MATHEMATICS PAPER 1 KEY LIGHT MOCK

2023 KCSE FOCUS

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MATHEMATICS PAPER1

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TEST PAPER 1 2023

Kenya Certificate of Secondary Education

Name: …………………………...……………… **Index Number:** ……………….

Student's Signature: ………………………... **Date:** ………………. **Class:**………....

Instructions to candidates

(i) Write your name, Index number and class in the spaces provided above.

(ii) Sign and write the date of examination in the spaces provided above.

(iii) This paper consists of **two** sections: **Section I** and **Section II**.

(iv) Answer **all** the questions in **Section I** and only **five** questions from **Section II.**
(v) **Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.**

(vi) Marks may be given for correct working even if the answer is wrong.

(vii) **Non – programmable** silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

(viii) This paper consists of 16 printed pages. **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
(ix) **Candidates should answer the questions in English.**

For examiner's use only

Section I

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

Section 2

17	18	19	20	21	22	23	24	Total

Grand Total

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SECTION I (50 Marks)

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

1. Without using mathematical tables or calculator evaluate:$7\frac{3}{5} - \frac{1}{3}\left(1\frac{1}{4} + 3\frac{1}{3}\right) \times 2\frac{2}{5}$. (3 marks)

2. Lessons in Nyamasaria and Kasagam Secondary schools take 30 minutes and 40 minutes respectively. The two bells ring simultaneously at 7.50 a.m. How many times will they ring together again between 7.50 a.m. and 3.00 p.m. (3 marks)

3. Use table of squares and square roots to find the value of $x = \sqrt{0.0472^2 + 0.1236^2}$ (3 marks)

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4. A straight line L_1 whose equation is $3y - 2x = -2$ meets the x – axis at R. Determine the coordinates of R. (2 marks)

5. Given that $\tan\alpha = 0.75$, without using mathematical tables or calculator find $\cos(90 - \alpha)$. (2 marks)

6. A Kenyan company received M Us dollars. The money was converted into Kenya Shillings in a bank which buys and sells foreign currencies as shown below.

	Buying (Kshs)	Selling (Kshs)
1 Sterling Pound	125.78	126.64
1 US Dollars	75.66	75.86

(a) If the company received Kshs.15, 132, 000, calculate the amount, M Us Dollars.

(2 marks)

(b) The company exchanged the above Kenyan shillings into Sterling pounds to buy a car in Britain. Calculate the cost of the car to the nearest Sterling Pound.   (2 marks)

7. In the figure below, A, B, C and D are points on the circumference. Chord BC = AC and angle ADC = 138°.
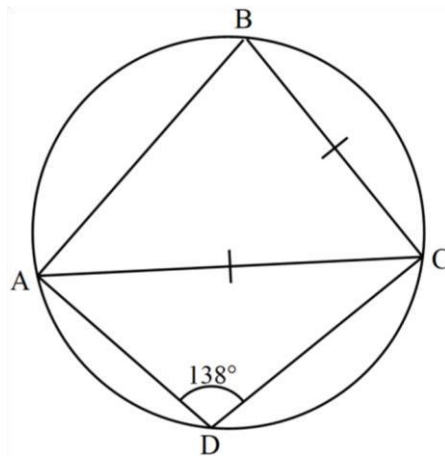
Giving reasons, calculate the size of angle ACB.   (3 marks)

8. (a) Using a ruler and a pair of compasses only, construct a quadrilateral PQRS in which PQ = 5 cm, PS = 3 cm, QR = 4 cm, <PQR=135^0 and Angle SPQ is a right angle.

(2 marks)

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(b) The quadrilateral PQRS represents a plot of land drawn to a scale 1:4000. Determine

the actual length of RS in meters.   (2 marks)

9. Find the ratio a**:**c if a:b = 2:5 and b**:**c = 2:3.   (2 marks)

10. Simplify the expression: $\dfrac{2p^2 - 3p - 5}{4p^2 - 25}$ (3 marks)

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11. In the figure below ABCDEF is a uniform cross – section of a solid. Given that DI is one of the visible edges of the solid, complete the sketch showing the hidden edges with broken lines. (3 marks)
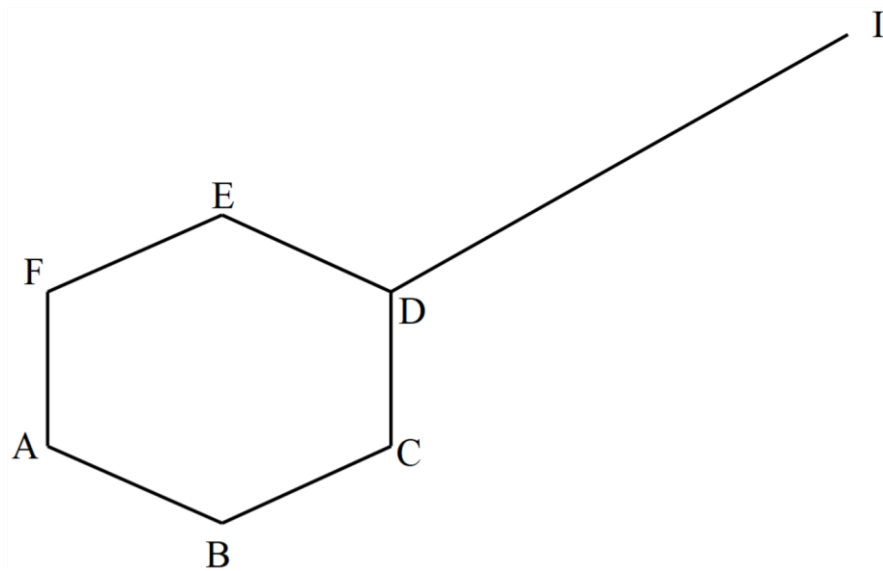
12. Given the inequalities $2x-3 \leq 4x+7 < x+13$, solve the inequalities and represent the solution on a number line. (3 marks)

13. The position vector of points A and B are $-10\mathbf{i} - 6\mathbf{j} + 9\mathbf{k}$ and $-5\mathbf{i}+\mathbf{k}$ respectively.

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Calculate **AB** leaving your answer in surd form.   (3 marks)

14. Two numbers p and q are such that $p^3 \times q = 135$, find p and q.   (3 marks)

15. A circle centre O has the equation $x^2 + y^2 = 4$. The area of the circle in the first quadrant is divided into five vertical strips each of width 0.4 cm.

(a) Use the equation of the circle to complete the table below for values of y correct to two decimal places.   (1 mark)

x	0	0.4	0.8	1.2	1.6	2.0
y	2.00			1.60		0.00

(b) Use trapezium rule to estimate the area of the circle.   (3 marks)

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16. Four interior angles of an irregular polygon are each 155º, while the rest are each 160º . Find the number
of sides of the polygon.   (3 marks)

SECTION II (50 Marks)

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

17. The figure below represent a model of a solid structure in the shape of a frustum of a cone with
hemispherical top. The diameter of hemispherical part is 70 cm and is equal to the diameter of
the frustum. The frustum has a base diameter of 28 cm and a slant height of 60 cm.

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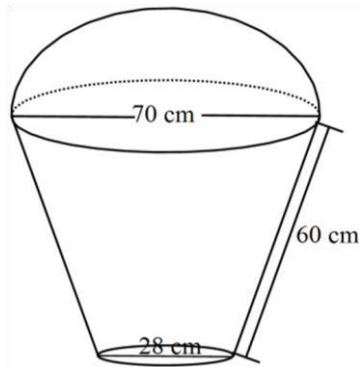
Calculate:

(a) The area of the hemispherical surface.   (2 marks)

(b) The slant height of the cone from which the frustum was cut.   (3 marks)

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

18. A matatu and Nissan left town A for town B 240 km away at 8:00 a.m. travelling at 90 km/hr and 120 km/hr respectively. After 20 minutes the Nissan had a puncture which took 30 minutes to mend.

(a) At what time did the Nissan catch up with the matatu?   (5 marks)

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(b) How far from town A did the Nissan catch up with the matatu?   (2 marks)

(c) At what time did the matatu reach town B?   (3 marks)

19. A number of people are asked to cut 20 cm length of string without measuring. Later 100 cm pieces are collected and measured correct the nearest 0.1 cm. The data below was obtained.

Length	18.0 −18.4	18.5−18.9	19.0 −19.4	19.5 −19.9	20.0− 20.4	20.5− 20.9	21.0 − 21.4	21.5− 21.9
Frequency	5	8	30	x	10	20	10	4

(a) Find :
   (i)   The value of x.   (1 mark)

(ii)   The modal class.   (1 mark)

(b) Calculate:
   (i)   The mean.   (4 marks)

(ii)   The median.   (4 marks)

20. Four cities A, B, C and D are such that town B is 1500 km due East of town A. Town C is 1800 km due North of town B. Town D is on a bearing of 330° from town A and on a bearing of 300° from C.
   (a) Use a ruler and compasses only to show the position of town A, B, C and D. (Take a scale of 1 cm = 300 km).   (5 marks)

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(b) Determine:
     (i)   The distance AD.   (2 marks)
     (ii)   The distance CD.   (2 marks)
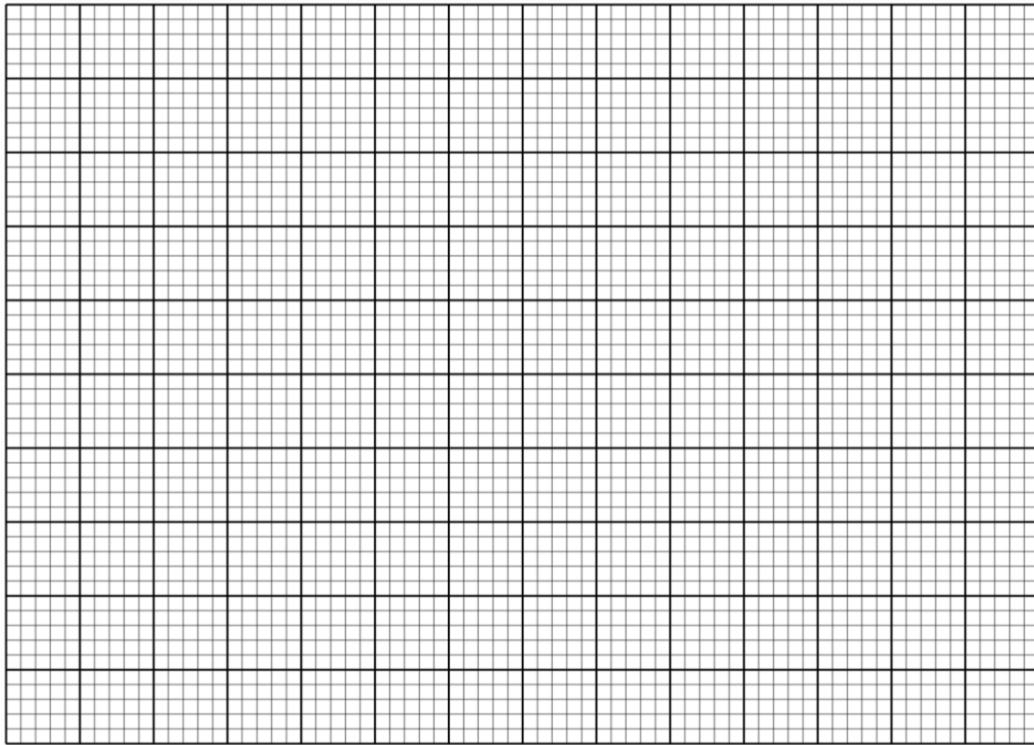
     (iii)   The bearing of town D from town B.   (1 mark)

21. The vertices of triangle PQR are $P(0,0)$, $Q(6,0)$ and $R(2,4)$.
    (a) Draw triangle PQR on the grid provided.   (1 mark)

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(b) Triangle P'Q'R'is the image of a triangle PQR under an enlargement scale factor $\frac{1}{2}$ and

centre $(2,2)$. Write down the coordinates of triangle P'Q'R'and plot on the same grid.

.   (3marks)

(c) Draw triangle P''Q''R''the image of triangle P'Q'R'under a positive quarter turn about point

$(1,1)$.   (2
marks)

(d) Draw a triangle P'''Q'''R''' the image of triangle P''Q''R'' under reflection in the line

$y= 1$.   (2
marks)

(e) Describe fully a single transformation that maps triangle P'''Q'''R''' onto triangle P'Q'R'.

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(2 marks)

22. (a) Find the inverse **A**$^{-1}$ of the matrix: **A**= $\begin{pmatrix} 4 & 3 \\ 3 & 2 \end{pmatrix}$ (2 marks)

(b) Rose bought 20 bags of oranges and 15 bags of mangoes for a total of Kshs.9 500. Chumo bought 15 bags of oranges and 10 bags of mangoes for a total of Kshs.6 750. If the price of a bag of oranges is x and that of mangoes is y:

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

(ii) Hence use the matrix **A**$^{-1}$ above to find the price of one bag of each item. (3 marks)

(c) The price of each bag of oranges was increased by 10% and that of mangoes reduced by 10%. The businesswomen (Rose and Chumo) bought as many oranges and as many mangoes as they bought earlier. Find by matrix method the total cost of oranges and mangoes that the businesswomen bought after the percentage change. (3 marks)

23. (a) Fill the table below for the function $y=x^2-4x+2$ for $-1\le x\le 5$.   (2 marks)

x	-1	0	1	2	3	4	5
y							

(b) (i) Draw the graph of the function $y=x^2-4x+2$ for $-1\le x\le 5$.   (3 marks)
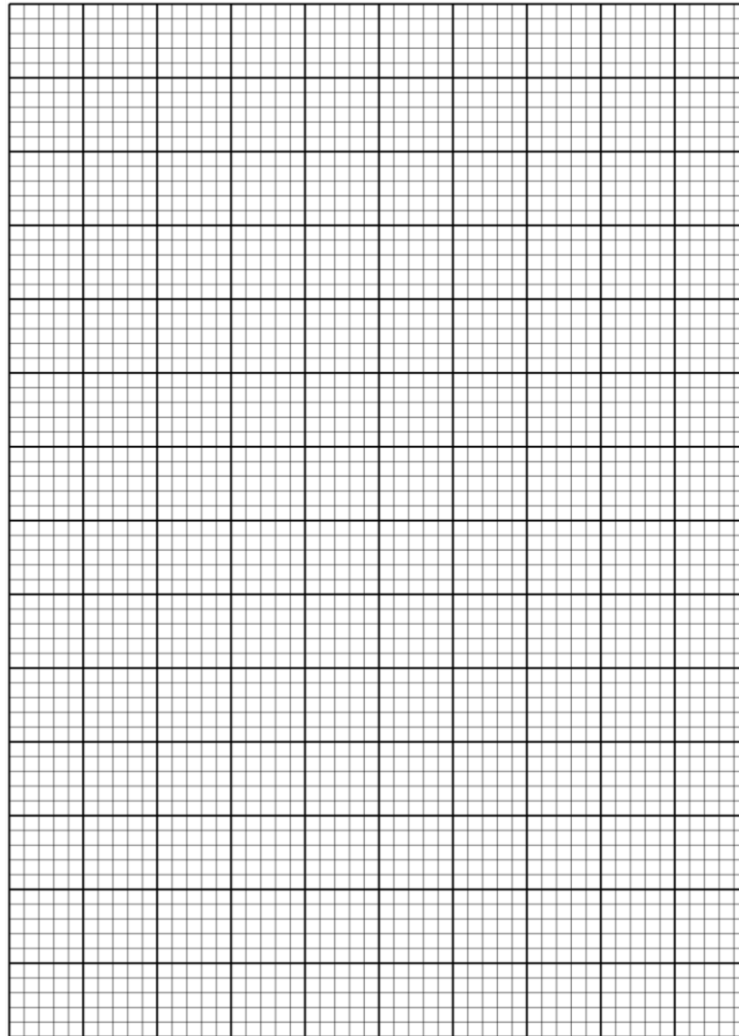
(ii)   On the same axes, draw line $y=x-1$.   (1 mark)

(c) Determine the values of x at the points of intersection between the curve $y=x^2-4x+2$ and line $y=x-1$ (2 marks)

(d) Draw the line of symmetry of the curve hence state its equation.   (2 marks)

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24. The displacement *s* of a particle after t seconds is given by $s = 4t^3 - \frac{5}{2}t^2 - 3t + 3$.

Determine the:

(a) Velocity of the particle when *t* = 3 seconds. (3 marks)

(b) Value of t when the particle is instantaneously at rest. (3 marks)

(c) Displacement when the particle is instantaneously at rest. (2 marks)

(d) Acceleration of the particle when *t* = 2 seconds. (2 marks)

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MATHEMATICS PAPER 1

TEST PAPER 2 2023

NAME OF SCHOOL...ADM............

CANDIDATE NAME ....INDEX NO. ....

CANDIDATE SIGNATURE................................... STREAM ....

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

Instructions to Candidates

a) Write your name and index number in the space provided above.
b) Sign and write the date of examination in the space provided above.
c) This paper consists of **TWO** sections: **section I** and **section II**
d) Answer **all** the questions in **section I** and on 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 marking even if the answer is wrong
g) **Non-programmable** silent calculator **and** KNEC Mathematical tables may be used, except where stated otherwise.
h) **The paper consists of 15 printed pages.**
i) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
j) **Candidates should answer the questions in English**

For Examiner's Use Only

Section I

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

Section II
Total

17	18	19	20	21	22	23	24

Grand

SECTION I [50 marks]
Answer __all__ the questions in this section in the spaces provided.

