement, the image of the points $A(3,1)$ and $B(1,2)$ are $A'(3,7)$ and $B'(7,5)$. Find the centre and scale factor of enlargement. (4 marks)

7. A Kenyan businessman intended to buy goods worth US dollar 20,000 from South Africa. Calculate the value of the goods to the nearest south Africa (S.A) Rand given that 1 US dollar = Ksh 101.9378 and 1 S.A Rand = Ksh 7.6326. (3marks)

8. Solve for x in the following equation. (3marks)

$$4^x (8^{x-1}) = \frac{\sin 45^\circ}{\cos 45^\circ}$$

9. From a viewing tower 40 metres above the ground, the angle of depression of an object on the ground is 36° and the angle of elevation of an aircraft vertically above the object is 48° . Calculate the height of the aircraft above the object on the ground.

(3marks)

10. Solve the equation $2x^2 + 3x = 5$ by completing the square method. (3marks)

11. The mean of five numbers is 20. The mean of the first three numbers is 16. The fifth number is greater than the fourth by 8. Find the fifth number. (3marks)

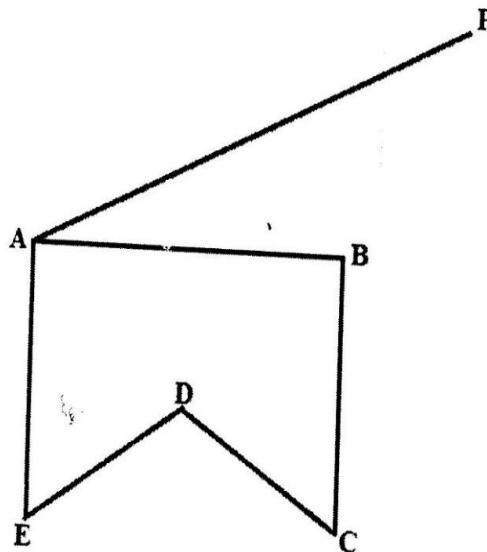
12. Simplify:

(3 marks)

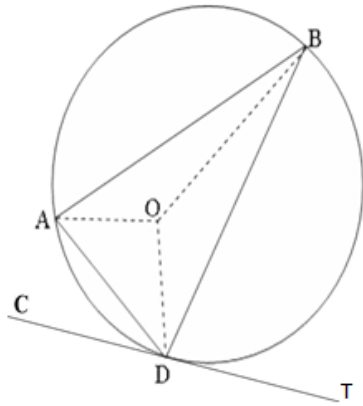
$$\left[\frac{x^3 - xy^2}{x^4 - y^4} \right]^{-1}$$

13. The figure below ABCDE is a cross-section of a solid ABCDEPDRST. 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)



14. In the circle below, O is the centre, angle DAB = 87° and acute angle AOD = 62° . CD is a tangent to the circle at D.



- Calculate the size of;
- i) Angle ABD. (2marks)
- (ii) Angle ADC (1mark)
- (iii) Angle ADB (1mark)

15. Given that $\log a = 0.30$ and $\log b = 0.48$ find the value of $\log \frac{b^2}{a}$. (3marks)

16. The area of a rhombus is 60cm^2 . Given that one of its diagonal is 15cm long. Calculate the perimeter of the rhombus. (3marks)

SECTION II (50marks)

Answer 5 questions only in this section

17. Three business partners Abila, Bwire and Chirchir contributed Ksh 120,000, Ksh 180,000 and Ksh 240,000 respectively to boost their business. They agreed to put 20% of the profit accrued back into the business and to use 35% of the profits for

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. 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)

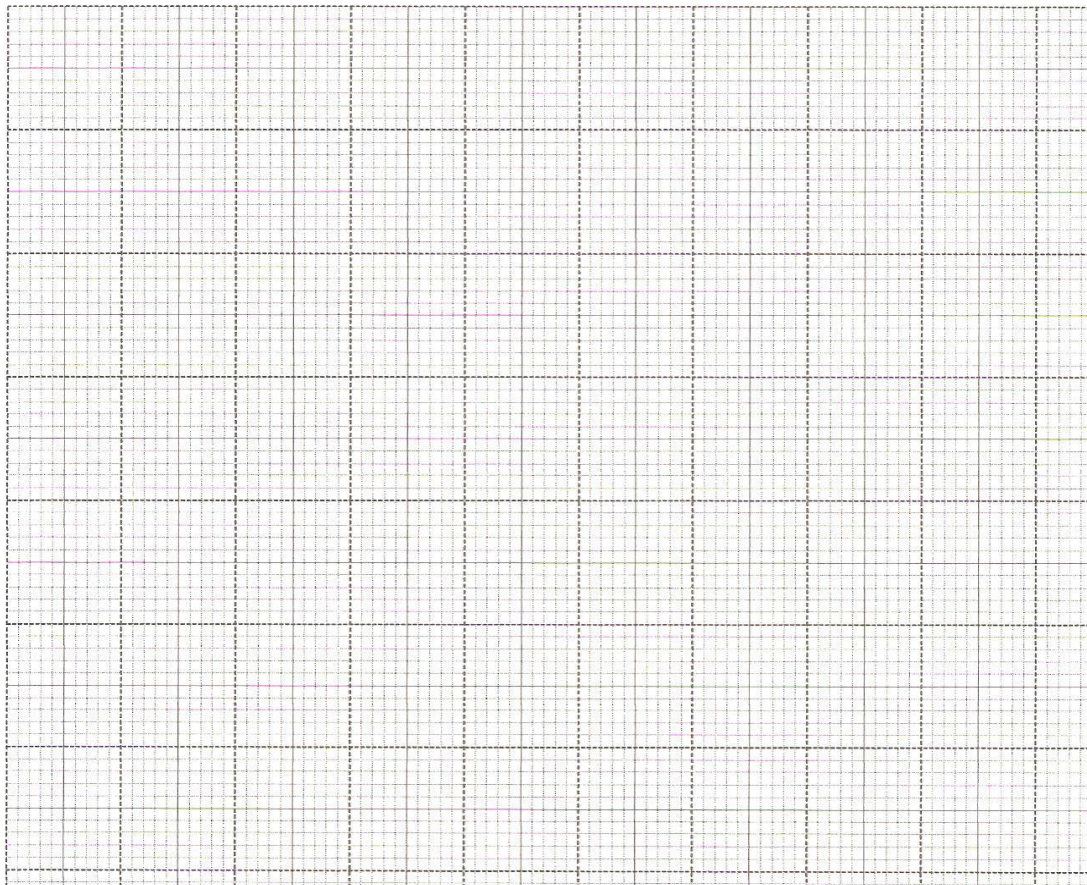
- c) Another line L_4 is parallel to L_1 and passes through $(-2, 3)$. Find the x and y intercepts of L_4 (4 marks)

20. The masses 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.
(2marks)

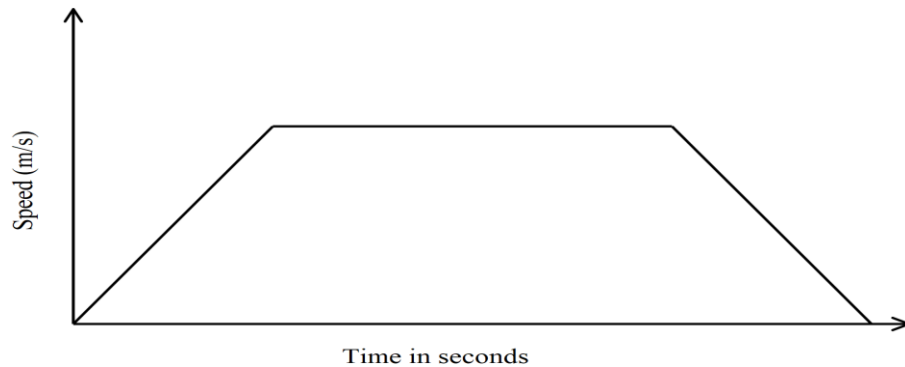
21. Use a ruler and compass only for all the constructions in this question.