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

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

2. Three bells ring at intervals of 9 minutes, 15 minutes and 21 minutes. The bells will net ring together at 11.00p.m. Find the time the bells had last rang together. (3 marks)

3. Simplify: $\dfrac{27^{2/3} \div 2^4}{32^{-3/5}}$ (2 marks)

4. Solve $4 \leq 3x - 2 < 9 + x$; hence list the integral values that satisfies the inequality. (3 marks)

5. The sum of interior angles of two regular polygons of side (n-1) and n are in the ratio 4:5. Calculate the value of interior angle of the polygon with side (n-1). (3 marks)

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6. A bus travelling at a speed of 63km/h left a station at 8.15am. a car later left the same station at 9.00 am and caught up with the bust at 10.45am. Find the average speed of the car.
     (3 marks)

7. Given that r=2 and h = 3r-1,evaluate   (3 marks)

$$\frac{7r^2 + 2rh}{\sqrt{4h - 2r}}$$

8. A line L Passes through point (3, 1) is perpendicular to the line 2y = 4x + 5. Determine the equation of Line L.   (3 marks)

9. The figure shows part of triangular Prism. ABCDEF. Complete the prism and measure length AF.   (4mark)

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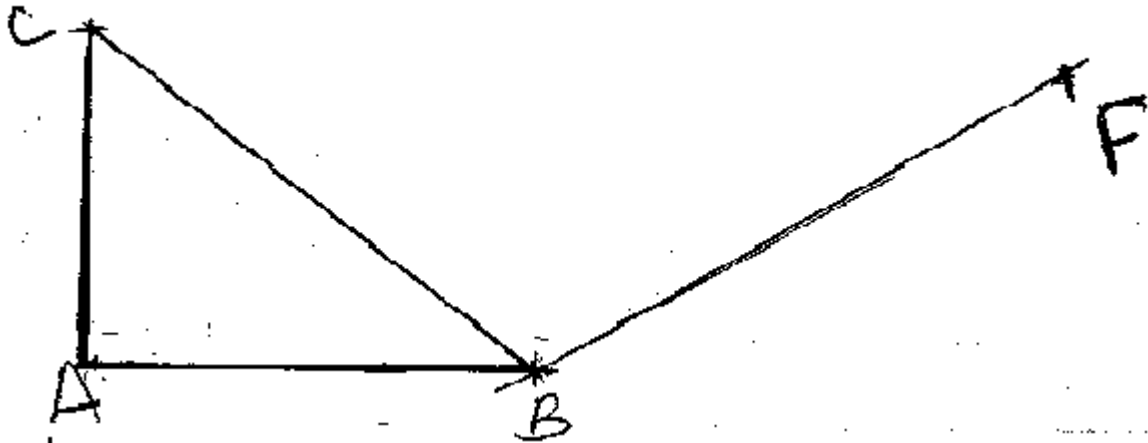
10. The position vectors of A,B and C are
$\binom{=4}{6}$, $\binom{-8}{2}$ and $\binom{2}{a}$ respectively. Vector **CA** is parallel to vector **OB**. Determine the value of a.   (3 marks)

11. A Kenyan company received US dollars 100,000. The money was converted into Kenya shillings in a bank which buys and Sells foreign currencies as follows.

	Buying (Ksh)	Selling (Ksh)
I US dollar	77.24	77.44
I Sterling Pound	121.93	122.27

(a). Calculate the amount of money, in Kenya shillings, the company received.   (2 marks)

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(b). The company buys a car from Britain in Sterling Pound.   Calculate the cost of the car to the nearest Sterling Pound. (2 marks)

12. Convert $\dfrac{2\pi^c}{9}$ into degrees. (2 marks)

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

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14. Two containers have base areas of 750cm^2 and 120cm^2 respectively. Calculate the volume of the larger container in litres given that the volume of the smaller container is 400cm^3.

(3 marks)

15. The figure below represents a plot of land ABCD such that AB=85m, BC = 75m, CD = 60m, DA = 50m and angle ACB = 90°. (3 marks)
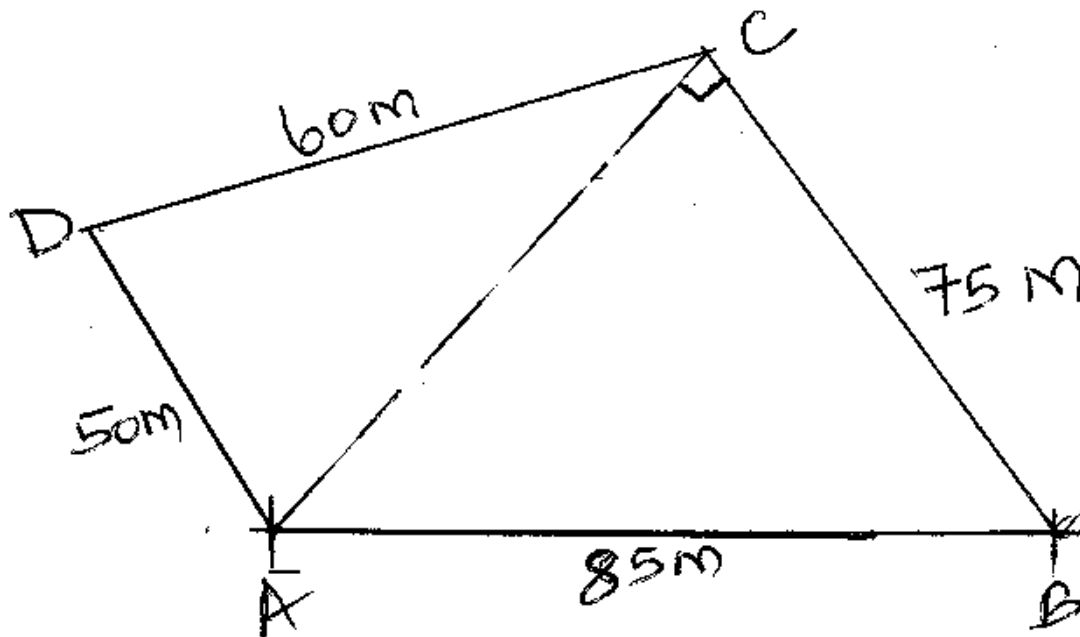
Determine the area of the plot in hectares correct to two decimal places. (4 marks)

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16. Use reciprocal to find the reciprocal of 0.01732. Hence evaluate.   (3 marks)

$$\frac{\sqrt[3]{0.008}}{0.01732}$$

SECTION II – (50 Marks)
Answer Only Five Questions in this section in the spaces provided.

17. A newly built classroom measuring 6.3m long, 4.5 wide and 3.2m high is to be cemented on the floor and all inside walls. The classroom has one door measuring 1.85m by 80cm and four windows measuring 1.5m by 70cm each. Cementing materials cost sh 500 per square metre while labour costs 20% of the cost of cementing materials. Calculate:-

   (a) to one decimal place, the total surface area to be cemented.   (4 marks)

   (b) The cost of cementing materials.   (2 marks)

   (c) The total cost of cementing the classroom.   (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(d) The school borrowed the loan to facilitate the total cost of cementing the classroom from a bank. The money earned a compound interest of 8% per annum. How much did the school repaid after 3 years. (2 marks)

18. In the figure below (not drawn to scale) AB = 8cm, AC = 6cm, AD = 7cm, CD = 2.82cm and ∠CAB = 50º.
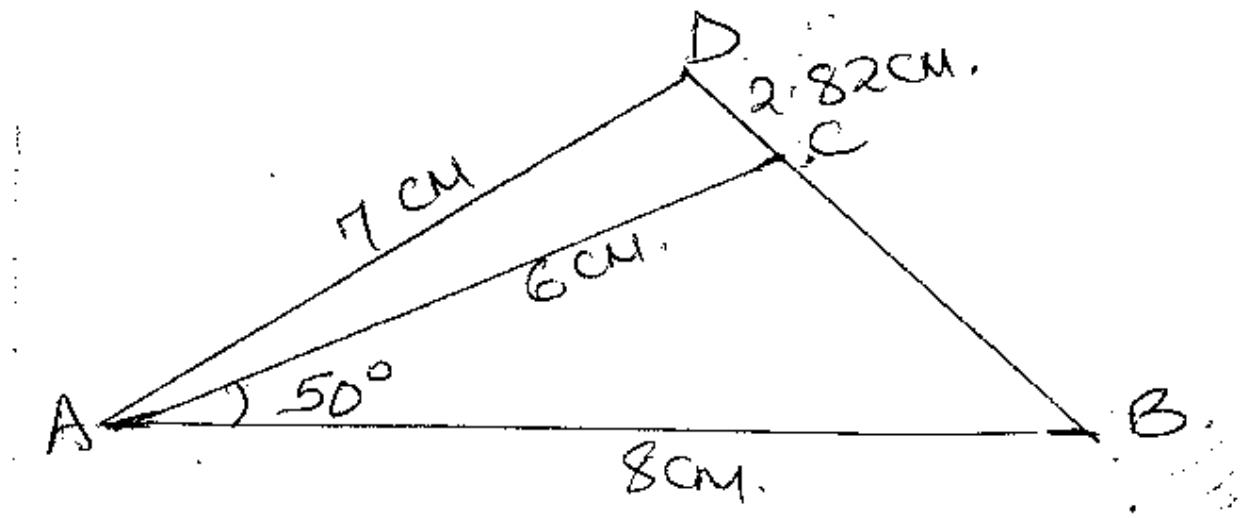
Calculate, to 2 decimal places:-
(a) The length BC (2 marks)

(b) The size of ∠ABC; (3 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(c) Th size of ∠CAD   (3 marks)

(d). the area of triangle ACD.   (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

19. (a). Two matrices P and Q are such that P = $\begin{pmatrix} k & 4 \\ 3 & 2 \end{pmatrix}$ and Q = $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$. Given that the determinant of PQ = 4, find the value of k. (3 marks)

(b).Find M^{-1} the inverse of matrix M = $\begin{pmatrix} 5 & 6 \\ 7 & 9 \end{pmatrix}$ (2 marks)

(c).Omondi bought 5 plates and 6 mugs for a total of ksh 2440. Ali bought 7 plates and 9 mugs for a total of Ksh 3560.

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

(ii). Use matrix method to find out the cost of a plate and that of a mug. (4 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

20. (a). Solve the equation $\frac{(x+3)}{24} = \frac{1}{(x-2)}$ (4 marks)

(b). The length of a floor of a rectangular hall is 9m more than its width. The area of the floor is 36m^2.

(i). Calculate the perimeter of the floor.   (4 marks)

(ii). A rectangular carpet is placed on the floor of the hall leaving an area of 28m^2. If the length of the carpet is twice its width, determine the width of the carpet.   (2 marks)

21. Three vertices of a parallelogram ABCD are A (-7,3), B(1,-1) and C(5,1). On the grid provided, draw the parallelogram ABCD.   (2 marks)

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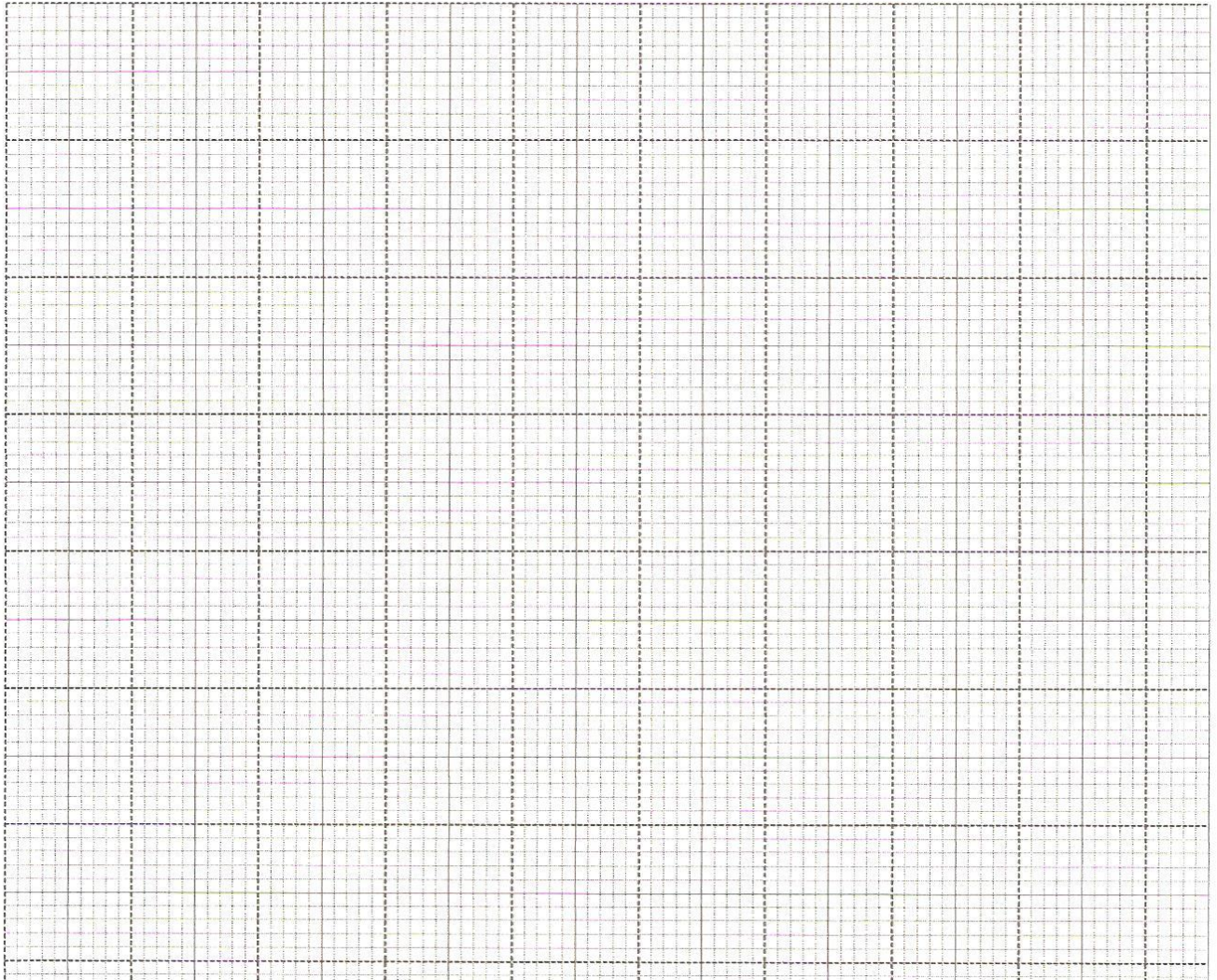
Determine

(i). the gradient of the line AB. (2 marks)

(ii). the equation of line AB in the form y = mr + c, where m and c are constants. (2 marks)

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(c).Another line L is perpendicular to CD and passes through point (1, 3),

Determine:

(i). the equation of L in the form ax+ by = c where a, b and c are constants.   (3 marks)

(ii). the coordinates of the y-intercept of line L.   (1 mark)

22. The marks of 40 students in a mathematics examinations were recorded as follows

64	50	58	73	51	42	58	46
58	60	45	48	69	48	50	43
52	64	58	46	59	54	41	61
73	49	74	55	44	73	53	67
62	47	66	52	60	61	54	70

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(a) Complete the frequency distribution table be low for the above information. Use classes of size 5 starting with the class 40-44.   (4 marks)

Mass (kg)	Frequency(f)	Mid-points(x)	fx	cf
40-44				

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

(c). Estimate:

(i). the mean mark.   (2 marks)

(ii). the median mark.   (3 marks)

23. The vertices of trapezium ABCD are A (2, 0), B (4, 0), C (6, 2), and D (2, 2)

   (a) On the grid provided below, draw:
      (i). the trapezium ABCD;   (1 mark)

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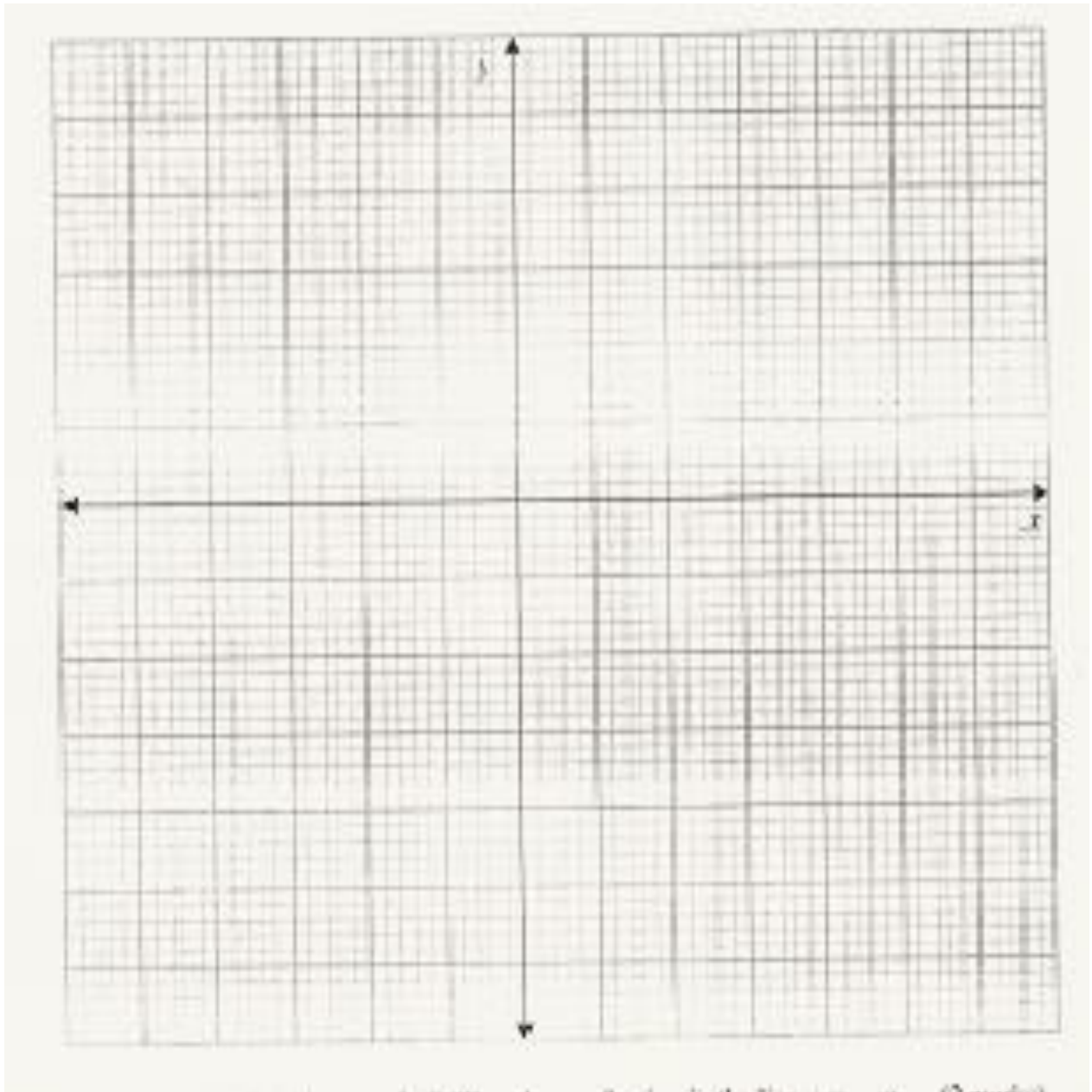
(ii). A'B'C'D' the image of ABCD under a reflection in the line y = -x; (2 marks)

(iii). A"B"C"D" the image of A'B'C'D' under rotation of -90°, centre (0, 0). (2 marks)

(b). Describe a transformation that maps A"B"C"D" onto ABCD (2 marks)

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(c). State pairs of trapezia that are directly congruent and those that are oppositely congruent.
(3 marks)

24. The gradient of the curve $y = 2^{x3} – 9^{x2} + px + 1$

   (a). Find
   (i). the value of P   (3 marks)

(ii). the equation of the tangent to the curve at x = 0.5.   (4 marks)

(iii).Find the co-ordinates of the turning points of the curve.   (3 marks)

MATHEMATICS PAPER 1

TEST PAPER 3 2023

NAME OF SCHOOL…………………………………………………………………………….