- a) Construct a triangle XYZ in which $XY = 6\text{cm}$, $YZ = 5\text{cm}$ and angle $XYZ = 120^\circ$.

(2marks)

- b) Measure XZ and angle YXZ. (2 marks)
- c) Construct the perpendicular bisector of XZ and let it meet XZ at M. (1 mark)
- d) Locate a point W on the opposite of XZ as Y and that $XW = ZW$ and $YW = 9\text{cm}$ and hence complete triangle XZW. (2 marks)
- e) Measure WM and hence calculate the area of triangle XZW. (3 marks)

22. The diagram below shows the speed time graph for a bus travelling between two stations, the bus starts from rest and accelerates uniformly for 75 seconds. It then travels at constant speed for 150 seconds and finally decelerates uniformly for 100 seconds.



- (a) Given that the distance between the two stations is 5225 m. Calculate

(i) maximum speed in km/h attained by the bus. (3 marks)

(ii) the acceleration of the bus (2 marks)

- (b) A van left Nairobi at 8.00 a.m and travelled towards Mombasa at an average speed of 80 km/h. At 8.30 am a car left Nairobi and travelled along the same road at an average speed of 120km/h.

(i) Calculate the distance covered by the car to catch up with the van. (4 marks)

(ii) Find the time of the day when the car caught up with van. (1 mark)

23. While designing the water circulation system, planners of an estate used assumption that each housing unit in the estate will require at least 0.32m^3 of water per day. To

satisfy this need, they are to use a water pipe of radius 8cm to distribute the water. The water will be flowing in the pipe for only 14 hours a day at the rate of 24cm/s.

a) Determine the amount of water to the nearest litres, supplied in one hour.
(3marks)

b) What is the maximum number of housing units that can be supported by the water circulation system? (Assume that a housing unit requires at most 0.32m^3 of water per day).
(2marks)

c) Each housing unit will pay a flat rate of sh. 280 per month for the supply of water. If the number of housing units in the estate is to be maximum and all end up being occupied, calculate the amount of money that will be collected in a month.
(2 marks)

d) The maximum number of housing units were constructed and all got occupied. The estate ended up using on average 0.35m^3 of water per housing unit per day. How much longer was the water pumped per day to satisfy the estate's water demand?
(3marks)

24. The equation of the curve is $y = x^3 - 2x^2 - 1$

(a) Determine

(i) the stationary points (4marks)

(ii) the nature of the stationary points in (a) (i) above (2 marks)

(b) Determine

(i) the equation of the tangent to the curve at $x = 1$ (2marks)

(ii) the equation of the normal to the curve at $x = 1$ (2marks)

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

Kenya Certificate of Secondary Education

MATHEMATICS PAPER 1

TIME: 2½ HOURS

SET 8 QUESTION PAPER

INSTRUCTIONS TO CANDIDATES:

1. Write your name, index number and school in the spaces provided above.
2. Sign and Write the date of examination in the spaces provided above.
3. This paper consists of two Sections; Section I and Section II.
4. Answer all the questions in Section I and any **FIVE** questions from Section II.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculation, giving your answer at each stage in the spaces provided below each question.
7. Non-programmable silent electronic calculators and **KNEC** Mathematical tables may be used unless 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 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 $\frac{9a^2y - 16b^2y^3}{4by^2 - 3ay}$ (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 $\sqrt{\frac{12x^4 y^{-1} Z^5}{3x^{-2}y^{-3} Z^3}}$ (2 mks)

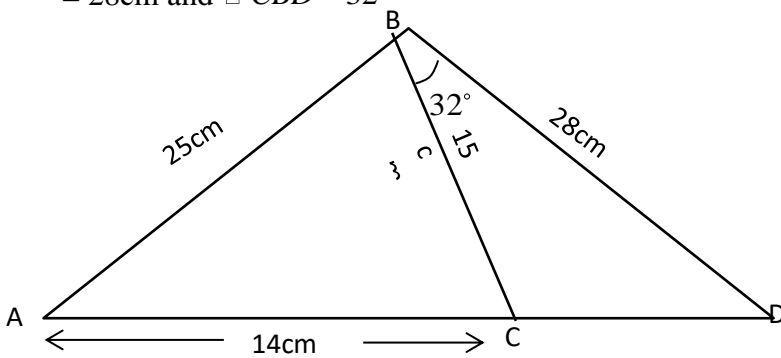
5. One interior angle of a certain polygon is 84° . If each of the other angles is 147° , how many sides does this polygon have? (3 mks)

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

	Buying shs	Selling shs
Riyal	19.68	19.78

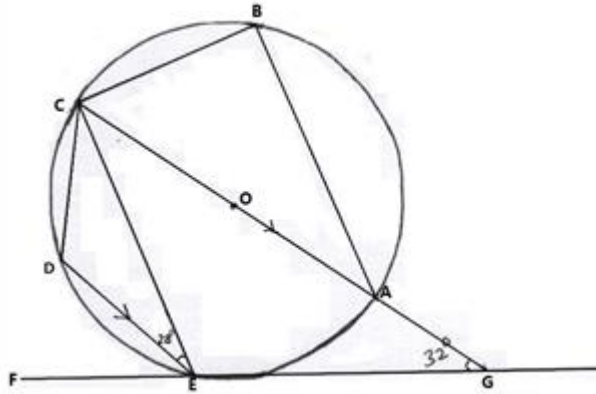
A tourist arrived with 5480 Riyal which he changed to Kshs. He spend $\frac{2}{3}$ of the total in visiting various sites. As he was leaving he changed all he had to Riyal. How much did he leave with?
 Answer to 1 d.p. (3 mks)

7. Find the area of the triangle below given that lines $AB=25\text{cm}$, $BC = 15\text{cm}$, $AC = 14\text{cm}$, $BD = 28\text{cm}$ and $\angle CBD = 32^\circ$ (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) $\angle AEG$ (2mks)

(b) $\angle ABC$ (2mks)