CANDIDATES NAME …………………………………………………….ADM……………

CANDIDATE SIGNATURE…………………………………….INDEX NO ………………...

DATE…………………………………….TARGET……………… STREAM……………..

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

Instructions to Candidates

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(a) Write your name and index number in the spaces provided below

(b) Sign and write the date of examination in the spaces provided above.

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(d) Answer **ALL** questions in **Section I** and **ONLY** five from **Section II**.

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(g) Non – programmable silent calculators and KNEC Mathematical tables may be used except where stated otherwise.

(g) The paper consists 15 printed pages.

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   **GRANT TOTAL**

17	18	19	20	21	22	23	24	Total

SECTION 1 (50 MARKS)

Answer all the questions in the space provided below each question

1. Evaluate without using mathematical tables or calculator $\dfrac{-12\div4-6\times3+5\times2}{8+(-5)\div2\times(-4)}$ (3marks)

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2. A three-digit number is such that twice the hundreds digit is more than the tens digit by 2.the unit digit is thrice the hundred digit. When the digits are reversed, the number is increased by 594.Find the number.
(4marks)

3. Simplify $\dfrac{x+4}{x-4} - \dfrac{5x+20}{x^2-16}$

(3marks)

4. The mass of maize flour to the nearest 10 grams is 8. 67kg.Determine the percentage error in this measurement.
(3marks)

5. Without using a calculator, solve for x in the equation $0.5^x \times 0.125^{1-x} = 32$.   (3marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

6. The velocity V m/s of a particle in motion is given by $V = 3t^2 - 2t + 5$.Calculate the distance travelled by the particle between t= 2 seconds and t = 6 seconds.   (3 marks)

7. Given that, the coordinates of two points P and Q are $(2, \quad 3, \quad 5) \ and \ (6, \quad k - 1, \quad 15)$ respectively and that their position vectors are parallel, Calculate the value of $|PQ|$.
(4marks)

8. A dealer sells a mobile phone at a profit of 25%. The customer sells it to a friend at ksh 60,000, making a profit of 20 %. Find the cost prize of the mobile phone.   (3 marks)

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9. A wall clock that gains 20 seconds after every hour was set to read the correct time on Tuesday at 03 25. Determine the time the wall clock will read on Thursday 03 25 h.   (3 marks)

10. A cylinder of radius 15 cm and height 24 cm is filled with water. A solid hemisphere of radius 7cm is submerged into the cylinder and removed. Find the change in height of water level in the cylinder.   (4 marks)

11. The average rate of depreciation in value of a laptop is 10% per annum. After three complete years its value was ksh 35,000. Determine its value at the start of the three-year period. (3marks)

12. If $3x + 2y : 7x - y = 3 : 2,$ $calculate\ the\ ratio\ x : y$
(3marks)

13. State the inequalities that satisfy the region defined by R. (3marks)

14. Solve for θ in the equation $\dfrac{\sin(2\theta+30)°}{\cos(3\theta-40)°} = tan45°$ (3marks)

15. The figure below shows a circle PQRS Centre O with SR produced to T.PQ//SR and $\angle QSR = 55°$.Calculate the size of $\angle QRT$. (3 marks)

16. The scale of a map is 1: 200.Calculate the actual area of a triangular coffee field whose sides are 6cm, 8cm and 10cm on the map. (3 marks)

SECTION 11 (50 MARKS)

*Answer **only** five questions from this section.*

17. A tower is on a bearing of 030º from a point P and a distance of 100m.From P, the angle of elevation of the top of the tower is 15º and the angle of depression of the foot of the tower is 1º.

a). Calculate the height of the tower. (4 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

b). A point Q is on the same horizontal plane as point P. The tower is on a bearing of 330° from Q and a distance of 70 m. Calculate:

i) The distance from P to Q. (3 marks)

ii) The bearing of P from Q. (3 marks)

18.a) The diagram below shows a bucket in the shape of a frustum of a cone with diameters 36 cm and 24 cm and a vertical height of 28 cm. The bucket contains water such that the diameter of the water surface is 30cm. Calculate the volume of the bucket.
(6 marks)

b) If the bucket above has a hole and 1.1 cm^3 of water leaks out every 5 seconds and collects in a cylindrical can of base radius and height 10 cm and 25 cm respectively. Calculate how long it takes to fill the cylindrical can. (4 marks)

19. A piece of wire, 18 cm long is cut into two parts. The first part is bent to form the four sides of a rectangle having length x cm and breath 1 cm.

a). State two expressions in terms of x only for the perimeter of the square and the rectangle. (2 marks)

b).If the sum of the areas of the square and the rectangle is A cm^2, show that $A = 16 - 3x + \frac{x^2}{4}$ (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

C). If A $= 8cm^2$, Solve the equation in (b) above for x, hence find the possible dimensions of the two pieces of wire. (6 marks)

20. The distance between two towns P and Q is 300 km. A bus started at P at 10.30 am and travelled towards town Q at 80 km/h. After 45 minutes a car started at Q and travelled to town P at x km/h. The car met the bus after 1hour 20 minutes.

a) Determine the value of x. (3 marks)

b) Find the distance from P where the car met the bus. (2 marks)

c) At what time did the car meet the bus? (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

d) If t a shuttle started at P, 1hour after the car left Q for P. Calculate the speed to the nearest km/h at which the shuttle should be driven in order to arrive at Q at the same time with the bus.   (3 marks)

21.a) Complete the table of values for the equation $y = x^2 + 3x - 6$, given that $-6 \leq x \leq 4$.   (2marks)

x	-6	-5	-4	-3	-2	-1	0	1	2	3	4
y	12						-6				22

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

(3 marks)

c) Using the graph drawn above Solve the equation

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

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

22. A Business man is paid a commission of 5% on sales of goods worth over ksh 100,000. He is paid a monthly salary of ksh 15,000 but 2% of his total earning is remitted as tax. In a certain month he sold goods worthy khs 500,000.

a) Calculate his monthly net earnings that month. (5marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

b) The following month, his monthly salary increased by 20%. His commission was increased to 10% but on goods worth over ksh 200,000. If his total earnings that month was ksh 64,800, Calculate the money received from the sale of goods.
(5marks)

23. The coordinates of two points A and B are (2, -3) and (-4, 5) and R is the mid-point of AB.

a) Determine the coordinates of R.   (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

b) Find the equation of a straight line joining A and B, expressing it in the form $y = mx + c$ where m and c are constants.   (3 marks)

c)   The straight line L_1 which is a perpendicular bisector of AB meets the X-axis at T. Find the coordinates of T.   (3 marks)

d) If the straight line L_1 is parallel to a line that passes through the point (-1, 6) and (a, 8), find a. (2 marks)

24. Two inlet taps P and Q opened at the same time can fill a tank in $2\frac{1}{2}$ h. The two taps were opened together at the same time and after 1 hour 10 minutes tap Q was closed and P continued alone and filled the tank after a further 4 hours. Find:

a) The fraction of the tank filled by both taps for 1 hour.   (1 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

b) The fraction of the tank filled by tap P after Q was closed. (2 marks)

c) The time which each tap working alone would have taken to fill the tank. (7 marks)

MATHEMATICS PAPER1

TEST PAPER 4 2023

NAME OF SCHOOL……………………………………………………………………………..

CANDIDATE NAME …………………………………………………ADM……………..

CANDIDATE SIGNATURE…………………………………………INDEX NO…………….

DATE……………………………….. STREAM …………………………………………….

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

Instructions to Candidates

(**h**) Write your name and index number in the spaces provided below
(**i**) Sign and write the date of examination in the spaces provided above.
(**j**) The paper consists of **TWO** sections: **Section I** and **Section II**.
(**k**) Answer **ALL** questions in **Section I** and **ONLY** five from **Section II**.
(**l**) All answers and working must be written on the question paper in the spaces provided below each question.

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(f)Show all the steps in your calculations, giving your answers at each stage in the spaces   below each question

(m) Marks may be given for correct working even if the answer is wrong.

(g) Non – programmable silent calculators and KNEC Mathematical tables may be used except where stated otherwise.

(n) The paper consists 15 printed pages.

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   **GRANT TOTAL**

17	18	19	20	21	22	23	24	Total

SECTION 1 (50 MARKS)

Answer all the questions in the space provided below each question

1. Evaluate without using mathematical tables or calculator $\dfrac{-12 \div 4 - 6 \times 3 + 5 \times 2}{8 + (-5) \div 2 \times (-4)}$ (3marks)

2. A three-digit number is such that twice the hundreds digit is more than the tens digit by 2.the unit digit is thrice the hundred digit. When the digits are reversed, the number is

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

increased by 594.Find the number.
(4marks)

3. Simplify $\dfrac{x+4}{x-4} - \dfrac{5x+20}{x^2-16}$

(3marks)

4. The mass of maize flour to the nearest 10 grams is 8. 67kg.Determine the percentage error in this measurement.
(3marks)

5. Without using a calculator, solve for x in the equation $0.5^x \times 0.125^{1-x} = 32$.   (3marks)

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6. The velocity V m/s of a particle in motion is given by $V = 3t^2 - 2t + 5$. Calculate the distance travelled by the particle between t= 2 seconds and t = 6 seconds. (3 marks)

7. Given that, the coordinates of two points P and Q are $(2, \quad 3, \quad 5)$ and $(6, \quad k-1, \quad 15)$ respectively and that their position vectors are parallel, Calculate the value of $|PQ|$. (4marks)

8. A dealer sells a mobile phone at a profit of 25%. The customer sells it to a friend at ksh 60,000, making a profit of 20 %. Find the cost prize of the mobile phone. (3 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

9. A wall clock that gains 20 seconds after every hour was set to read the correct time on Tuesday at 03 25. Determine the time the wall clock will read on Thursday 03 25 h. (3 marks)

10. A cylinder of radius 15 cm and height 24 cm is filled with water. A solid hemisphere of radius 7cm is submerged into the cylinder and removed. Find the change in height of water level in the cylinder. (4 marks)

11. The average rate of depreciation in value of a laptop is 10% per annum. After three complete years its value was ksh 35,000. Determine its value at the start of the three-year period. (3marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

12. If $3x + 2y : 7x - y = 3:2,$ $calculate$ the $ratio$ $x:y$
(3marks)

13. State the inequalities that satisfy the region defined by R. (3marks)

14. Solve for θ in the equation $\frac{\sin(2\theta+30)°}{\cos(3\theta-40)°} = tan45°$ (3marks)

15. The figure below shows a circle PQRS Centre O with SR produced to T.PQ//SR and $\angle QSR = 55°$.Calculate the size of $\angle QRT$. (3 marks)

16. The scale of a map is 1: 200.Calculate the actual area of a triangular coffee field whose sides are 6cm, 8cm and 10cm on the map. (3 marks)

SECTION 11 (50 MARKS)

*Answer **only** five questions from this section.*

17. A tower is on a bearing of 030º from a point P and a distance of 100m.From P, the angle of elevation of the top of the tower is 15º and the angle of depression of the foot of the tower is 1º.

a). Calculate the height of the tower. (4 marks)

b). A point Q is on the same horizontal plane as point P. The tower is on a bearing of 330ºfrom Q and a distance of 70 m. Calculate:

i) The distance from P to Q. (3 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

ii) The bearing of P from Q.   (3 marks)

18.a) The diagram below shows a bucket in the shape of a frustum of a cone with diameters 36 cm and 24 cm and a vertical height of 28 cm. The bucket contains water such that the diameter of the water surface is 30cm. Calculate the volume of the bucket.
(6 marks)

b) If the bucket above has a hole and 1.1 cm^3 of water leaks out every 5 seconds and collects in a cylindrical can of base radius and height 10 cm and 25 cm respectively. Calculate how long it takes to fill the cylindrical can. (4 marks)

19. A piece of wire, 18 cm long is cut into two parts. The first part is bent to form the four sides of a rectangle having length x cm and breath 1 cm.

a). State two expressions in terms of x only for the perimeter of the square and the rectangle. (2 marks)

b).If the sum of the areas of the square and the rectangle is A cm^2, show that $A = 16 - 3x + \frac{x^2}{4}$ (2 marks)

C). If $A = 8cm^2$, Solve the equation in (b) above for x, hence find the possible dimensions of the two pieces of wire. (6 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

20. The distance between two towns P and Q is 300 km. A bus started at P at 10.30 am and travelled towards town Q at 80 km/h. After 45 minutes a car started at Q and travelled to town P at x km/h. The car met the bus after 1hour 20 minutes.

a) Determine the value of x.   (3 marks)

b) Find the distance from P where the car met the bus.   (2 marks)

c) At what time did the car meet the bus?   (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

d) If t a shuttle started at P, 1hour after the car left Q for P. Calculate the speed to the nearest km/h at which the shuttle should be driven in order to arrive at Q at the same time with the bus.   (3 marks)

21.a) Complete the table of values for the equation $y = x^2 + 3x - 6$, given that $-6 \leq x \leq$ 4.   (2marks)

x	-6	-5	-4	-3	-2	-1	0	1	2	3	4
y	12						-6				22

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

(3 marks)

c) Using the graph drawn above Solve the equation

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

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

22. A Business man is paid a commission of 5% on sales of goods worth over ksh 100,000. He is paid a monthly salary of ksh 15,000 but 2% of his total earning is remitted as tax. In a certain month he sold goods worthy khs 500,000.

a) Calculate his monthly net earnings that month. (5marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

b) The following month, his monthly salary increased by 20%. His commission was increased to 10% but on goods worth over ksh 200,000. If his total earnings that month was ksh 64,800, Calculate the money received from the sale of goods.
(5marks)

23. The coordinates of two points A and B are (2, -3) and (-4, 5) and R is the mid-point of AB.

a) Determine the coordinates of R.   (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

b) Find the equation of a straight line joining A and B, expressing it in the form $y = mx + c$ where m and c are constants. (3 marks)

c) The straight line L_1 which is a perpendicular bisector of AB meets the X-axis at T. Find the coordinates of T. (3 marks)

d) If the straight line L_1 is parallel to a line that passes through the point (-1, 6) and (a, 8), find a. (2 marks)

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a) The fraction of the tank filled by both taps for 1 hour. (1 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

b) The fraction of the tank filled by tap P after Q was closed. (2 marks)

c) The time which each tap working alone would have taken to fill the tank. (7 marks)

MATHEMATICS PAPER 1

TEST PAPER 5 2023

NAME OF SCHOOL…………………………………………………………………………………………………..

CANDIDATES NAME …………………………………………………………………………….ADM……………………………

CANDIDATES SIGNATURE…………………………………………………………….INDEX NO………………………………

DATE……………………………………………………. STREAM…………………………………………………………………..