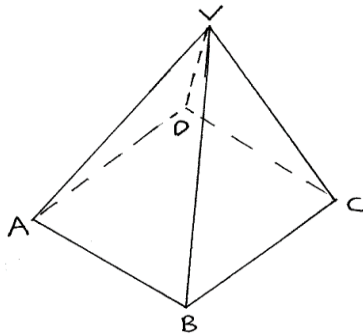
10. Wasike and Wanjala live 40km apart. Wasike starts cycling from his home at 8.00a.m toward's Wanjala's house at 16km/h. Wanjala stars cycling towards Wasike's house 30 minutes later at 8km/h. **what** time did they meet. (3mks)

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 $\cos A = \frac{5}{13}$ and angle A is acute, without using tables or calculator, find the value of $2 \tan A + 3 \sin A$. (3 mks)

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)

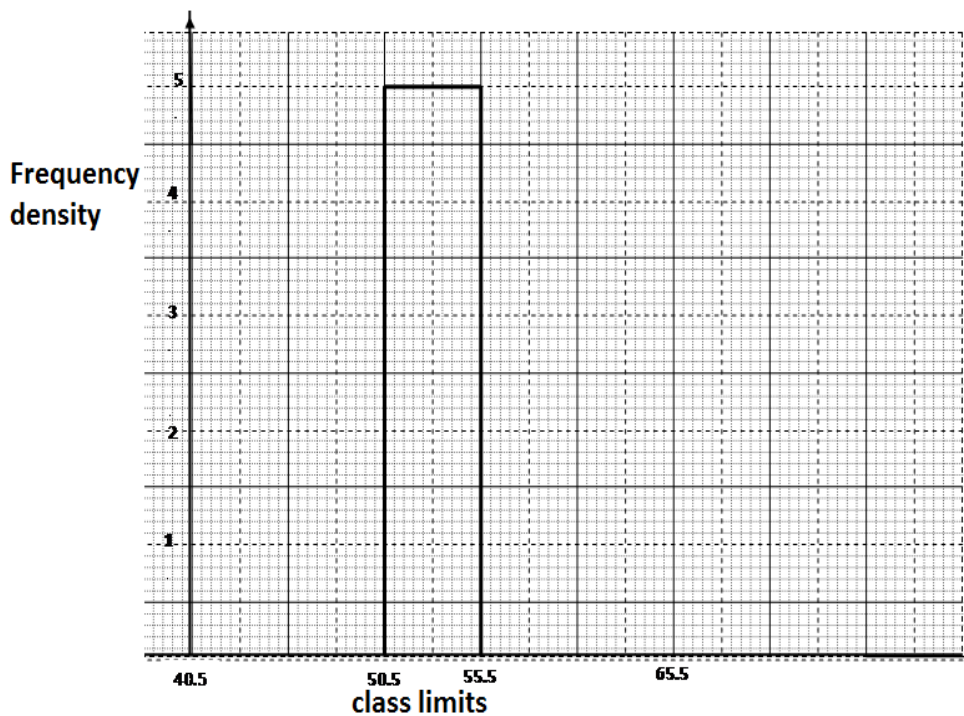
- (b) Calculate the total surface area. (2mks)

15. A plane leaves town P to town Q on a bearing of 130° and a distance of 350km. it then flies

500km on a bearing of 060° 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)

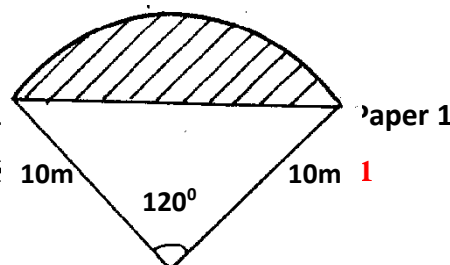
Mass(kg)	frequency
41-50	20
51-55	
56-65	40



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° 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 16cm. 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.

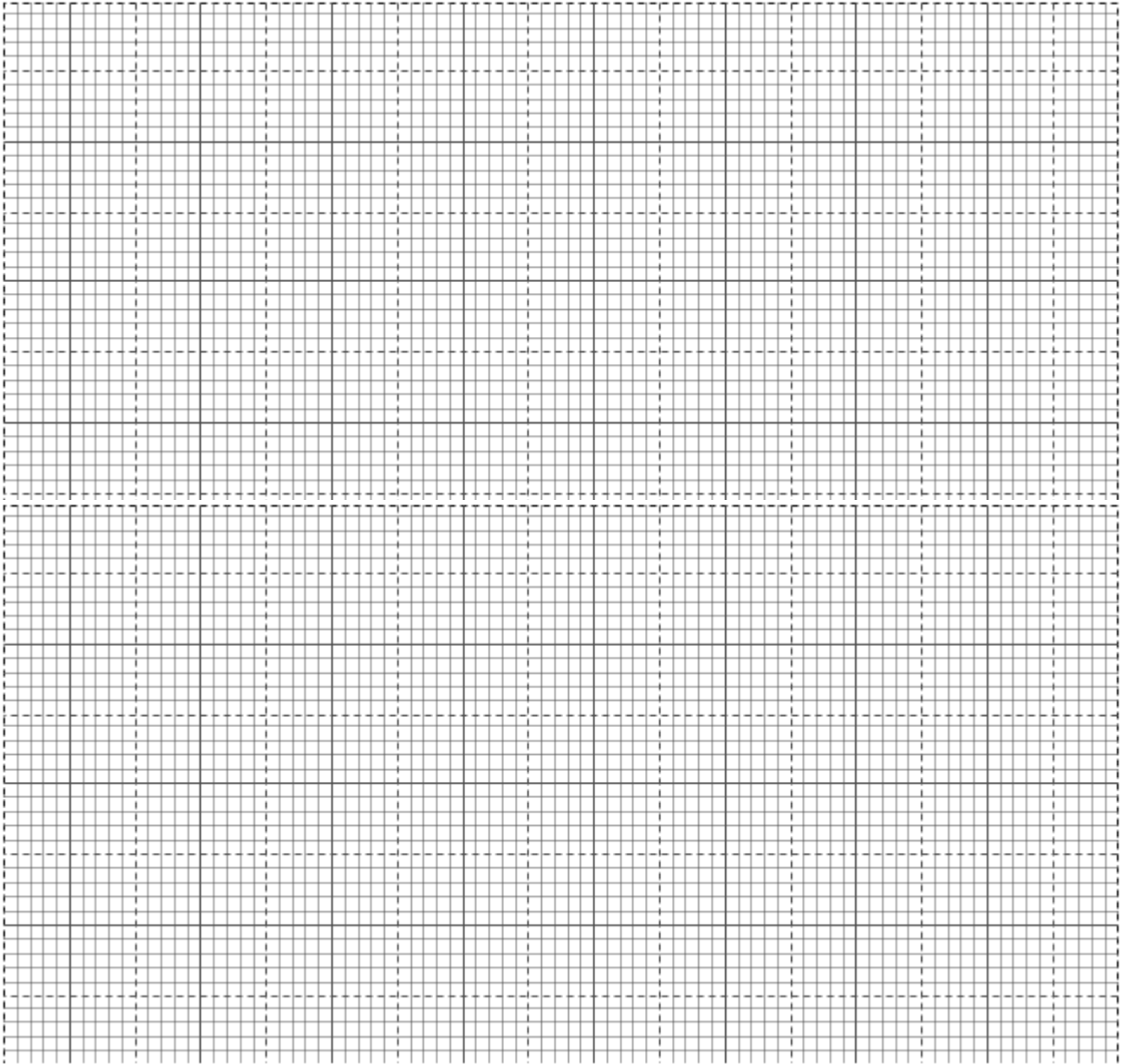
(2mks)