TIME 2HRS 30 MINS

Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES

1.   Write your name and index number in the space provided at the top of this page.

2.   The paper contains TWO sections; section I and section II

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

3.   Answer all the questions in section **I** and **ANY FIVE** questions from section **II**

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

5.   Marks may be given for correct working even if the answer is wrong.

6.   Non-programmable silent electronic calculators and KNEC mathematical tables maybe used.

For Examiners use only

Section 1

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

This paper consists of 16 printed pages

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

SECTION I (50 MARKS)

Answer all the questions in this section

1.   Use mathematical tables to evaluate; $\dfrac{2}{(3.432)^{\frac{1}{2}}} + \dfrac{4}{\sqrt{0.0684}}$

(3mks)

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2. A wholesaler sold a cell phone to a retailer making a profit of 20%. The retailer later sold the cell phone for Ksh.3120 making a profit of 30% calculate the amount of money the wholesaler had paid for the cell phone.
(3 mks)

3. A piece of plot in Gilgil 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. (3mks)

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

	Buying	Selling
1US Dollar	76.38	75.19
1UK pound	132.92	132.95

A tourist arrived in Kenya from Britain with 126,000 UK sterling pounds. He converted the pounds into Kenyan shillings. While in Kenya he spent $\frac{4}{5}$ of the money. He changed the balance to US dollars. Calculate to the nearest Dollar, the amount he received. (3 mks)

5. The figure below shows quadrilateral ABCD in which AB = 6cm. BC = $\frac{1}{2}$ CD, CD = DA and angle ADC = angle BCD = 90^0.
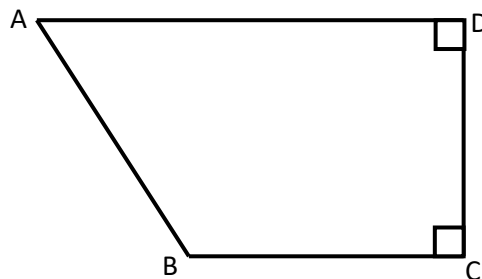
Calculate the area of the quadrilateral ABCD. (4 Mks)

6. The exterior angle of a regular polygon is (χ - 50)° and the interior angle is (2χ + 20)°. Find the number of sides of the polygon.   (3 mks)

7. simplify: $\frac{12x^2+ax-6a^2}{9x^2-4a^2}$ (3 mks)

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

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181
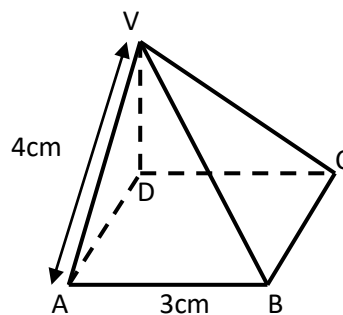
(a) Draw a labelled net of the pyramid.   (2 Mks)

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

9. The mass of two similar solids are 324g and 768g. Find
(a)   height of the smaller solid if the height of the bigger solid is 20cm.   (2 mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(b)   the surface area of the smaller solid if the surface area of the bigger solid is 40cm².
(2 mks)

10. State all the integral values which satisfy the inequality $\frac{3a + 2}{4} < \frac{2a + 3}{5} < \frac{4a + 15}{6}$ (3mks)

11. The length of a rectangle is (3x+1)cm, its width is 3cm shorter than its length. Given that the area of the rectangle is 28cm², find its length.   `
    (3marks)

12. The curved surface area of a cylindrical container is 1980cm^2.if the radius of the container is 21cm, calculate to one decimal place the capacity of the container. (take $\pi = \frac{22}{7}$)   (4 marks)

13. Using a ruler and a pair of compasses only, draw a line AB = 7cm long. Construct $< $ BAC = 67.5^0. Use line AC to divide AB into 3 equal parts.   (2 mks)

14. Given that Sin (x + 4^0) = Cos (3x)^0. Find tan (x + 40^0) to 4 s.f.   (3 mks)

15. Given that $log_{10}7 = 0.8451$ and $log_{10}6 = 0.7782.$ $find$ $log_{10}25.2$ (3 mks)

16. The position vector **OA** = - 3a *i* + b *j*, **OB** = 6a *i* + 4b *j* and **OC** = 15a *i* + 7b *j*, where a and b are scalars. Find in column form;

     (i) **AB** (1 mk)

     (ii) **AC** (1 mk)

Hence show that A,B and C are collinear. (1 mk)

SECTION II (50 MARKS)

Answer any five questions in this section

17. A straight line passes through the points (8, -2) and (4, -4)
    (b) Write its equation in the form ax + by + c = 0 where a, b and c are integers. (3 Mks)

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

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(d) 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 Mks)

(e) Find the length of QP   (2 Mks)

18. A group of people planned to contribute equally towards buying land at a price of Shs 180,000. However 3 members of the group withdrew from the project. As a result, each of the remaining members were to contribute KShs. 3000 more.

(a) Find the original number of members in the group.   (6 Mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

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

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

(2 Mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

19. a)   The figure below is a velocity time graph for a car.
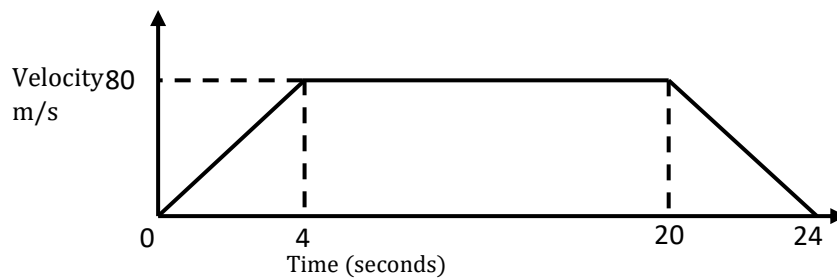
(i)   Find the total distance travelled by the car.   (2 Mks)

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

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

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

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

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

20. Triangle PQR has vertices at P (2,3), Q(1,2) and R(4,1), while triangle $P^IQ^IR^I$ has vertices P^I(-2,3),Q^I(-1,2), R^I(-4,1)
    (a) (i) Draw triangle PQR and $P^IQ^IR^I$ on the grid provided. (2 Mks)
        (ii) Describe fully a single transformation which maps triangle PQR onto triangle $P^IQ^IR^I$.
        (2 Mks)
    (b) (i) On the same grid, draw triangle $P^{II}Q^{II}R^{II}$ the image of PQR under a reflection on the line y + x = 0 (2 Mks)
        (ii) Describe fully a single transformation which maps triangle $P^{II}Q^{II}R^{II}$ onto triangle $P^IQ^IR^I$.

        (2 Mks)
    (c) On the same grid, draw triangle $P^{III}Q^{III}R^{III}$ the image of $P^{II}Q^{II}R^{II}$ under a reflection on the line x = 0 (2 Mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181
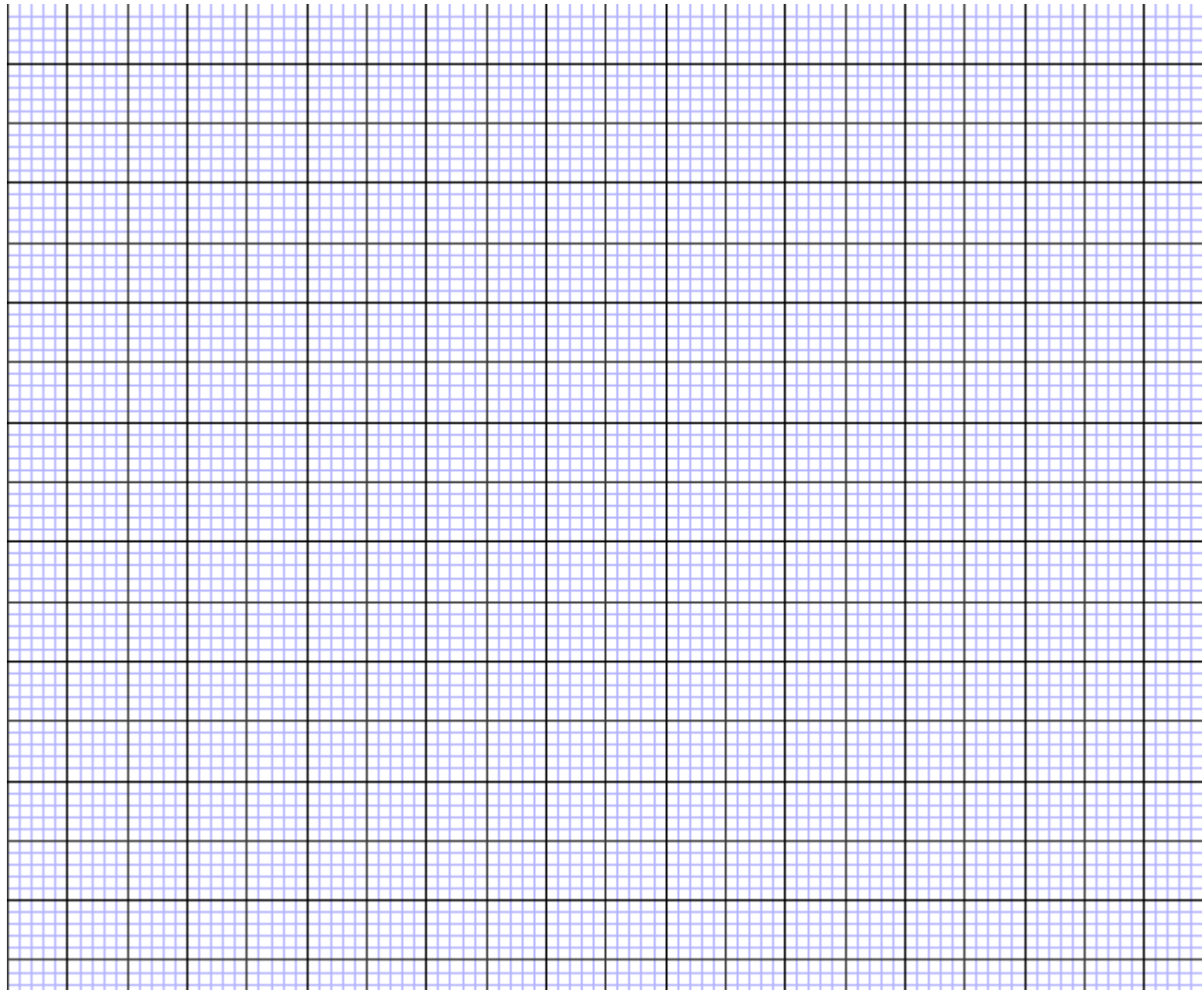
21. A trader bought 8 cows and 12 goats for a total of Ksh.294,000. If he had bought 1 more cow and 3 more goats he would have spend Ksh.337,500.
    (a) Form two equations to represent the above information.   (2 mks)

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

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(c) The trader sold the animals he had bought making a profit of 40% per low and 45% per goat.

(i) Calculate the total amount of money he received.   (2 mks)

(ii) Determine his profit in Kenya shillings.   (2 mks)

22. Three warships A,B and C are at the sea such that ship B is 500km on a bearing N30E from ship A. Ship C is 700km from ship B on a bearing of 120°.An enemy ship D is sighted 800km due south of ship B.
a) Taking a scale of 1cm to represent 100km, locate the positions of ships A, B, C and D.(4 mks)

b) Find the bearing of:

   i)   Ship A from D   (1 mk)

   ii) Ship D from C   (1 mk)

c) Use scale drawing to determine the distance between

   i)   D and A   (1 mk)

   ii) C and D.   (1 mk)

d) Measure angle DAC and angle BCD   (2 mks)

23. The figure below shows a tumbler with diameters 6cm and 10cm and height 15cm.

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181
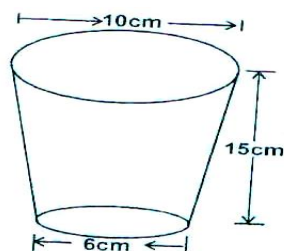
(e) If it is filled with water, what area is in contact with water? (7 Mks)

(f) Find the volume of the tumbler. (3 Mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

24. The following are masses of 25 people taken in a clinic.

20	35	29	45	60
66	56	29	48	37
59	64	24	28	32
35	45	48	52	55
54	55	36	39	35

(a) Using a class width of 8 and starting with the lowest mass of the people. Make a frequency distribution table for the data.
(3 Mks)

(b) Calculate the mean mass of the people. (2 Mks)

(c) On the grid provided, draw a histogram and a frequency polygonto represent the information.
(5 Mks)
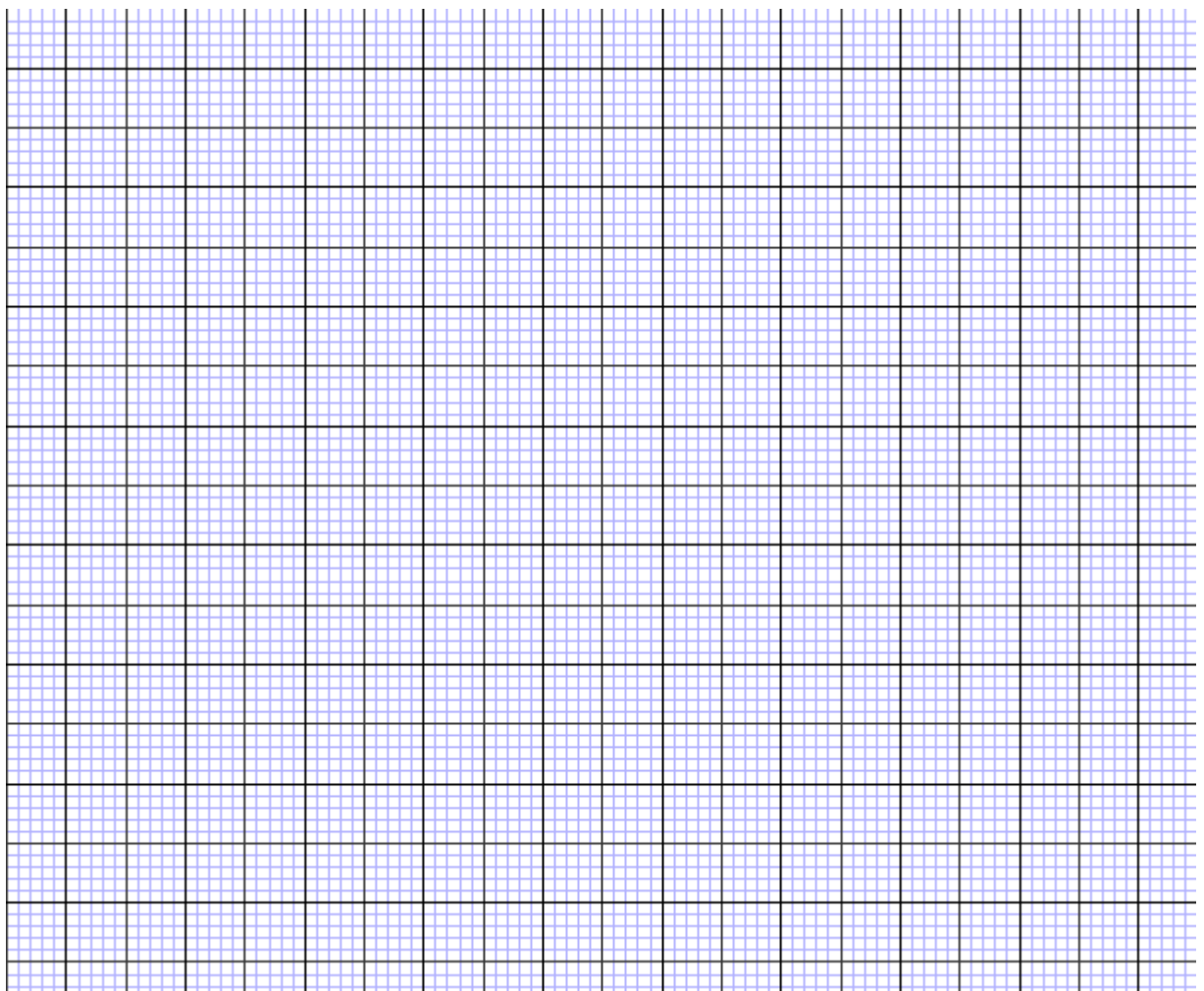
MATHEMATICS PP 1

TEST PAPER 6 2023

NAME OF SCHOOL...

CANDIDATES NAME...ADM..................

CANDIDATES SIGNATURE...INDEX NO ....

DATE..............................STREAM....................................TARGET................................

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

MATHEMATICS ALT. A

Paper 1

INSTRUCTION TO 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 16 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 USE

  SECTION I

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

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: (50MKS)

ATTEMPT ALL THE QUESTIONS FROM THIS SECTION

1. Without using a calculator or a mathematical table evaluate (3mks)

$$\frac{\dfrac{6}{7} \, of \, \dfrac{14}{3} \div 8 \times \dfrac{-2}{3}}{-2 \times 3 + (14 \div 7) \times -3}$$

2. In a disco hall, four lights signals are programmed at intervals of 8 seconds, 10 seconds, 12 seconds and 15 seconds. What is the earliest time they will give out light signals simultaneously if the last time they did this 1915 Hrs.

    (3mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

3. Simplify $\dfrac{12x^2 - 16x}{20 - 11x - 3x^2}$

(3mks)

4. The number of sides of two regular polygons differ by one. If the sum of the interior angles of these polygons is in the ratio 3:2 calculate the number of sides of each polygon and name them.

(4mks)

5. Under an enlargement scale factor -4 the image of point A(4,3) is A^1(-4,-5). Calculate the coordinates of the centre of enlargement.

(3mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

6. Given that $A + \begin{pmatrix} 2 & 0 \\ 1 & 3 \end{pmatrix} = \begin{pmatrix} 2 & 3 \\ 0 & 1 \end{pmatrix}$ find A^T the transpose of matrix A. (2 mks)

7. If $\dfrac{x^h}{y^{\frac{2}{3}}} \div \dfrac{y^k}{yx^3} = x^3 y^{-4}$, find h +k

(3mks)

8. The figure below shows a circle inscribed in a square. The length of the arc AB is $\dfrac{44}{7}\sqrt{7}$ cm.

Calculate the area of the shaded region. $\left(\pi = \dfrac{22}{7} \right)$.

(4mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181
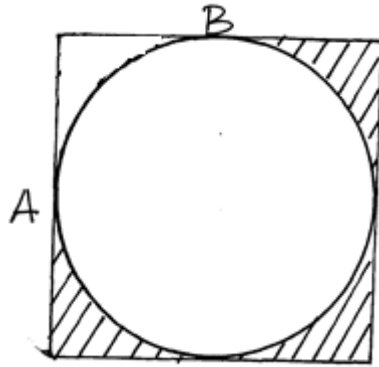
9.   Two students Paul and Omondi standing 10m apart on the same side of a tall building on a

   horizontal ground. Paul who is closer to the building sees the roof top at an angle of 70^0,

while   Omondi at an angle of 46.8^0, if the building, Paul and Omondi lies on a straight line, calculate

the   height of the building correct to 3 s.f.

   (4 mks)

10.   A trapezium was created by joining two similar triangles. What is the perimeter of the

   quadrilateral?

   (3mks)
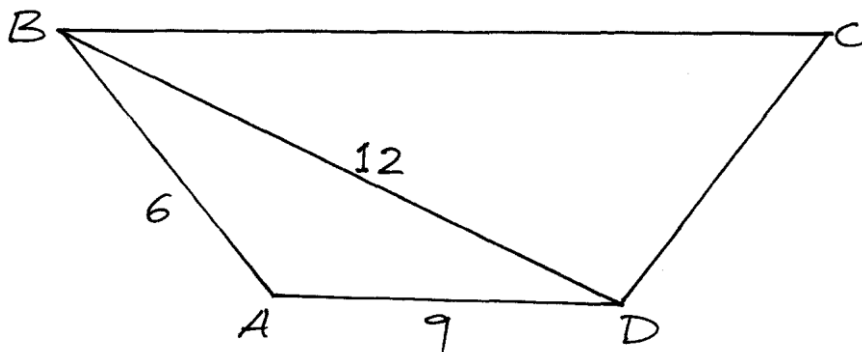
11.   Mr Wajakoya purchased animal feeds for his 10 cows which would last for 7 days. After feeding   his cows for 4 days, he sold 4 cows. How many more days will the feeds last the remaining cows.

                        (3mks)

12.   Use the tables of logarithms to evaluate.

        (4mks)

$$\left(\frac{6.79 \times 0.391}{\log 5} \right)^{\frac{-3}{4}}$$

13.   A pentagonal prism has each of its sides as 5cm and length 10cm. Find the volume of the prism.

        (3 mks)

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14.   Solve the following inequalities and state the integral solutions.

(3mks)

$$\frac{1}{2}(24 - 4x) > 6(3x - \frac{4}{3}) \geq -\frac{2}{3}(42 + 3x)$$

15.   When a shirt is sold at sh 126 a loss of x% is made. If the same shirt is sold at sh 154, a profit
of   x% is realized. Find the buying price of the shirt.

(3mks)

16.   Without using calculator or mathematical tables, find the value of x in sin60^0 = cos (3x-45)^0

given   that $0^0 \leq x \leq \frac{\pi^C}{2}$

(2mks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

<u>**SECTION II**</u>
<u>*ANSWER ANY FIVE QUESTIONS*</u>

17.   The figure below shows a line that passes through points P, Q and R. Given that its equation is $\dfrac{-7y}{30} + \dfrac{x}{10} = 1$ and that point Q is equidistant from x and y-axis
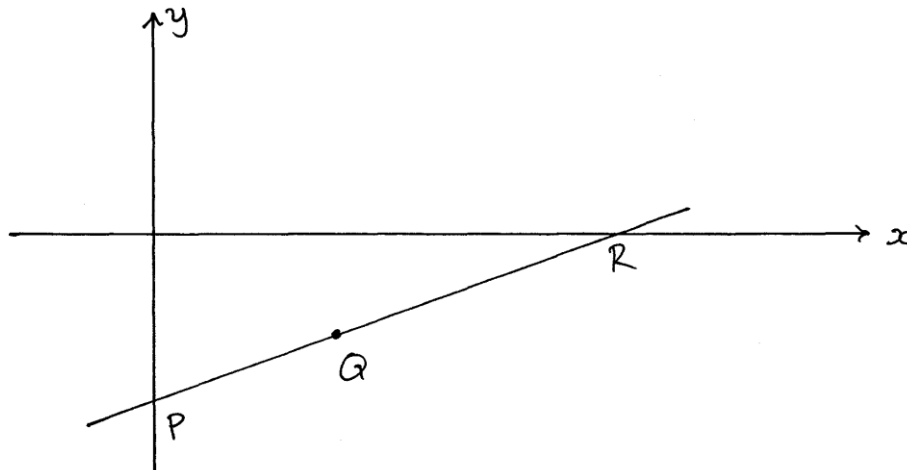
(a)   Calculate the co-ordinates of points Q.
(4mks)

(b)   Calculate the size of angle formed by the line and y-axis.
(3mks)

(c)   Find the equation of the perpendicular to the line through Q in the form of $\dfrac{x}{a} + \dfrac{y}{b} = 1$

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(3 mks)

18. The figure below shows a histogram of a certain data.
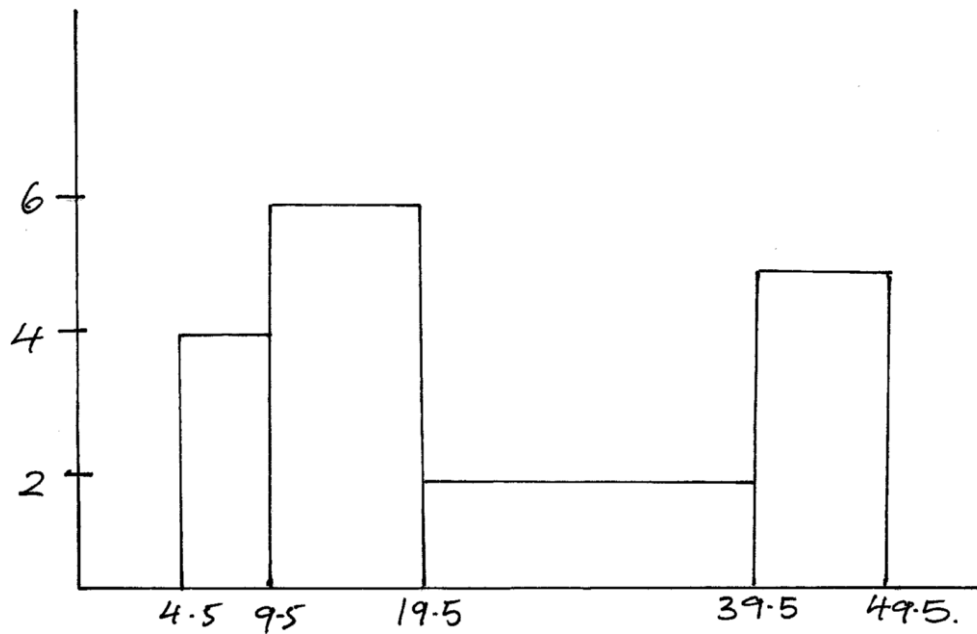
    (a)   Given that the frequency of the last class is 30, prepare frequency distribution table for the   data.
    (3mks)

    (b)   (i)   State the modal class.
    (1 mk)

        (ii)   Estimate the mean height
    (3mks)

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     (c)   Using a vertical line show where the median lies and state the median. (3mks)

19.   Towns A and B are 420km apart. Two Lorries departed from A at the same time travelling   towards B. Lorry X travelled at an average speed of 15km/h less than Y and reached 1 hour and   24 minutes later.
     (a)   Calculate the average speed of lorry Y. (5mks)

     (b)   How far was X from A when Y reached B. (2mks)

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(c)   A van left town B heading towards A at the time lorries X and Y left A. If the van   travelled at an average speed of 90km/h, how far from A did it meet Lorry Y.   (3mks)

20.   The vertices of a triangle PQR are P(0,0), Q(6,0) and R(2,4).
       (a)   Draw triangle PQR on the grid provided.
       (1mk)
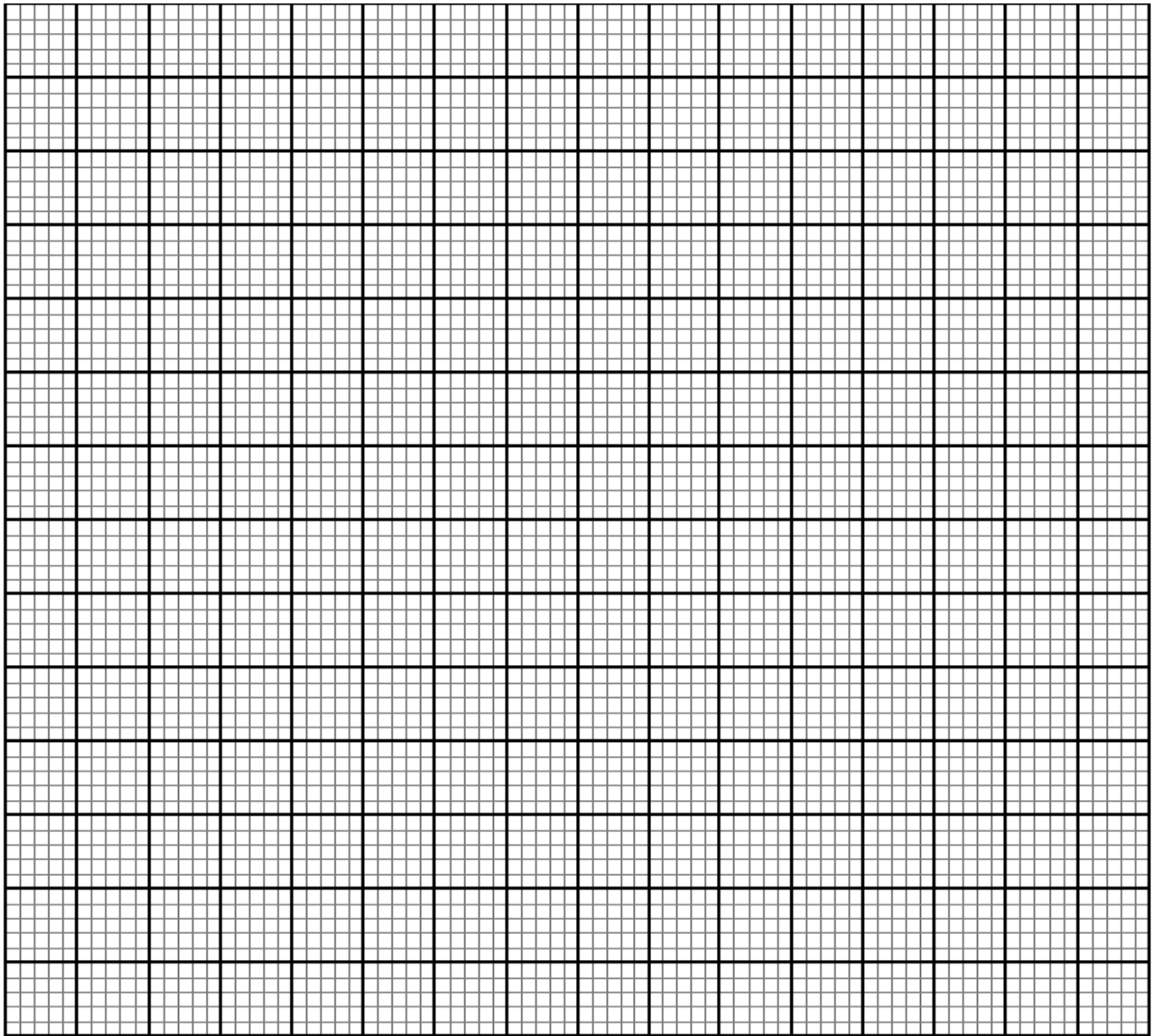
(b)   Triangle $P^1Q^1R^1$ is the image of triangle PQR under an enlargement scale factor $\dfrac{1}{2}$ and   centre (2,2), write down the co-ordinates of $P^1Q^1R^1$ and plot on the same grid. (3mks)

(c)   Draw triangle $P^{11}Q^{11}R^{11}$ the image of triangle $P^1Q^1R^1$ under a positive quarter turn   about point (1,1). State the co-ordinates of $P^{11}Q^{11}R^{11}$.
(3mks)

(d)   Draw triangle $P^{111}Q^{111}R^{111}$ the image of $P^{11}Q^{11}R^{11}$ under a reflection in the line y=1.
(2mks)

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(e)   State the type of congruence between triangle $P^1Q^1R^1$ and $P^{111}Q^{111}R^{111}$.
(1mk)

21.   The diagram below represents a solid consisting of a hemispherical bottom and a conical frustum   at the top. O_1O_2 =4cm, $O_2B=R=4.9$cm and $O_1A=r=2.1$cm.
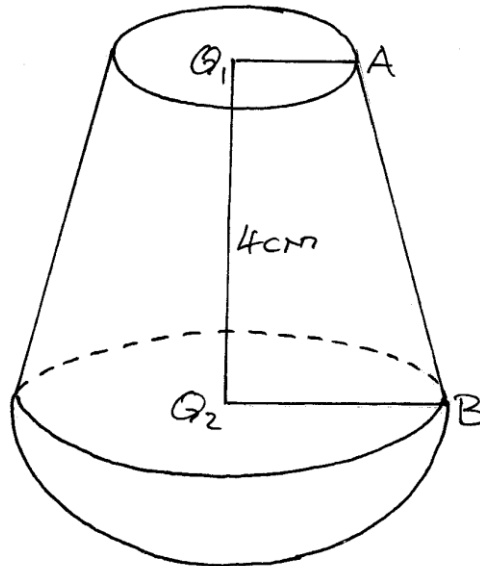
Calculate to 1 d.p,
(a)   The height of the chopped off cone and hence the height of the bigger cone.
(2mks)

(b)   The surface area of the solid.
(4mks)

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(c)   Calculate the volume of the solid.
(4mks)

22.   In the triangle below P and Q are points on OA and OB respectively such that
OP:PA=3:2 and   OQ:QB =1:2 AQ and PQ intersect at T. Given that OA= a and OB= b
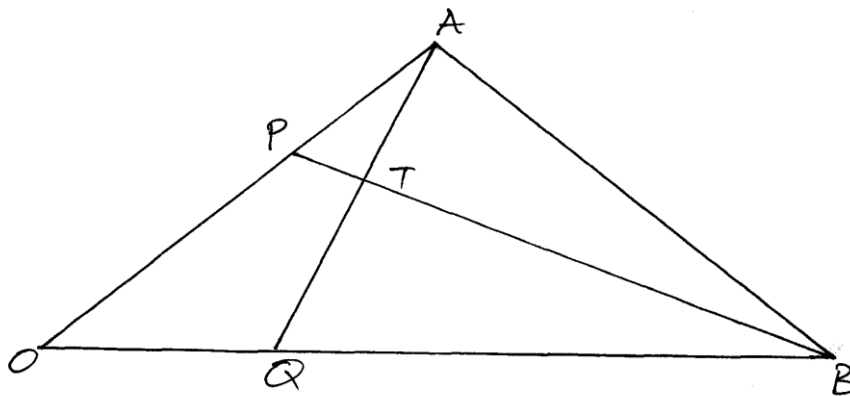
(a)   **Express AQ** and **PQ** in terms of a and b

(2mks)

(b)   Taking **BT**=k**BP** and **AT**=h**AQ** where h and k are real numbers.
     (i)   Find two expressions for **OT** in terms of a and b

(2mks)

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(ii)   Use the expressions in b(i) above to find the values of h and k.
(3mks)

(c)   Show that B, T and P are collinear.
(3mks)

23.   A ship leaves port M and sails on a bearing of 050^0 heading towards island L. Two navy   destroyers ships sail from a naval base N to intercept the ship. Destroyer A sails such that it   covers the shortest distance possible. Destroyer B sails on a bearing of 010^0 to L. The bearing of   N from M is 100^0 and distance NM=300km. Using a scale of 1cm represents 50km, determine;
(i)   The position of M, N and L.
(5 mks)

(ii)   The distance travelled by destroyer A.
(2mks)

(iii)   The distance travelled by destroyer B.
(2mks)

(iv)   The bearing of N from L.
(1mks)

24.   (a)   Determine the x and y-intercepts of the curve $y=(x-1)(x+3)^2$
(3mks)

(b)   Find the stationary points of the curve above and state their nature.
(4mks)

(c)   Sketch the curve.
(3mks)

THIS IS THE LAST PRINTED PAGE!

MATHEMATICS PAPER 1

TEST PAPER 7 2023

NAME OF SCHOOL..

CANDIDATES NAME ....ADM..........................

CANDIDATE SIGNATURE.. INDEX..

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

DATE……………………………….TARGET ………………………………STREAM…………………………

Kenya Certificate of Secondary Education
Paper 1
Time: 2 ½ Hours

INSTRUCTION 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 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 16 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 USE
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 QUESTIONS

1. Simplify (4mks)

$$\frac{2\frac{1}{4} - 1\frac{2}{3} - \frac{5}{8} \text{ of } 3}{\frac{1}{6} - \left(-\frac{1}{3}\right)^2}$$

2. Without using table or calculator evaluate. (3mks)

$$\sqrt[3]{\frac{1.90 \times 0.032 \times 0.08}{20 \times 0.0038}}$$

3. The sum of the interior angles of a regular polygon is 40 times the size of the exterior angle.
   Find the number of sides of the polygon. (3mks)

4. A farmer has a piece of land measuring 840M×396M. He divides it into square plots of equal size.
   Find the maximum area of one plot.
      (3mks)

5. A Kenyan business woman bought goods from Japan worth 2,950,000 yens. On arrival in Kenya the custom duty of 20%was charged on the value of goods. If the exchange rates were as follows:

   1 US dollar =118 yens
   1 US dollar = Sh76

   Calculate the duty paid in Kenya Shilling
         (3mks)

6. Determine the values of X that satisfy the inequalities and show the solution on a number line.
      (3mks)
               $-3 - x \leq \frac{1}{3} x - 5 > \frac{2}{3} x - 6$

7. Solve for x in $27^{(x+1)} - 3^{(3x+2)} - 400 = 86$
   (3mks)

8. A business man bought two bags of maize at the same price. On arrival at his business premises he discovered that one was of higher quality than the other. He sold the higher quality bag of maize at Sh. 1,040 and made a profit. He made a loss by selling the low quality bag of maize at Sh. 880. Given that the profit is three times the loss, calculate the buying price. (3mks)

9. The figure below shows triangle PQR in which PR=12cm. T is a point on PR such that TR=4cm. Line ST is parallel to QR.
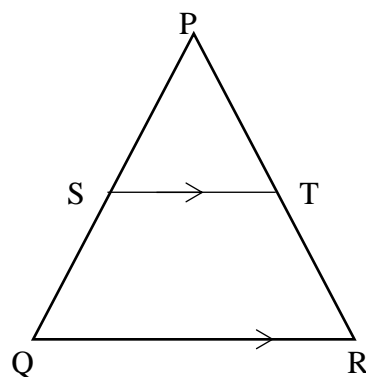
If the area of triangle PQR is 336 cm², find the area of the quadrilateral QRTS.
   (3mks)

10. Two buses A and B leaves the same station. Bus A heads due East while bus B heads due North. The North bound bus travelled at 10km/h faster than the East bound bus. After 5 hours the two busses were 250km apart. Calculate the speed of north bound bus.
(4mks)

11. Given that tan x = $\frac{12}{5}$, Find the value of
(3mks)

$\frac{\text{Sin x} + 2 \text{ Cos x}}{1 - \sin x}$, without using a calculator or mathematical table.