(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)

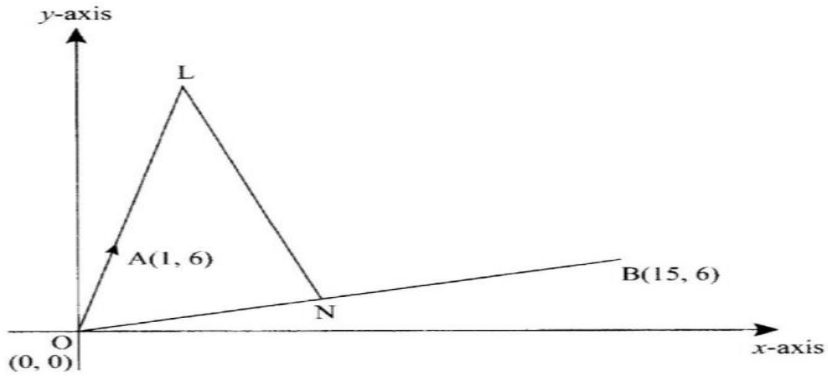
(b) Two institutes regions and Alphax purchased beans at sh.B per bag and maize at sh.M per bags. Regions purchased 8 bags of beans and 14 bags of maize for sh. 47,600. Alphax purchased 10 bags of beans and 16 bags of maize for sh. 57,400.

(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 \vec{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)

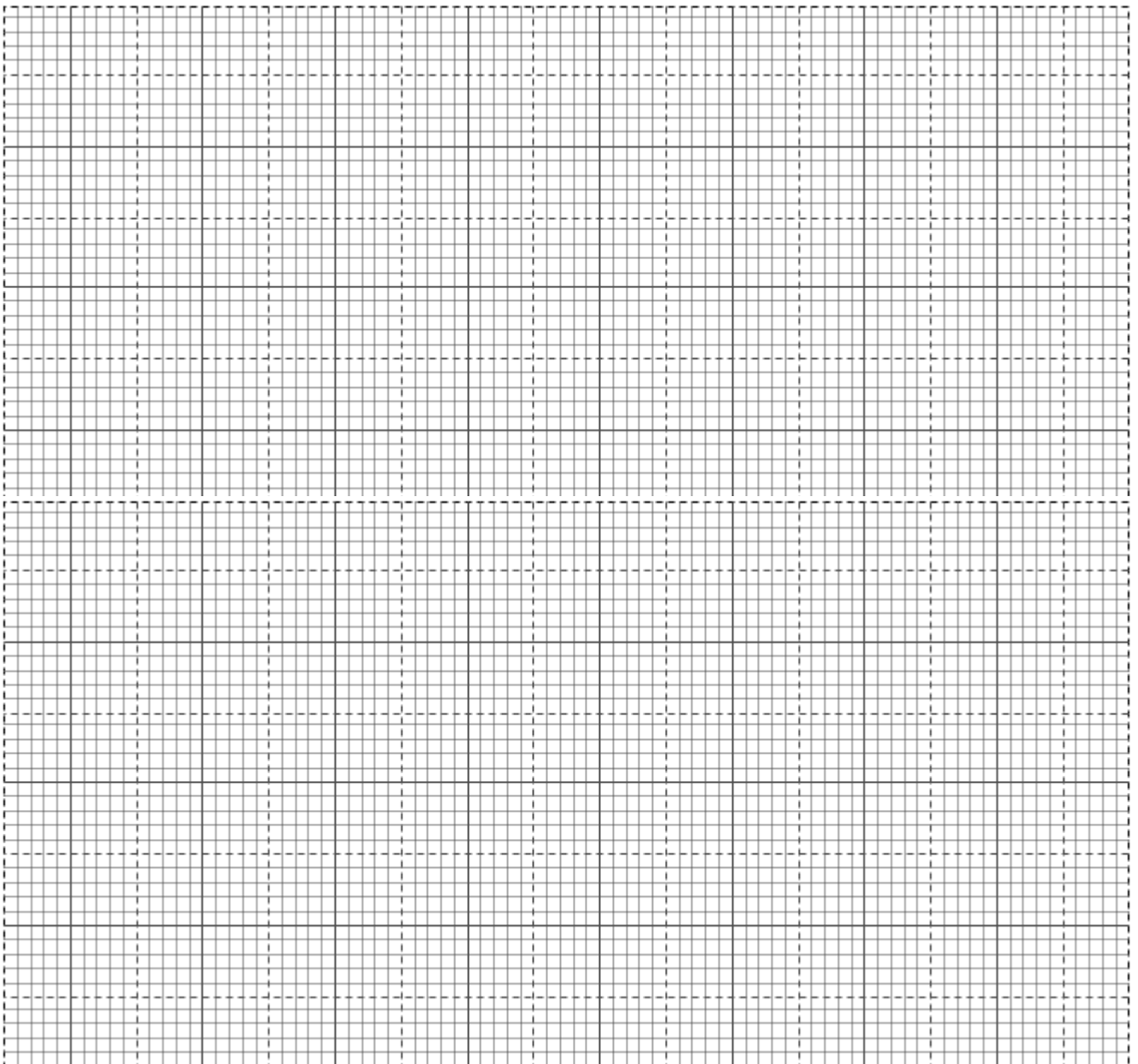
(c) If line OM is produced to T such that $OM:MT = 6:1$
 (i) Find the position vector of T. (1 mark)

(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 $-2 \leq x \leq 3$ (2 mks)

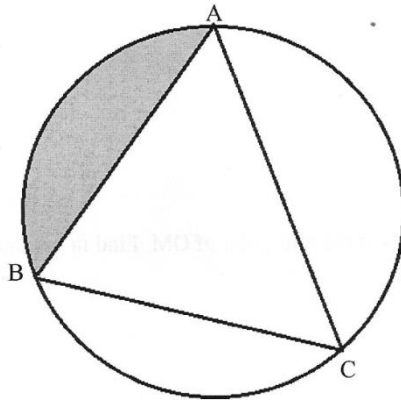
x	-2	-1	0	1	2	3
y						

(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)

NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

Kenya Certificate of Secondary Education

121/1

Mathematics

Time 2 ½ hours

SET 9 QUESTION PAPER

INSTRUCTIONS TO CANDIDATES

1. Write your name, index number and class in the spaces provided above.
2. The paper contains two sections: **Section I** and **Section II**.
3. This paper contains **14 PRINTED** pages make sure all **PAGES ARE PRINTED** and **NON IS MISSING**
4. Answer **ALL** the questions in **Section I** and **ANY FIVE** questions from **Section II**.
5. All working and answers must be written on the question paper in the spaces provided below each question.
6. Marks may be awarded for correct working even if the answer is wrong.
7. Negligent and slovenly work will be penalized.
8. Non-programmable silent electronic calculators and mathematical tables are allowed for use.

For examiners 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

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TURN OVER

SECTION A (50 marks)

Answer all questions in this section in the spaces provided.

1. Without using a calculator evaluate

$$\frac{5 \times 6 + (-76) \div 4 + 27 \div 3}{(-5) \div 3 \times (-4)}$$

(3marks)

2. (a) Express 2268 in terms of its prime factors

(1mark)

- (b) Hence determine the smallest positive number x such that $2268x$ is a perfect square.

(2marks)

3. Elvis arrived in Kenya with 5000 sterling pound, he exchanged it to Kenya Shilling and spent sh. 267 100. Before jetting out of the country, he exchanged the balance into Euros. Using the exchange rates below, calculate the amount he obtained in Euros in Kenya shillings. (3marks)

Currency	Buying	Selling
1 Sterling pound	114.20	114.50
1Euro	101.20	101.30

4. Simplify the expression

(3marks)

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

5. When two wires of length 179m and 234m are divided into pieces of equal lengths a remainder of 3m is left in each case. Find the least number of pieces that can be obtained.

(3marks)

6. Without using calculator, solve for n in the equation

$$1 - \left(\frac{1}{3}\right)^n = \frac{242}{243}$$

(3marks)

7. Solve for y in the equation $\frac{7-y}{4} - \frac{9-2y}{3} = \frac{1}{2}$ (3marks)

8. Two similar solids have surface area of 48cm^2 and 108cm^2 respectively. Find the volume of the smaller solid if the bigger solid has a volume of 162 cm^3 (3 marks)

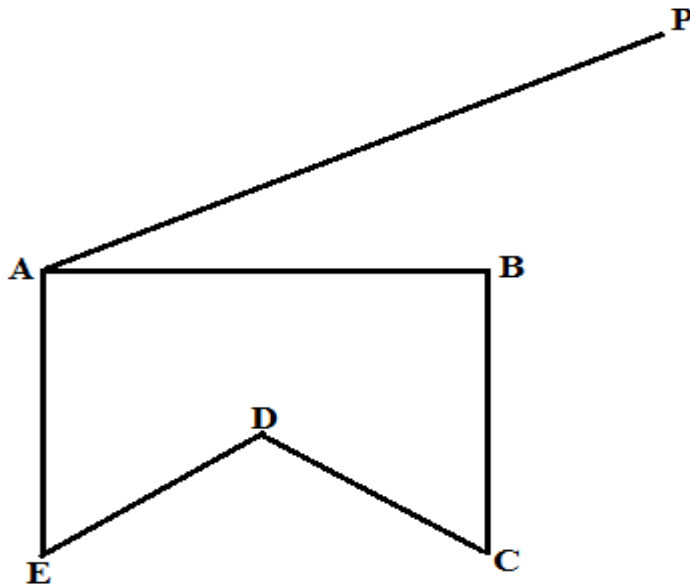
9. Use reciprocal table only to evaluate $\frac{1}{0.325}$
(3marks)

Hence, evaluate $\frac{\sqrt{0.25}}{0.325}$ to 1.d.p

10. A plot measuring 1.2m by 19.1 m is surrounded by a path 0.5m wide. Find the area of the path in square metres. (3marks)

11. The interior angle of a regular polygon is 60° more than its exterior angle, find the number of sides of the polygon. (3marks)

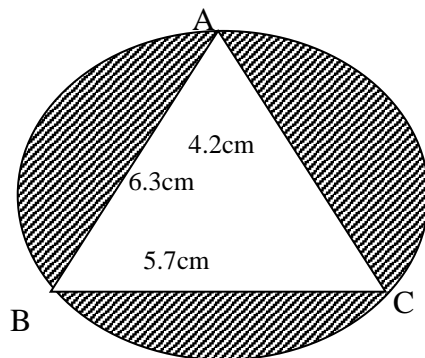
12. In the figure below ABCDE is a cross-section of a solid. The solid has a uniform cross-section. Given that AP is an edge of the solid, complete the sketch showing the hidden edges with a broken lines. (3 marks)



13. If $\tan x = \frac{1}{\sqrt{3}}$ find without using tables or calculator the value of $\sin(90-x) + \cos(90-x)$ leaving your answer in simplified surd form (3marks)

14. A line perpendicular to the line $3y-2x=2$ passes through the point $(-3,2)$. Determine the equation of the line and write it in the form $ax + by = c$ where a , b , and c are constant. (3marks)

15. The circle below whose area is 18.05cm^2 circumscribes triangle ABC where $AB = 6.3\text{cm}$, $BC = 5.7\text{cm}$ and $AC = 4.2\text{cm}$. Find the area of the shaded part. (4 Marks)



16. In a book store, books packed in cartons are arranged in rows such that there are 50 cartons in the first row, 48 cartons in the next row, 46 in the next and so on.

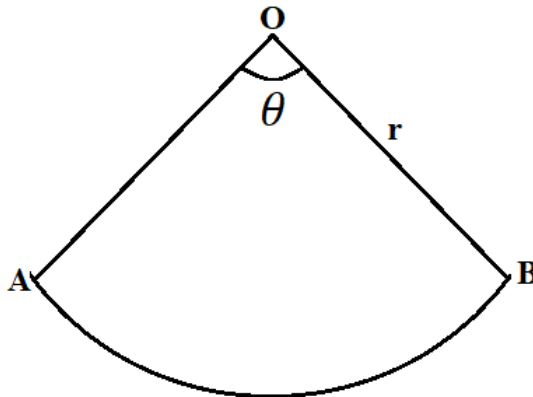
(a) How many cartons will there be in the 8th row? (2 Marks)

(b) If there are 20 rows in total, find the total number of cartons in the book store.(2 Marks)

SECTION II (50 Marks)

*Answer any **five** questions from this section in the spaces provided.*

17. The figure below represents a sector of a circle radius r units. The area of the sector is 61.6 cm^2 and the length of the arc AB is one tenth of the circumference of the circle from which the sector was obtained. (Take $\pi = \frac{22}{7}$)



- a) Calculate;
- the angle θ subtended by the sector at the centre. (2 marks)
 - The radius r of the circle. (3 marks)

- c) Find the cost of producing 100 kg of chocolate bars and 50 kg of eclaires in factory B. (2 marks)