12. Use reciprocal tables to find the value of $\frac{1}{0.325}$

Hence evaluate $\searrow \dfrac{0.000125}{0.325}$
(3mks)

13. Simplify completely
(3mks)

$$\frac{2x^2-98}{3x^2-16x-35} \div \frac{x+7}{3x+5}$$

14. Fatuma is now three times as old as her brother and four times as old as her son. Eight years from now, Fatuma age will be twelve years more than the sum of the age of the brother and the son. Find Fatuma's present age.
(3mks)

15. Express $3.\dot{5}$ in the form of $a \frac{b}{c}$ where a, b and c are constants.
(3mks)

16. The diagram below shows a histogram showing marks scored in a certain test.
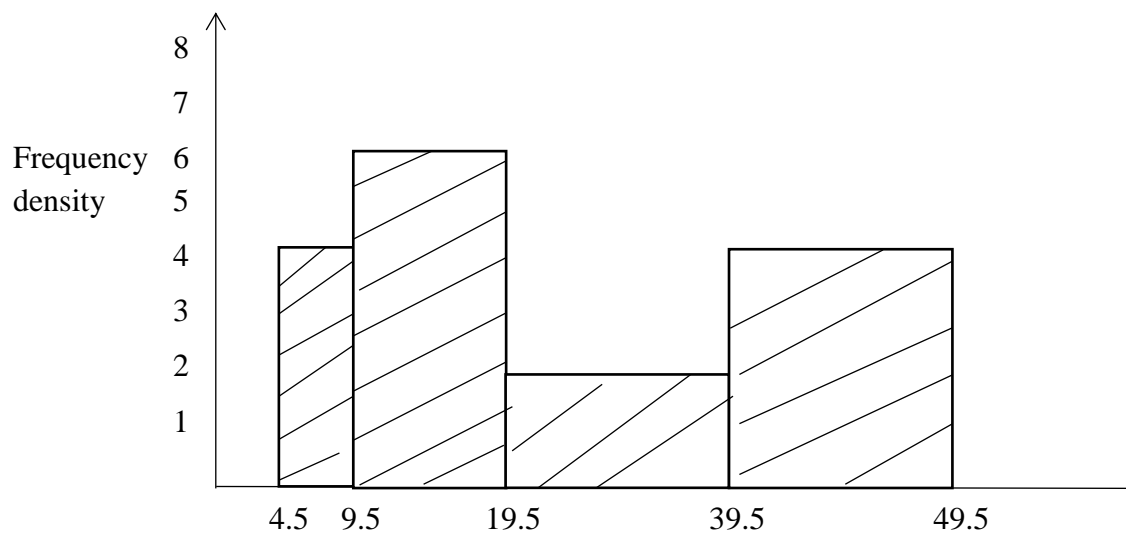
Develop a frequency distribution table for the data if the first class has a frequency of 8.
(3mks)

SECTION II (50 MARKS)
Answer any five questions from this section.

17. Co-ordinate's of point P and Q are (1,-2) and (3,10) respectively. Point T divides PQ in the ratio 1:1.

    (d) Determine the co-ordinates of T.
        (2mks)

    (e) (i) find the gradient of the perpendicular to PQ.
        (1mk)

    (ii) determine the equation of the line perpendicular to PQ and passing through T.

    (2mks)

(f) Given that the line in (ii) above cuts the Y-axis at point R, calculate the distance TR correct to 4 s.f.
(3mks)

(g) Given that point Q is the image of P under a translation, find the image of R under the same translation.
(2mks)

18. The model of tank consists of a conical top mounted on a cylindrical part and a bottom hemispherical part. The total height of the model is 15cm, the height of the cylindrical part is 8cm and the radii of hemisphere of the cone is 3cm. (use $\pi =3.142$)

(o) Calculate the surface area of ;
23. The conical part correct to (4 s.f) (2mks)

24. The cylindrical part correct to (2 d.p) (2mks)

25. The hemispherical bottom correct to (2 d.p) (2mks)

26.   Total surface area of the model   (1mk)

(p) The actual tank has a total height of 6M. find the total surface area of the actual tank.
       (3mks)

19. There are two sweets manufacturing factories A and B. factory A produces sweets with 60.5% sugar while factory B produces sweets with 80.5% sugar.

   (a) Determine the total mass of sugar in 80 kg of sweets from A and 40kg of sweets from B.
       (3mks)

   (b) 80 kg of sweets from A were crushed together with 40kg of sweets from B. find the percentage of sugar in the mixture correct to 2 d.p.
       (2mks)

(c) Type A sweets cost sh. 37 per kg while type B sweets cost sh. 55 per kg. in what ratio should they mix type A and type B in order to give a profit of 25% when sold at sh. 50 per kg.
(3mks)

(d) Find the profit realized after selling 20kg of the mixture.
(2mks)

20. The equation of a curve is $y=3x^3-4x^2+1$

Determine;

(g) The gradient function of the curve
(1mk)

(h) Find the gradient of the curve when X=1
(2mks)

(i) The equation of the tangent to the curve at the point. (2,3)
     (3mks)

(j) The angle which the targent to the curve at (2,3) makes with X-axis correct to 1
     d.p.
              (1mk)

(k) The equation of the line L which passes through the point (2,3) and is
     perpendicular to the targent.
                    (3mks)

21. Triangle ABC with vertices A(3,4) B(1,3) and C(2,1) has the image $A^1B^1C^1$ with vertices
    A^1 (-4,3)B^1 (-3,1) and C^1 (-1,2) under transformation T.

   23. Draw triangle ABC and$A^1B^1C^1$ on the same axes.
        (2mks)
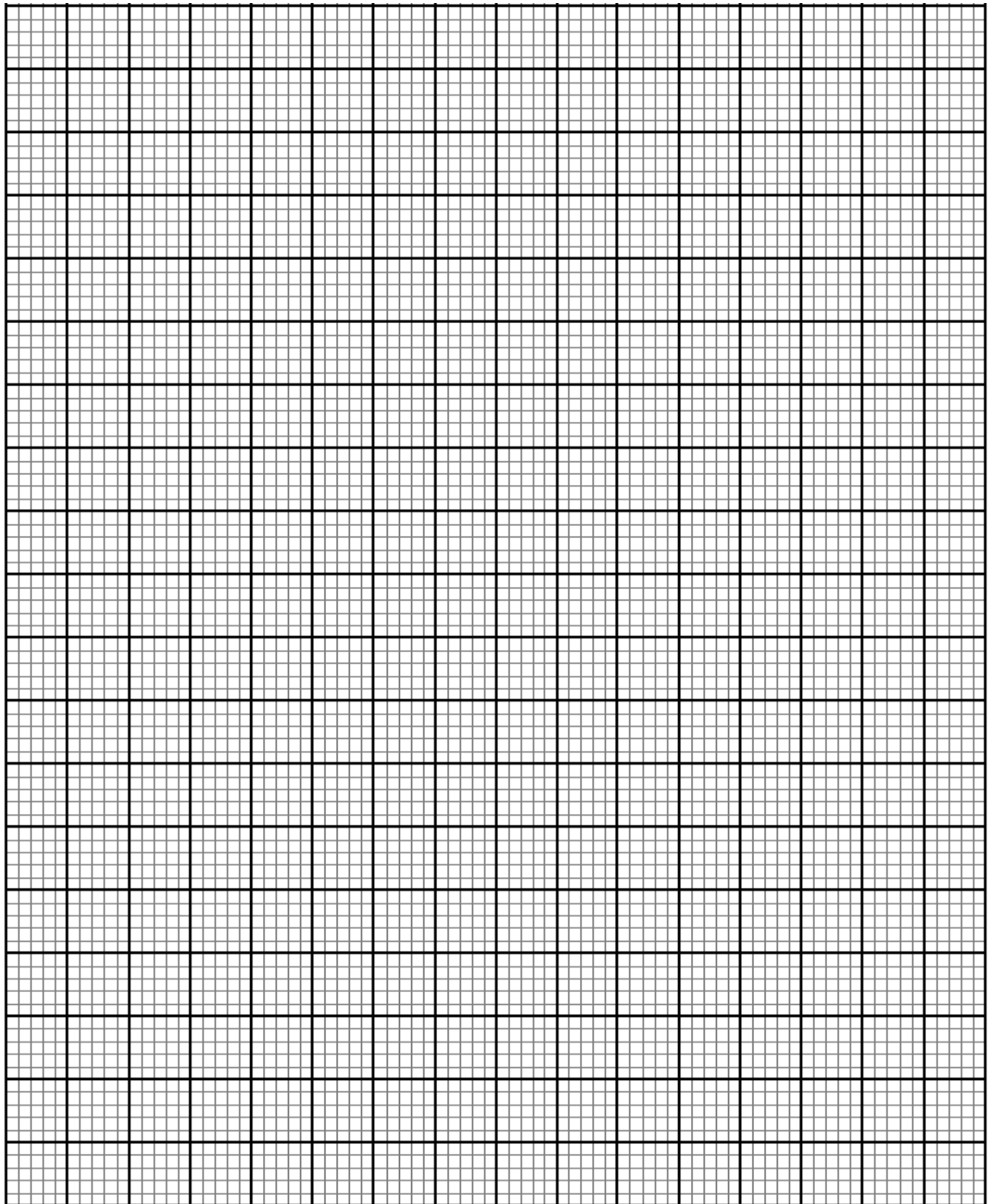
24. Describe transformation T fully.
    (2mks)

25. Draw triangle $A^{11}B^{11}C^{11}$ the image of $A^1B^1C^1$ under reflection in the line y=0.
    (2mks)

26. Describe a transformation that maps ABC into $A^{11}B^{11}C^{11}$.
    (2mks)

27. Identify two pairs of triangles which are oppositely congruent to each other.
    (2mks)

22. The diagram below shows two towers AB and CD on a level ground. P and Q are two points on a straight road BD.
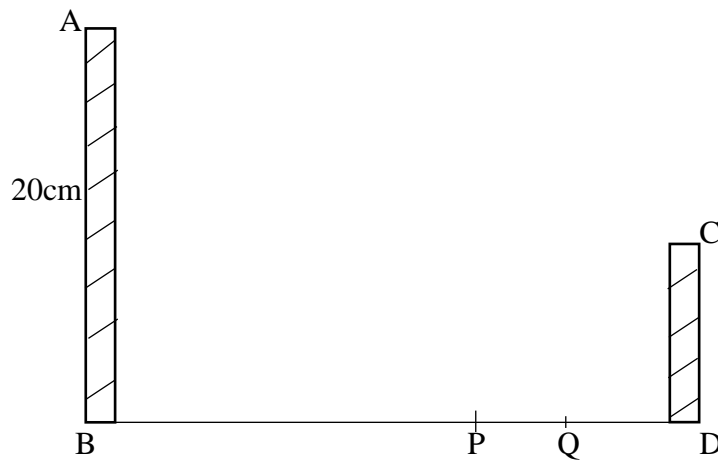
(a) A car moves from B towards D. At point p, the angle of elevation of point A was 11.3°. calculate the distance BP correct to 1dp.
(2mks)

(b) The car moving at 36km/h took 5 seconds to move from P to Q.
    25.   Calculate distance PQ.
                (1mk)

    26.   Calculate the angle of elevation of point A from Q correct to 1 d.p.
                (2mks)

(c) Given that QC=50.9M and BD = 200M
    (i)   Find the height CD correct to 2d.p.
                (2mks)

    (ii)   Find the angle of elevation of A from C.
                (3mks)

23. The table below shows height of 50 students.

Height (cm)	$140 \leq x < 145$	$145 \leq x < 150$	$150 \leq x < 155$	$155 \leq x < 160$	$160 \leq x < 165$
Frequency	3	15	19	X	2

(d) Find the value of x
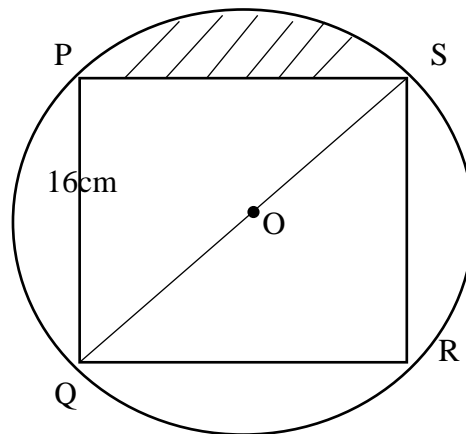(1mk)

(e) State the modal class
(1mk)

(f) State the modal frequency
(1mk)

(g) Estimate the mean height
(3mks)

(h) State the median class
(1mk)

    (i) Estimate the median height

          (3mks)

24. The figure below shows a circle centre O and radius 17cm. given that QS is the diameter and the rectangle PQRS is inscribed in the circle.

    (d) Calculate length PS

          (3mks)

    (e) Calculate angle POS correct to 1 d.p.

          (3mks)

(f) Calculate the area of the shaded part.
         (4mks)

MATHEMATICS PP1

TEST PAPER 8 2023

NAME OF SCHOOL..

CANDIDATE NAME.. ADM..................

CANDIDATE SIGNATURE.. STREAM.............................

DATE..TARGET...........................INDEX.....................

Instructions to Students

(j) Write your name and Admission number in the spaces provided above.
(k) Sign and write the date of examination in the spaces provided above.
*(l) This paper consists of **two** sections: **Section 1 and section II.***
*(m) Answer **ALL** question in section I and **only five questions** from section II.*
(n) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
(o) Marks may be given for correct working even if the answer is wrong.
(p) Non-programmable silent electronic calculators and KNEC mathematics tables may be used, except where stated otherwise.

For Examiner's Use Only

Section I

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

Section II

17	18	19	20	21	22	23	24	Total				

									Grand Total	

SECTION I

(h) Without using a calculator evaluate: (3Mks)

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

(i) A forex bureau in Nairobi Kenya buys and sells foreigh currency at rates shown below.

	Buying in Ksh.	Selling in Ksh.
Euro	129.80	131.60
UAN Dirhams	28.40	29.80

A Belgian tourist arrived in Nairobi, Kenya with 5000Euros. She converted the whole amount to local currency. While in Kenya she spent Ksh.321200 and changed to UAE Dirhams before leaving for Dubai. Calculate the amount in UAE Dirhams that she received. (3Mks)

(j) Solve the following linear inequalities and represent the solution on a number line. (3Mks)

$3x + 1 \geq 10$
$2(x-1)$ $8x - 32$

(k) Without mathematical tables or a calculator, evaluate   (3Mks)

$27^{2/3} \times (81/16)^{-1/4}$

(l) The mass of a solid cone of radius 14cm and height 18cm is 4.62kg. Find its density in g/cm^3 (Take π = 22/7.   (3Mks)

(m) Two similar solids have masses of 80kg and 270kg. Find the area of the larger solid if the smaller solid has a surface area of $48cm^2$.   (3Mks)

(n) Simplify
$$\frac{3x^2 - 2xy - y^2}{9x^2 - y^2}$$ (3Mks)

(o) Use the prime factors of 1764 and 2744 to evaluate (3Mks)

$$\frac{\sqrt{1765}}{\sqrt[3]{2744}}$$

(p) The sum of interior angles of a regular polygon is 1800. Find the size of each exterior angle.
(3Mks)

(q) The line y=mx+6 makes an angle of 75°58' with X-axis. Find the coordinates of the point where the line cuts the x-axis.
(3Mks)

(r) A two digit number is made by combining any 2 of the digits 1,3,5,7,9 at random.
 (a) Make an array of possible combination.
        (2Mks)

 (b) Find the probability that the number is a prime number.
     (2Mks)

(s) Under enlargement, the images of points A(3,1) and B(1,2) are A'(3,7) and B'(7,5).
     Without construction, find the centre and the scale factor of enlargement.
     (4Mks)

(t) Using a ruler and a pair of compasses only,
     (d) Construct triangle <BAC in which BC=8cm, angle ABC=112½° and BAC =45°

        (2Mks)

(e) Drop a perpendicular from A to meet CB produced at P, hence find the area of triangle ABC.
(2Mks)

(u) Use logarithms to evaluate
(4Mks)

$$\frac{\sqrt[3]{\log 45.08}}{45.73 \times 0.56}$$

(v) Given that x is an acute angle and cos x⁰ = $\frac{2}{5}\sqrt{5}$,find without using mathematical tables or a calculator, tan (90-x)⁰.

$\frac{2}{5}\sqrt{5}$ (2Mks)

(w) Given that OA=2i+3j and OB=3i-2j, find the magnitude of AB to one decimal place.

(2Mks)

SECTION II   (50 MARKS)

(x) Given that $y=7-3x-2x^2$ for $-4≤x≤3$

(q) Complete the table below   (2Mks)

X	-4	-3	-2	-1	0	1	2	3
Y	7	7		7	7	7		7
-2x	12	9		3	-0	-3		-9
$-2x^2$	-32	-18		-2	0	-2		-18
Y	-13	-2		8	7	2		-20

(r) Draw the graph $y = 7-3x – 2x^2$ for $-4≤x ≤3$ (3Mks)

(c) Use the graph to find the roots of the equation.

(l) $-2x^2 - 3x + 7 = 0$ (2Mks)

ANESTAR SCHOOLS   MATHEMATICS PAPER 1 QUESTION PAPER   LANJET 2022   Page

(m) $-2x^2 - 4x + 9 = 0$
(3Mks)

(y) A class of 36 students sat for a mathematics test which was marked out of 100 with individual marks shown below.

46 20 51 76 36 41 25 40 48
65 64 28 59 32 72 72 58 64
75 76 54 68 75 61 52 86 58
36 33 72 29 59 35 91 64 75

(f) Draw a frequency distribution table starting with 20 – 29 class   (3Mks)

(s) State the modal class   (1Mk)

(c) Calculate the mean mark for the students.   (3Mks)

(d) Calculate the median mark   (3Mks)

(z) Kimaeti is a town centre 600km from Nairobi city. A bus starts from Nairobi for Kimaeti at 7.00am at an average speed of 80km/h. At 8.30am a car started from Nairobi to Kimaeti and moved at an average speed of 120km/hr using the same route. Calculate;

   (i)   The distance covered by the bus before the car started its journey.

       (3Mks)

   (ii)   The relative speed for the two vehicles.
       (2Mks)

   (iii)   The time the car overtook the bus: (1Mk)

   (iv)   Distance covered by the car before overtaking the bus.   (2Mks)

(v)   Distance from Kimaeti to the car at the time the car was overtaking the bus.

(aa) (a) Given that A =(3   x) and B = (1   2)
                    X+1 2   3   0

Find the values of x for which AB is singular matrix.
(4Mks)

(b) Siboti bought 3 exercise books and 5 pens for a total of Ksh. 165. If Siboti had bought   2 exercise books and 4 pens, he would have spent Ksh. 45 less. Taking x to represent   the price of an exercise book and y to represent the price of a pen.