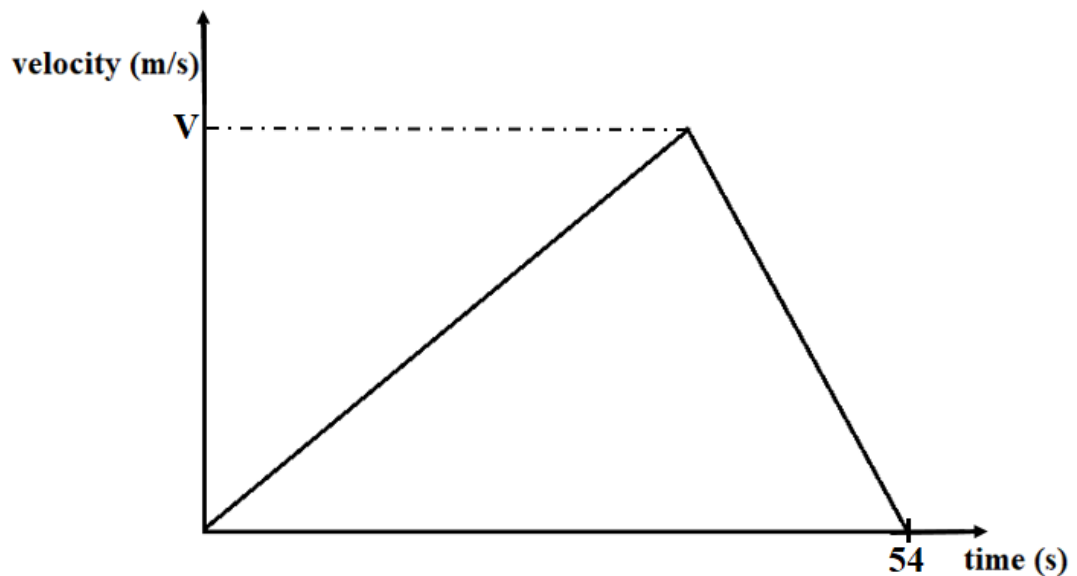
19. The following measurements were recorded in a field book of a farm in metres (xy = 400m)

	Y	
	400	
C60	340	
	300	120D
	240	100E
	220	160F
B100	140	
A120	80	
	x	

- (a) Using a scale of 1cm representing 4000cm, draw an accurate map of the farm.(3 Marks)

(b) If the farm is on sale at Kshs. 80,000.00 per hectare, find how much it costs.(7 Marks)

20. The figure below shows a velocity-time graph of an object which accelerates from rest to a velocity of $V \text{ ms}^{-1}$ then decelerated to rest in a total time of 54 seconds.



- a) If it covered a distance of 810 metres;
i) Find the value of V. (2 marks)

- ii) Calculate its deceleration, given that its initial acceleration was $1\frac{2}{3}ms^{-2}$

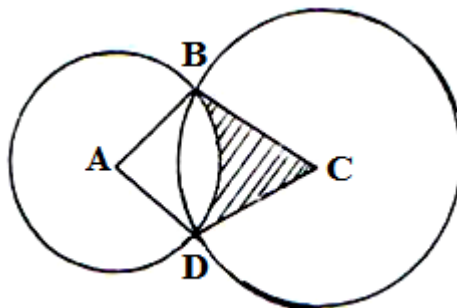
(2 marks)

- b) A bus left town X at 10.45 am and travelled toward town Y at an average speed of 60 km/h. A car left town X at 11.45 am on the same day and travelled along the same road toward Y at an average speed of 100km/h. The distance between town X and town Y is 500km.

- i) Determine the time of the day when the car overtook the bus. (3 marks)

- ii) Both vehicles continued towards town Y at their original speeds. Find how long the car had to wait in town Y before the bus arrived. (3 marks)

21. In the diagram below, two circles, centres A and C and radii 7cm and 24cm respectively intersect at B and D. $AC = 25cm$.



- (a) Show that angle $ABC = 90^\circ$.

(3 Marks)

(b) Calculate

(i) the size of obtuse angle BAD

(3 Marks)

(ii) the area of the shaded part

(4 Marks)

22. (a) a straight line L_1 whose equation is $9y - 6x = -6$ meets the x-axis at Z.
Determine the coordinates of Z. (2 marks)

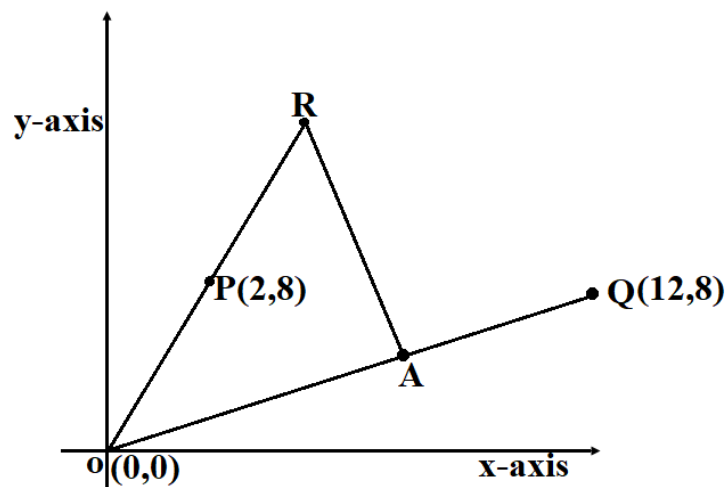
(b) A second line L_2 is perpendicular to L_1 at Z. Find the equation of L_2 in the form $ax + by = c$, where ,b and c are integers. (3 marks)

(c) a third line L_3 passes through the point (2,5) and is parallel to L_1 . Find:

i) The equation of L_3 in the form $ax + by = c$, where a, b and c are integers. (2 marks)

- ii) The coordinate of point R at which L_2 intersects L_3 . (3marks)

23. In the diagram below, the coordinates of points O, P and Q are (0,0), (2,8) and (12,8) respectively. A is a point on OQ such that $4OA=3OQ$. Line OP produced to R is such as $OR=5OP$.



- a) Find vector RA . (3 marks)

b) Given that point L is on **PQ** such that **PL: LQ=12:5**, find vector **RL**. (4 marks)

c) Show that R, L and A are collinear. (2 marks)

d) Find the ratio of **RL:LA**. (1 marks)

24. Five points, P, Q, R, V and T lie on the same plane. Point Q is 53km on the bearing of 055° of P. Point R lies 162° of Q at a distance of 58km. Given that point T is west of P and 114km from R and V is directly south of P and $S40^{\circ}E$ 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)

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NAME:..... INDEX NO.....

SCHOOL:.....ADM..... STREAM:.....

CANDIDATE'S SIGN DATE TARGET.....

Kenya Certificate of Secondary Education

121/1

Paper 1

Mathematics

Time 2 ½ hours

SET 10 QUESTION PAPER

INSTRUCTIONS TO CANDIDATES

9. Write your name, index number and class in the spaces provided above.
10. The paper contains two sections: **Section I** and **Section II**.
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For examiners 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

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SECTION I**Attempt ALL questions in this section.**

1. A certain fraction given as $\frac{31250}{11907}$ is multiplied by another fraction $\frac{a}{b}$ such that the final result gives a perfect cube. Determine the values of a and b if they represent the least possible integers.

(3 marks)

2. Simplify the expression given by {3
marks }

$$\frac{6vu^2 - 6vu}{3v^2u^2 - 3v^2u^3}$$

3. Given that $\cos 2\left(\theta - \frac{7}{5}\right) = \sin \frac{1}{3}\left(\theta + 25\right)$ calculate the exact value of θ
(3 marks)

4. Solve the inequality and represent the solution on a number line. (3 marks)

$$6 - 4x \leq x < \frac{4x + 10}{3}$$

5. A straight line L_1 passes through a point M which is the mid – point of AB where A $(-1, -3)$ and

$B(-3,5)$. L_1 is perpendicular to the line L_2 whose equation is $y + 5x = 0$. Calculate the distance of point M from the line L_2 .