(i) form two equations to represent the above information
(1Mk)

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

(iii)   A teacher of a class of 36 students bought 2 exercise books and 1 pen for each

student. Calculate the total amount of money the teacher paid for the books and
pens.
(2Mks)

(bb) The figure below shows a stump of wood of height 16cm. The bottom and top radii are 10.5cm and 7cm respectively.
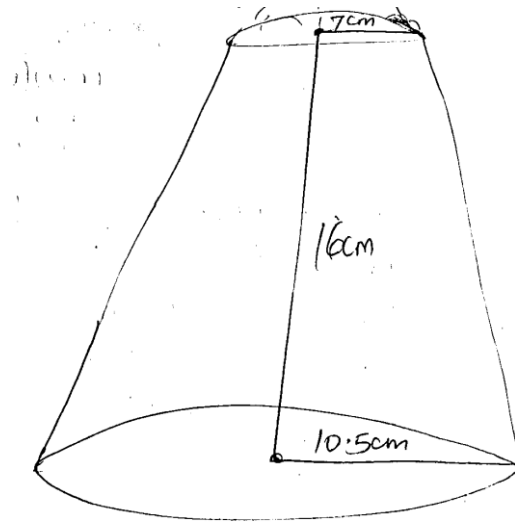
Calculate:

(i)   The slant height of the smaller cone that was cut off to form the stump.

        (2Mks)

(ii)   The curved surface area of the stump.   (4Mks)

(iii)   The volume of the stump.
        (4Mks)

(cc) A particle moves a long straight line such that its displacement S metres from a given point is $S = 2t^3 - 4t^2 + 2t + 6$ where t is time in seconds. Find;

(e) The displacement of the particle at t=3. (2Mks)

(f) The velocity of the particle when t =5 (3Mks)

(c) The values of t when the particle is momentarily at rest. (3Mks)

d) The acceleration of the particle when t = 2. (2Mks)

(dd) (a) Complete the table below for the function $y = x^2 - 3x + 6$ in the range $-2 \leq x \leq 8$. ($y = x^2 - 3x + 6$)

X	-2	-1	0	1	2	3	4	5	6	7	8
Y											

(b)Use the trapezium rule with 10 steps to estimate the area bounded by the curve, $y = x^2 - 3x + 6$, the lines x=-2, x=8, and the x-axis.
(3Mks)

c) Use the mid-ordinate rule with 5 strips to estimate the area bounded by the curve, $y = x^2 - 3x + 6$, the lines x=-2, x=8, and the x-axis.
(2Mks)

d) By integration, determine the actual area bounded by the curve

$y = x^2 - 3x + 6$, the lines x = -2, x = 8, and x – axis. (3Mks)

(ee)A safari rally competition has four check points A, B, C and D. Check point B is on a bearing of N 75°E from check point A at a distance of 34km. Check point C is on a bearing of 570°E from check point B at a distance of 20km. Check point A is on a bearing of 330° from Check point D and Check point C is on a bearing N40^{o}E of D. Using a scale of 1:500,000.
  (iii) Find the relative position of A, B, C and D. (5Mks)

(iv) Find the distance of;

    (g)   D from A   (1Mk)

    (h)   C from D   (1Mk)

c) Determine;

(i) The compass bearing of A from D   (2Mks)

(ii)The true bearing of D from B.   (1mk)

MATHEMATICS PAPER 1

TEST PAPER 9 2023

NANE OF SCHOOL……

CANDIDATE NAME…………………………………………………………………………ADM…………………….

DATE ……………………………………………………………INDEX…………………………………………………..

SIGNATURE…………………………………………….TATGET…………………………..STREAM……………………….

121/1

Kenya Certificate of Secondary Education

TIME: 2½ HOURS

INSTRUCTION TO CANDIDATE'S:

(a) Write your name, index number and school in the spaces provided at the top of this page.

(b) Sign and write the date of examination in spaces provided above.

(c) This paper consists of **TWO** sections: **Section I** and **Section II**.

(d) Answer **ALL** the questions in **Section I** and any **five** questions from Section **II**.

(e) **Show all the steps in your calculation, 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) **This paper consists of 16 printed pages.**

(i) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing. *(j)* **Candidates should answer the questions in English**.

FOR EXAMINER'S USE ONLY:

SECTION I

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

SECTION II

17	18	19	20	21	22	23	24	TOTAL

Grand Total

SECTION I: (50 MARKS)

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

1. Two signals have been set to flash at interval of 15 minutes, 24 minutes if they flash at 8.13am

When will they flash together again? (2 marks)

2. Solve for **m** in the equation: (3 marks)

$$3^{4(m+1)} + 3^{4m} = 246$$

3. Use tables of cubes, cube roots and reciprocals to find the value of;

$$\frac{4}{(8.63)^3} + \left(\frac{5}{34.46}\right)^{\frac{1}{3}}$$

4.   Evaluate:
            (3 marks)

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

5.   If tan X = $^4/_3$, find the value of $\sin^2 X + \cos X$ without using tables or calculator.   (3marks)

6.   Triangle $A^1B^1C^1$ is the image of triangle ABC under the transformation represented by the matrix $\begin{pmatrix} 3 & 1 \\ 5 & 4 \end{pmatrix}$.

If the area of triangle $A^1B^1C^1$ is 140cm^2, find the area of triangle ABC.   (3 **marks**)

7.   Use the exchange rates below to answer this question

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

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 ¾ 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.
                                                (3mks)

8. Convert 0.123into a fraction. (3 marks)

9. A train moving at an average speed of 72km/hr. takes 15 seconds to complete cross a bridge that is 80m long.Find the length of the train.
(3 marks)

10. The interior angle of a regular polygon is 6½ times the exterior angle. How many sides does the
polygon have? (3 marks)

11.   Simplify:

$$\frac{3a^2 - 48}{48 - 24a - 3a^2}$$ (3 marks)

12.   A solid metal cuboid 1.5m long, 0.4m wide and 0.25m high is made of material of density 7.5g/cm³.
   Calculate its mass in kg.   (3 marks)

13.   Find the equation of a straight line which is equidistant from the points A (2, 3) and B (6, 1).

Express your answer in the form $\dfrac{x}{a} + \dfrac{y}{b} = 1$ where a and b are constant.
(3marks)

14.   Ruto is $2\frac{1}{4}$ times as old as his son. Five years ago, the ratio of their ages was 8:3. What will be their ages 6 years from now?   (4 marks)

15. Two similar cylinders have diameter of 7cm and 21cm. If the larger cylinder has a mass of 6237g.
    Find the mass of the smaller cylinders. (4 marks)

16. Find the inequalities that define the region R shown in the figure below. (3 marks)
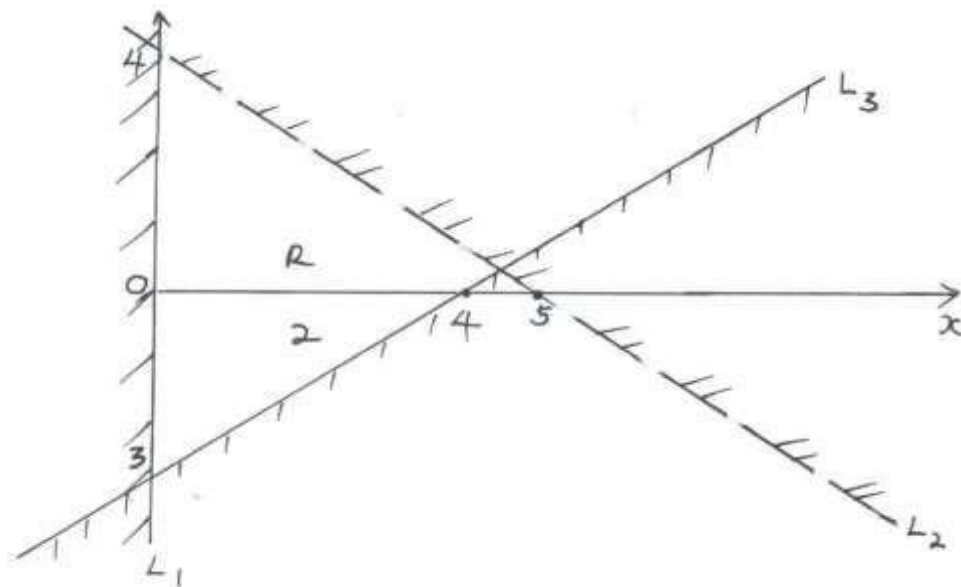
SECTION B: (50 MARKS)

Answer any FIVE questions from this section.

17.   Samatha and Meshi entered into a business partnership in which they contributed Kshs.

120,000 and Kshs. 150,000 every year respectively. After one year Fuki joined the business

and contributed Kshs.

90,000

a)   Calculate the ratio of their investment after 3 years of business
(3mks)

b)   It was agreed that 30% of the profits after 3 years be used to cater for the cost of running the business, while the remaining would be shared proportionally. Calculate each person's share if
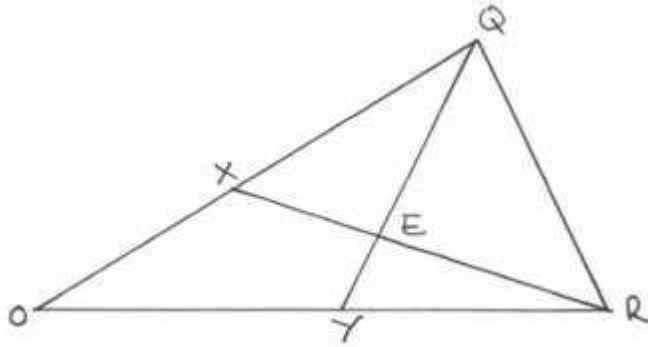
the profit made after three years was Kshs, 187,000.

(4mks)

c)   If each of them invested their shares in the business, find their new individual investments at the beginning of the fourth year.

(3mks)

18.   In the figure below OQ = q and OR = r. Point X divides OQ in the ratio 1:2 and Y divides OR in the ratio 3:4. Lines XR and YQ intersect at E.

a)   Express in terms of q and r.

(i)   XR.

(1 mark)

       (ii)   YQ.

                        (1 mark)

b)   If XE = mXR and YE = nYQ, express OE in terms of

       (i)   r, q and m.

                            (1 mark)

       (ii)   r, q and n.

                  (1 mark)

c)   Using the results in (b) above, find the values of m and n.

           (6 marks)

19.   A car accelerates from rest for 10seconds until it reaches a velocity of 12meters per second. It then continues at this velocity for the next 40 seconds after which it breaks are applied and it comes to rest at a constant retardation of 1.5meters per second squared.

a) Determine

    i)   The acceleration over the first 10seconds

                      (2mks)

    ii)   The time taken during the retardation

                      (2mks)

b) Draw the velocity time graph for the journey and use it to determine

    i)   The total distance covered by the car
(4mks)

ii)   The percentage of the total distance which was covered during the first 15 seconds.

        (2mks)

20. (a) Complete the table given below for the equation $y = -2x^2 + 3x + 3$ for the range $-2 \leq x \leq 3.5$

     by filling in the blank spaces.   (2 marks)

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3	3.5
y		-6		1						-2		-11

   (b) Use the values from the table above to draw the graph of $y = -2x^2 + 3x + 3$.   (3 marks)

   (c) Use your graph to:

   (i) determine the integral values of x in the graphs range which satisfy the inequality

   $2x^2 - 3x - 3 \leq 3$.   (3 marks)

   (ii) Solve $-2x^2 + 2x + 5 = 0$.   (2 marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

21.   A sector of a circle of radius 40cm subtends an angle of 26º at the centre of the circle.

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

(a)   Calculate
       (i)   The area of the sector.   (2 marks)

       (ii)   The length of the arc.   (2 marks)

(b)   The sector is folded to form an inverted right cone. Calculate
       (i)   The base radius of the cone.   (2 marks)

      (ii)   To one decimal place, the vertical height of the cone.   (2 marks)

(c)   Calculate the capacity of the cone in litres.   (2 marks)

22.   The table below shows marks obtained by 100 candidates at Eastside High School in a Biology examination.

Marks	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75 - 84	85 - 94
Frequency	6	14	24	14	$\square$	10	6	4

(a)   Determine the value of $\square$.
        (2 marks)

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

(c)   Calculate the median mark.
            (4 marks)

(d)   Calculate the mean mark.
            (3 marks)

23.   A straight line passes through 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)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

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 co-ordinates of point Q.   (3 marks)

d)   Find the length of QP.
         (2 marks)

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.

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

(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)

MATHEMATICS PAPER 1

TEST PAPER 10 2023

NAME OF SCHOOL …………………………………………………………………………..

CANDIDATE NAME…………………………………………………..ADM …………………

SIGNATURE………………………STREAM……………………….. INDEX……………..

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

DATE…………………………………..TARGET…………………………………

Kenya certificate of secondary education (KCSE

Instructions to candidates
  (c) *Write your name, admission number and class in the spaces provided above.*
  (d) *Sign and write the date of examination in the spaces provided above.*
  (f) *You are reminded of the necessity of* **orderly presentation** *in your answers.*
  (e) *The paper contains* **TWO** *sections:* **Section I** *and* **Section II.**
  (f) *Answer* **ALL** *the questions in* **Section I** *and any* **five** *questions from* **Section II**
  (g) *All answers and working must be written on the question paper in the spaces provided below each question.*
  (g) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
  (h) *Marks may be given for correct working even if the answer is wrong.*
  (i) *Non – programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.*

For Examiner's use only.

Section I

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

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

SECTION I (50 MARKS)

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

1. An aircraft Company bought eight aircrafts for eighteen billion, nine hundred and seventy-five million, twenty-eight thousand, two hundred and forty.
    (a) Write the total cost of the eight aircrafts in figures.   (1mark)

    (b) Calculate the cost of each aircraft.   (2marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

2. Solve for x in the equation $\frac{3}{x+1} + \frac{2}{x+5} = \frac{1}{x-2}$ (4mks)

3. (a)The number 16200 is given as $2^x \times 3^y \times 5^z$. Find the value of $x + y + z$ (1mark)

(b). When another number N is multiplied by 16200, a perfect cube is obtained. Find the least value of N (2marks)

4. Given that sin $\propto° = \frac{1}{\sqrt{5}}$ where a is an acute angle find, without using Mathematical tables

(a) Cos $\propto°$ in the form of $a\sqrt{b}$, where a and b are rational numbers (2marks)

(b) $Tan\ (90-\propto)°$ 2marks

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181

5. The area of a rhombus is 60 cm^2. If the shorter diagonal is 8 cm. Find the perimeter of the rhombus. (4 marks)

6. A 63kg metal of density 7,000 kg/m^3 is moulded into a rectangular pipe with external dimensions of 12cm by 15cm and internal dimensions of 10cm by 12cm. Calculate the length of the pipe in meters.
   (3marks)

7. The position vectors of the points P, Q and R are $\begin{pmatrix} -3 \\ -1 \end{pmatrix}, \begin{pmatrix} \frac{1}{2} \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ respectively. Show that P, Q and R are collinear (3marks)

8. In the triangle ABD, BA is parallel, to CE, given that BA= 18cm, CE = 8cm and AE = 6cm,

find the length of DE (3marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181
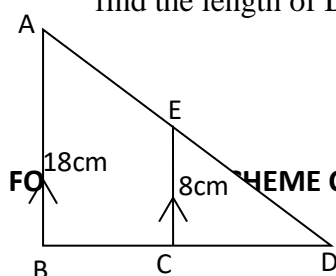
9. Given the equation $\frac{9^{4x}}{3^{2x}} = \frac{1}{9^{-4}}$, solve for x to its simplest form. (3 marks)

(c) A Kenyan company received M US Dollars. The money was converted into Kenyan shillings in a bank which buys and sells foreign currencies.

	Buying (in Ksh.)	Selling (in Ksh.)
1Sterling Pound	145.78	146.64
` US Dollar	110.66	110.86

If the company received Ksh. 15,132, 000, calculate the amount M, received in US Dollars.
(2marks)

11. Two interior angles of an irregular n sided polygon is 117 each. The remaining exterior angles are 39^0 each. Calculate the number of sides of the polygon (3marks)

12. Determine the inequalities that represent and satisfies the unshaded region
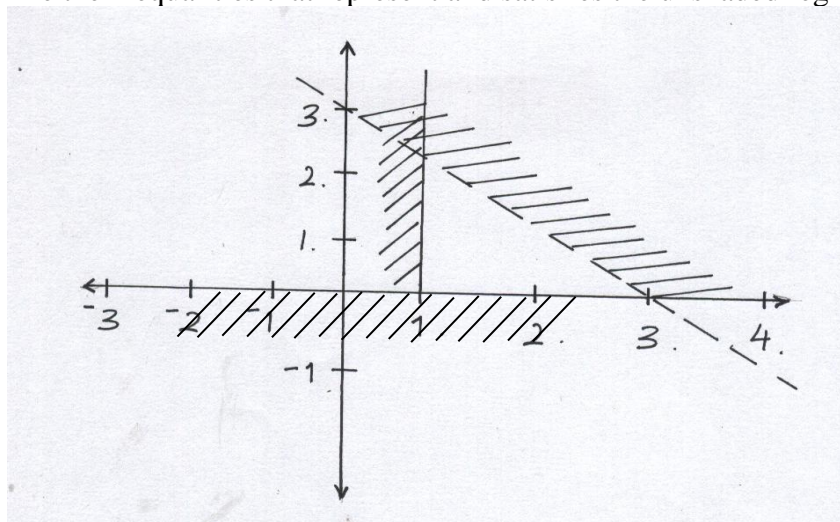
(3marks)

14. There are two grades of rice, grade A and Grade B. Grade A costs Sh 80 per Kg while Grade B costs Sh 60 per Kg. In what ratio must the two be mixed in order to produce a blend costing Sh 75 per Kg.
(3marks)

15. One of the three vertices of triangle ABC is A (2,-3). Point A is mapped onto A^I (-4, 7) under a reflection on mirror line M. find the equation of the mirror-line M
(3marks)

16. A camp has enough food ration to last 10,000 refugees for 35 days. After 5 days, 2500 more refugees arrived in the camp. If all are now put on a half ration, how much longer will the food last?   (3 marks)

SECTION II (50 marks)

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

17. a). A particle moving at $20\ m/s$ accelerates to $30\ m/s$ in 5 seconds then travels at this speed for 10 seconds before decelerating to rest in 4 seconds. Draw a velocity –time graph and use it to calculate the distance covered by the particle in 19 seconds.
        (3 marks)

b). A train $100\ m$ long travelling at $72km/h$ overtakes another train travelling in the same same direction at $56km/hr$ and passes it completely in 54 seconds. Find the length of the second train.   (4 marks)

ii). Find the time (how long) they would have taken to pass each other if they had been travelling at these speeds in opposite directions. (3 marks)

(i)   (a) Find the inverse of the matrix A , given that A is $\begin{pmatrix} 2 & 3 \\ 3 & 4 \end{pmatrix}$

  (b) Jane bought 200 bags of sugar and 300 bags of rice for a total cost of shs. 850,000. Peter bought 120 bags of rice and 90 bags of sugar for a total cost of shs. 360,000. If the price of a bag of sugar is shs. x and that of rice is shs. y.