(3 marks)

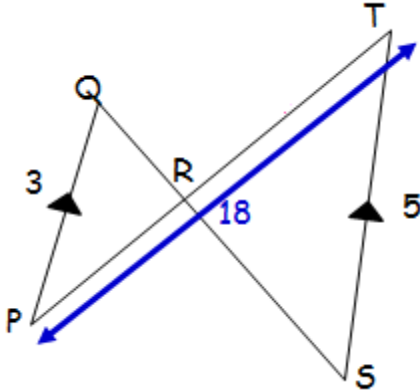
6. Use logarithms tables to evaluate:
marks }

{3

$$\frac{0.00576^2 \times (9.31)^{1/3}}{}$$

$$(4.261)^2 + 0.00869$$

7. Find the values of RT given that the triangles RPQ and RST are similar. (2 marks)



8. Calculate the values of x and a in the equation given below

(4 marks)

$$24^{x-1} \times 243^{x-1} = 2^a \times 3^{3a-6}$$

9. Mr. Kirui earns a basic salary of sh. 12,000 per month. In addition he is also paid a commission of $2\frac{1}{2}\%$ for sales above sh. 15,000. In a certain month, he sold goods worth sh. 140,000 at a discount of 5%.

Calculate his total earning that month.
(3marks)

10. Using a pair of compasses and ruler only construct a triangle ABC in which $AB=6\text{cm}$, $\angle CAB=75^\circ$ and $BC=8\text{cm}$.
(2 marks)

Without any measurement, divide the line AB into 7 equal parts and hence locate a point X such that $AX:XB = 4:3$
(2 marks)

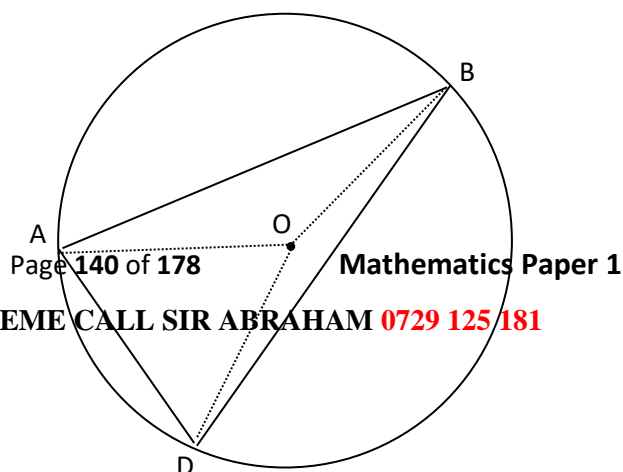
11. Water flowing at a rate of 2m/sec through two pipes of diameter 3cm and 5cm respectively deliver water to a 6 cm diameter pipe. Calculate the speed of flow in the 6 cm pipe if all are kept full. Give your answer in m/sec

(3 marks)

12. In the circle O is the centre, angle $DAB=88^\circ$. Arc AB is twice arc AD.

Calculate angle AOB.

(2 marks)



13. Without using a calculator, determine the perimeter of a rhombus whose diagonals are 6.624 cm and 10.52cm. (Mathematical tables can be used)
(3 marks)

14. A line AB, 8m long is divided into 2 parts, AC and CB such that AC: CB = 3: 5. A further point D divides CB in the ratio $n : 1$. If AD: DB = 19: 5, find the value of n .
(3 marks)

15. A train 88m long moving at x km/h overtakes a second train moving at 56km/h in the same direction.

- a. Given that the first train takes 13.2 seconds to pass a passenger in the second train
Calculate the speed of the first train.

(2 marks)

- b. Calculate the length of the second train if it passes the other one completely in $22\frac{1}{2}$ seconds.

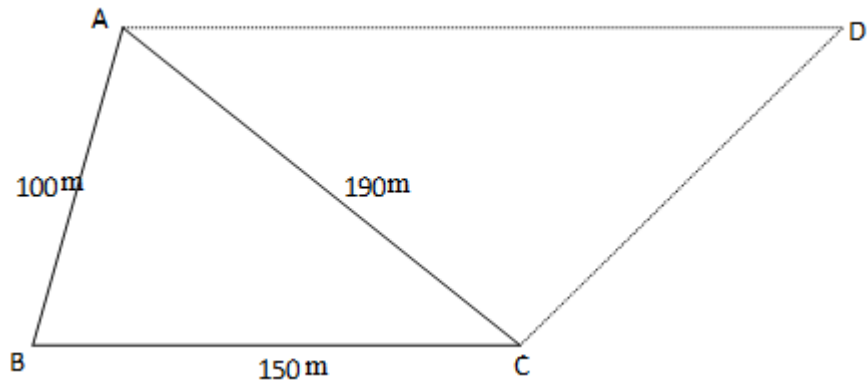
(2 marks)

16. The graph of $y = ax^2 + bx + c$ passes through the origin. The gradient of the tangent when $x = 1$ is 4 and when $x = 2$ is 5. Find the values of a , b and c . (3 marks)

SECTION II answer ANY 5 questions in this section

(50 marks)

17. A triangular piece of land ABC has sides $AB=100\text{m}$, $BC=150\text{m}$ and $AC=190\text{m}$.



- a) Calculate the area of the triangular piece of land ABC (2 marks)

- b) Calculate the value of angle ACB. (3 marks)

- c) A new piece of land ABCD is a trapezium with $AD \parallel BC$ whose area is three times that of triangle ABC, calculate the perimeter of ABCD. (5 marks)

18. From the top A of a building 125m above a street, the angle of elevation of the top B of a second building on the opposite side is $18^{\circ}36'$ and the angle of depression of the base of the second building from A is $39^{\circ}48'$

- a. Calculate the width of the street (3 marks)

- b. Calculate the height of the wall on the opposite side (2 marks)

- c. A taut extension string connects points A and B. A bird spots an insect sitting at a point X on the string. X is three quarter way from A. The bird's landing at X causes vertical sag of 50cm on X. Calculate the angle depression of X from B after the sag. (5 marks)

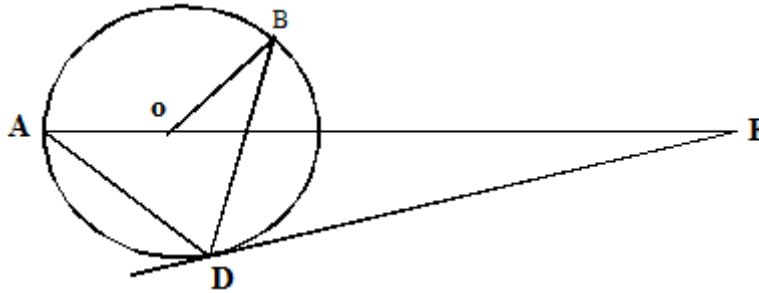
19. A school with n students planned to purchase a van costing Ksh. 2,000,000. It was decided that each student had to contribute an equal amount to meet the cost of the van. Forty students left the school before contributing. Then, each of the remaining students had to contribute Ksh 2500 more.

- a) Form an equation in n and hence find the number of students who were in the school at the beginning. (4 marks)

- b) Before the students made their contribution, the area MP agreed to pay for 30% of the cost of the bus. Calculate the amount each student contributed. (3 marks)

- c) The students' contribution consisted of the amount they received from members of the public and from their parents. These amounts were in the ratio 5:17. Calculate the total amount the students received from their parents. (2 marks)

20. In the figure below, O is the centre of the circle. A, B, C and D are points on the circumference of the circle. A, O, X and C are points on a straight line. DE is a tangent to the circle at D. Angle BOC = 48° and angle CAD = 36° .



- a. Giving reasons in each case, find the value of the following angles:
 a) Angle CBA.

(2marks)

- b) Angle BDE

(2marks)

c) Angle CED

(2marks)

b. It is also given that $AX = 12\text{cm}$, $XC = 4\text{cm}$ and $DB = 14\text{cm}$ and $DE = 15\text{cm}$. Calculate

a) DX

(2marks)

b) AE

(2marks)

21. The number of passengers on a certain regular weekday train service of 50 occasions was

165	141	163	153	130	158	119	187	185	209
177	147	166	154	159	178	187	139	180	143
160	185	153	168	189	173	127	179	163	182
171	146	174	149	126	156	155	174	154	150
210	162	138	117	198	164	125	142	182	218

- a. Reduce this data to a grouped frequency table with a class intervals of 10 passengers starting with 110 -etc

(3 marks)

Use the data in your frequency table to

- b. Estimate the mean number of passengers on a particular occasion

(3 marks)

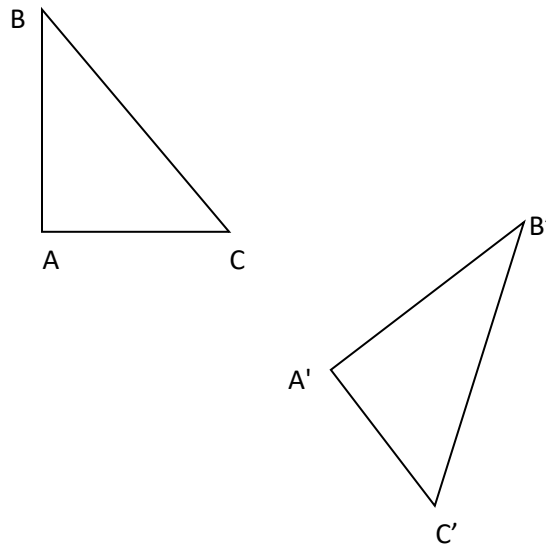
- c. Estimate the range of marks of the middle 80% of the class.

(4 marks)

22. Three variables p , q and r are such that p varies directly as q and inversely as the square of r .
- a. When $p = 18$, $q = 24$ and $r = 4$.
Find p when $q = 30$ and $r = 10$.
(4marks)
- b. Express q in terms of p and r .
(1mark)
- c. If p is increased by 20% and r is decreased by 10% find:
i) A simplified expression for the change in q in terms of p and r .
(3marks)

- ii) The percentage change in q .
(2 marks)

23. a) Using construction, locate the centre of rotation that will map triangle ABC onto triangle $A'B'C'$ in the figure below. Fully describe this transformation (4 marks)



- b) Draw a triangle with vertices at $A(-2,6)$, $B(2,3)$ and $C(-2,2)$ on the grid provided

(1 mark)

On the same axes draw the following images:

- i) $A'B'C'$ the image of ABC under a reflection in the line $x = -1$ (1 mark)
- ii) $A''B''C''$ the image of $A'B'C'$ under an enlargement with centre at $(1,1)$ and a scale factor of -1 (1 mark)
- i) $A'''B'''C'''$ is the image $A''B''C''$ of under 180° rotation about B'' (1 mark)

24.(a) The equation of a curve is given by $y = x^3 + x^2 - 6x$.

Show that the value of x at the minimum turning point is $\frac{-1 + \sqrt{19}}{3}$

(3marks)

(b) The displacement x metres of a particle moving along a straight line after t seconds is

given by $x = 4t + 2t^2 - t^3$

(i) Find its initial acceleration

(2marks)

(ii) Calculate the time when the particle was momentarily at rest.

(2marks)

(c) (i) Find the values of x where the curve $y = x^2(x - 2)$ crosses the x -axis.

(1mark)

(ii) Hence find the area enclosed by the curve $y = x^2(x - 2)$, the lines $x = 0$, $x = 2\frac{2}{3}$ and

the x-axis.

(2marks)

THIS IS THE LAST PRINTED PAGE

WE HAVE ALSO THE FOLLOWING

1. MATHEMATICS

- FORM 1 - FORM 4 TOPICAL QUESTIONS AND ANSWERS
- FORM 1 – FORM 4 OPENER, MID-TERM AND ENDTERM EXAMS
- TOP RANK PREDICTION MOCK SERIES EVERY YEAR
- FORM 1- FORM 4 NOTES
- SCHEMES OF WORK EVERY YEAR

2. ENGLISH

- FORM 1 - FORM 4 TOPICAL QUESTIONS AND ANSWERS
- FORM 1 – FORM 4 OPENER, MID-TERM AND ENDTERM EXAMS
- TOP RANK PREDICTION MOCK SERIES EVERY YEAR
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- SCHEMES OF WORK EVERY YEAR
- POETRY QUESTIONS AND ANSWERS

- POETRY NOTES
 - PARLIAMENT OF OWIS, ARTIST OF THE FLOATING WORLD, THE SAMARITAN, SILENT SONGS, FATHERS OF NATIONS (EXERPT QUESTIONS, GUIDES, ESSAYS AND MARKING SCHEMES, VIDEOS AVAILABLE).
3. KISWAHILI
- FORM 1 - FORM 4 TOPICAL QUESTIONS AND ANSWERS
 - FORM 1 – FORM 4 OPENER, MID-TERM AND ENDTERM EXAMS
 - TOP RANK PREDICTION MOCK SERIES EVERY YEAR
 - FORM 1- FORM 4 NOTES
 - SCHEMES OF WORH EVERY YEAR
 - USHAIRI QUESTIONS AND ANSWERS
 - USHAIRI NOTES
 - ALL SETBOOK QUESTIONS, VIDEOS, GUIDES AND ASNSWER AVAILABLE
4. BIO, CHEM, PHY, AGRIC, BST, COMP, HMSC, GEO, HIST, CRE
WE HAVE THE FOLLOWING FOR THE ABOVE 10 SUBJECTS
- FORM 1 - FORM 4 TOPICAL QUESTIONS AND ANSWERS
 - FORM 1 – FORM 4 OPENER, MID-TERM AND ENDTERM EXAMS
 - TOP RANK PREDICTION MOCK SERIES EVERY YEAR
 - FORM 1- FORM 4 NOTES
 - SCHEMES OF WORH EVERY YEAR
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