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

      (ii) Use matrix method to find the price of one bag of each item (3marks)

(c) Robert bought 225 bags of sugar and 360 bags of rice. He was given a total discount of shs. 33,300. If the discount on the price of a bag of rice was 2%, calculate the percentage discount on the price of a bag of sugar.
      (3marks)

19. The table below shows scores for a form 4 class Math results in Ushindi School.

Marks	20-29	30-49	50-54	55-69	70-79	80-84	85-99
No of Students	3	12	6	15	5	7	3
f.d							

(a). Fill in the column for frequency density row on the table   (2marks)

(b). Draw a histogram to represent the above data   (3marks)

FOR MARKING SCHEME CALL SIR ABRAHAM 0729125181
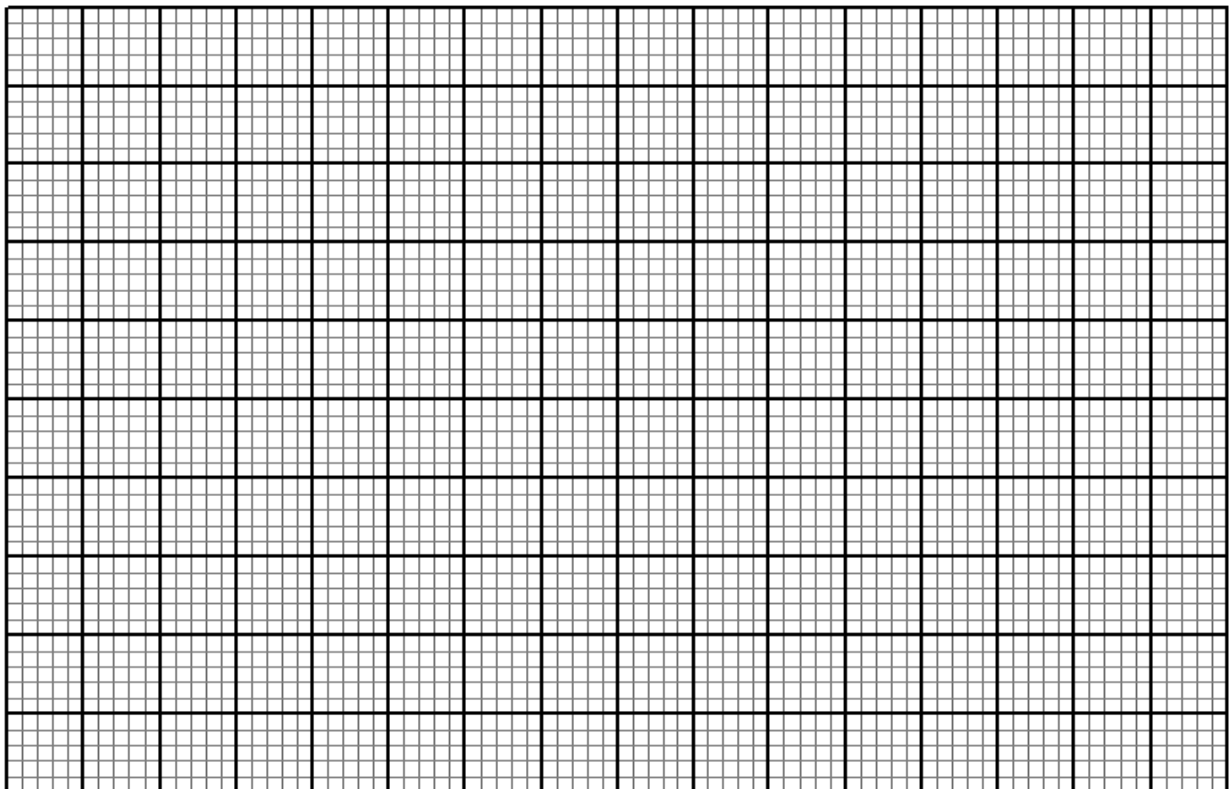
(c). By using the histogram drawn above calculate the median of the data and indicate using a line where it lies in the histogram. (5marks)

20. (a). Complete the table below for the equation $y = 4x^3 - 3x^2 - 6x$ 2marks

x	$-1\frac{1}{4}$	-1	$-\frac{1}{2}$	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	$1\frac{3}{4}$
y	-5		$1\frac{3}{4}$		$-3\frac{1}{4}$		$-2\frac{1}{4}$	

b. Using a scale of 4 cm to represent 1 unit on the x axis and 2cm to represent 1 unit on the y-axis draw the graph of $y = 4x^3 - 3x^2 - 6x$ for $-1\frac{1}{4} \le x \le 1\frac{3}{4}$ on the grid provided 3marks
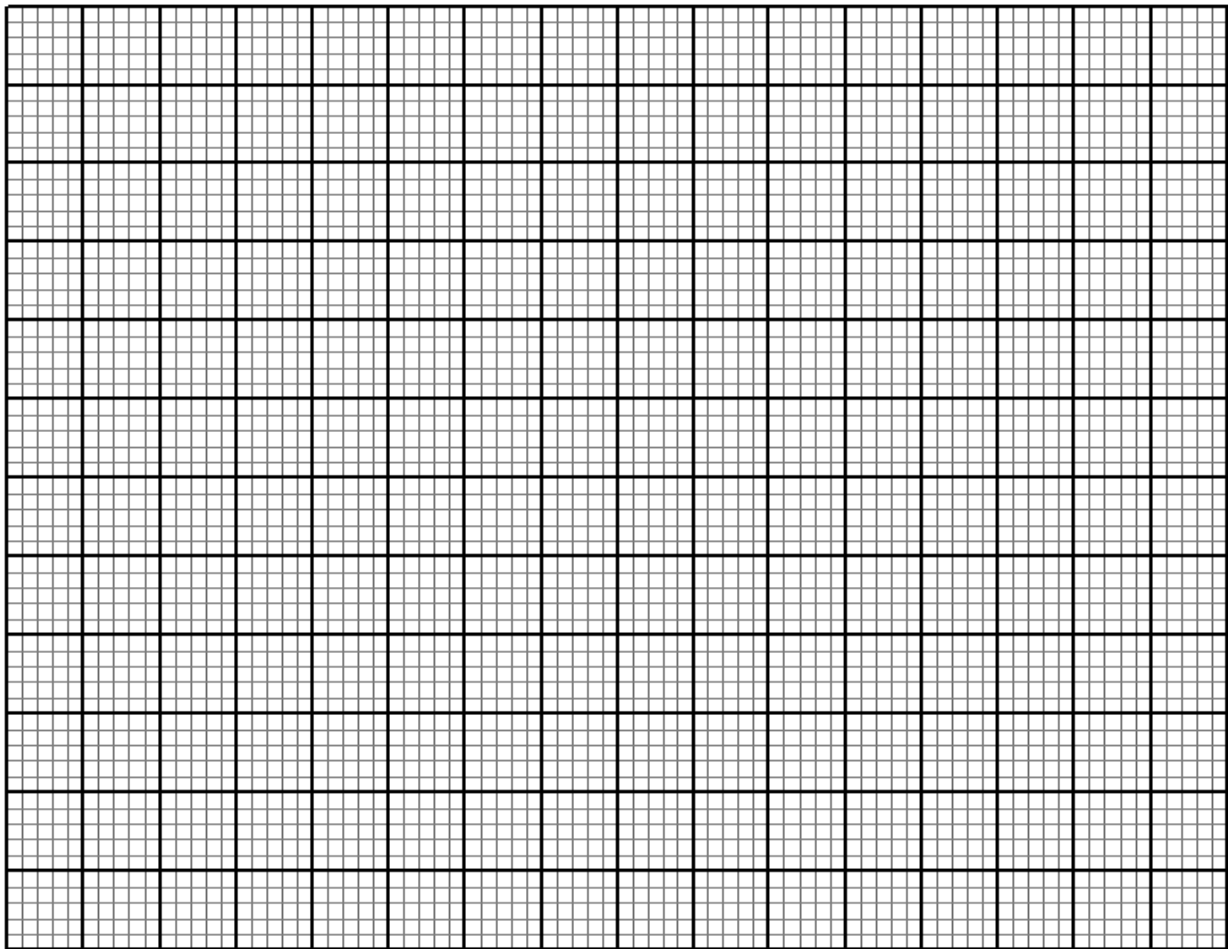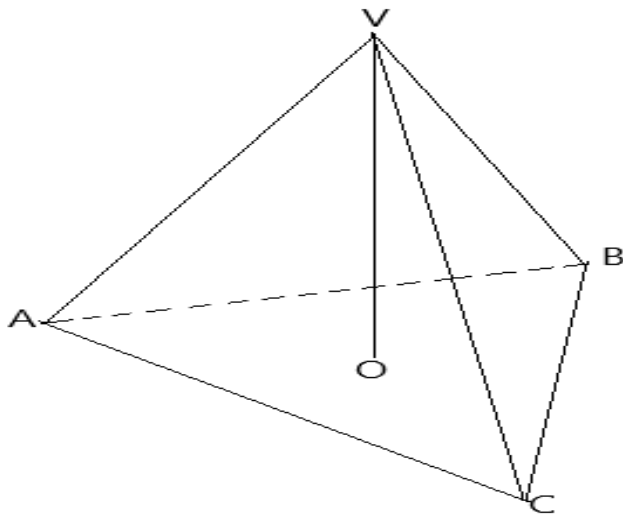
c). Use your graph to find the range of values of x for which $y \leq -3$ (1mark)

d). Use your graph to solve the equation $4x^3 - 3x^2 - 6x = 0$ (2marks)

e). By drawing a suitable straight-line graph on the same axes solve the equation

$-4x^3 + 3x^2 + 7x - 1 = 0$ (2marks)

21. The figure below shows a solid regular tetrahedron of side 15 cm. Point O is center of the base ABC


a). Calculate the perpendicular height VO of the pyramid to 1 decimal place. (3 marks)

b). The tetrahedron is cut parallel to the base ABC forming a frustrum. The slant height of the frustrum is two-thirds the slant height of the pyramid. Calculate;

(i). The volume of the frustrum. (4 marks)

(ii). The surface area of the solid frustrum (3 marks)

22. a) Draw the quadrilateral with vertices at A(-6,-1) B(-6,-4) C(3,-4) and D(3,-1)

(1mark)
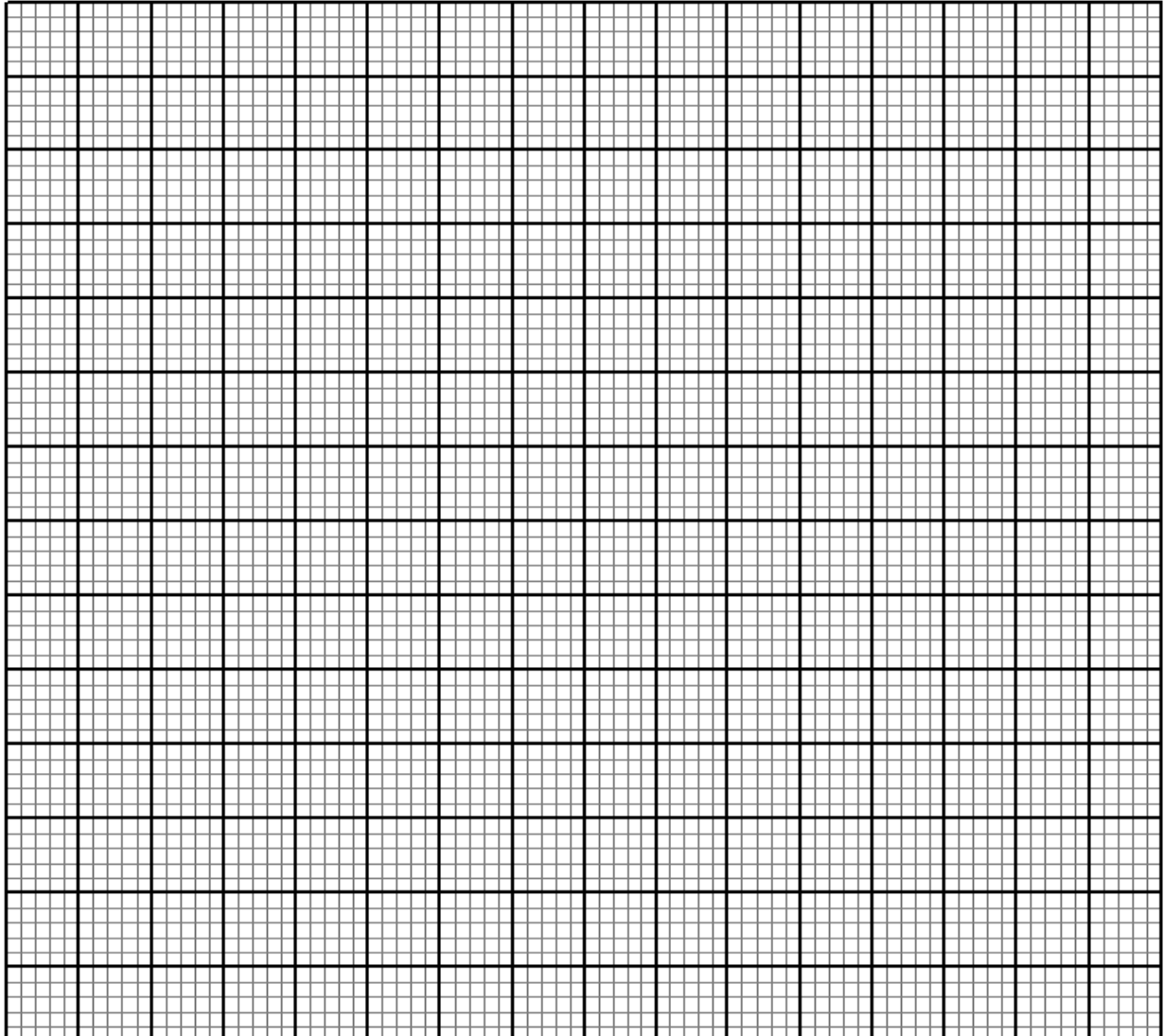
(b) On the same grid, draw the image of ABCD under enlargement centre (0,-1) scale factor 1/3, label the image A'B'C'D'.
(2marks)

(c) Draw A''B''C''D'' the image of A'B'C'D' under rotation of +90° about (1,0).

(2marks)

(d) Draw A'''B'''C'''D''' the image of A''B''C''D'' under reflection in the line $y - x = 0$

2marks

(e) Draw $A^{IV}B^{IV}C^{IV}D^{IV}$ the image of A'''B'''C'''D''' under translation $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and write down its coordinates
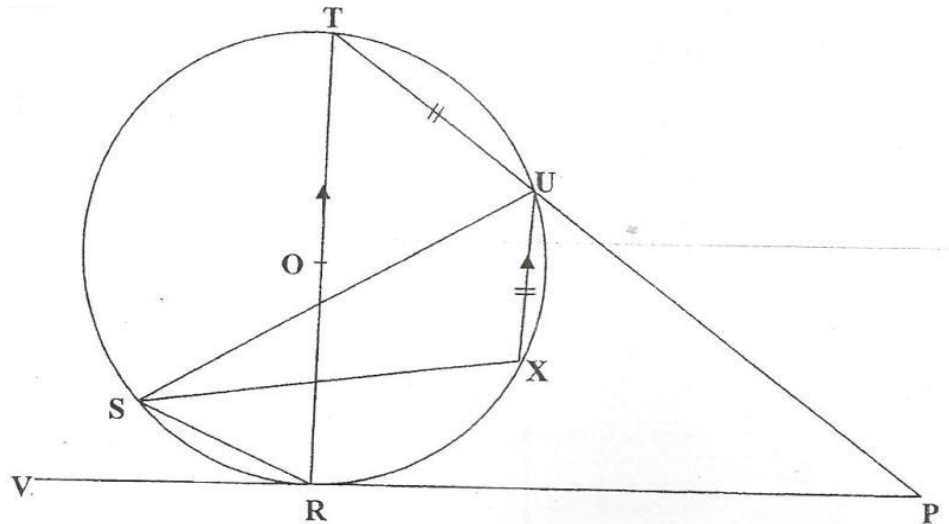(3marks)

23. (a). The equation of a line L_1 is $7y - 5x - 20 = 0$. Find the x-intercept of the equation

(1mark)

b). Another line L_2 is perpendicular to L_1 and passes through (-5, 3). Find the equation of L_2.
(3marks)

c). L_3 passes through (0,-3) and parallel to the line L_4 whose equation is $3y - 8x = 3$ find the equation of L_3.   (3marks)

d). Calculate the coordinates of point of intersection between the lines L_1 and L_3.   (3marks)

24. In the figure below, O is the center of the circle TOR is the diameter and PRV is tangent to the circle at R.

Given that $<SUR = 25^0$, $<URP = 60^0$, TU = UX and that UX is parallel to the diameter; giving reasons calculate;

(a) $<$TOU   (2 marks)

(b) $<$XUP   (2 marks)

(c) $<$STR   (2 marks)

(d) Reflex $<$SXU   (2 marks)

e). $<$RPU   (2marks)