MATHEMATICS PAPER 1

EXPECTED QUESTIONS IN KCSE

Comprises 6 KCSE prediction set exams (Class of KCSE March 2022).

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PREDICTION 1

Name _____ **Index No**_____

School _____ **Candidate's Signature** _____

Date _____

121/1
MATHEMATICS ALT A
PAPER 1

2021
2 ½ Hours

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

17	18	19	20	21	22	23	24

Grand Total

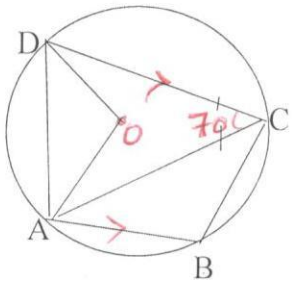
SECTION I [50 marks]
Attempt All the Questions

1. Evaluate $\frac{\text{½ of } 3\text{ ½} + 1\text{ ½ } (2^1/_2 - {}^2/_3)}{\text{¾ of } 2\text{ ½} \div \text{½}}$ (3 marks)

2. Mr.Rotich decided to honour his top 3 students in Mathematics by sharing sh 12,000 in the ratio 6:5:x for the first, second and third student respectively. If student number 2 got sh 4,000, find the value of x. . (3 marks)

3. Express $3.02\dot{3}$ as a fraction. (2 marks)

4. O is the center of the circle below and AB is parallel to DC. Angle ACD=70^o and angle ACB=10^o (3 marks)



Calculate the angles:

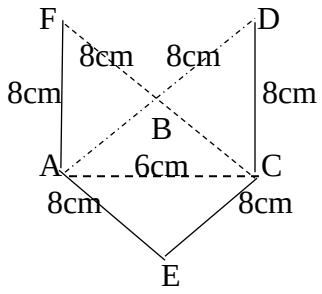
(i) ABC (2 marks)

(ii) OAD (2marks)

5. A sphere has a radius of 3.0cm. Find its density if the sphere has a mass of 100grams. (3 marks)

6. Use reciprocal table to evaluate reciprocal of 0.3654. Hence find $\frac{\sqrt{3.24}}{0.3654}$ to 3 significant figures (3 marks)

7. Below is a net of a model of a 3- dimensional figure. The lengths AB=BC=AC=6cm and lengths AF = FB = BD = CD = CE = AE = 8.0 cm. (3 marks)



(a) Sketch the solid model taking ABC as the base and height 5cm. (2 marks)

(b) Name the figure sketched. (1 mark)

8. Using logarithm tables, evaluate. (4 marks)

$$\frac{\sqrt[3]{47.26x0.866^2}}{345.8}$$

9. A line has the equation $3x - 2y - 5 = 0$. Find:

(a) The gradient of the line. (1mark)

(b) The equation of the line in the form $y = mx+c$ that passes through the point (4,6) and is perpendicular to the given line. (3 marks)

10. The exterior angle of a regular polygon is $(x-50)^o$ and the interior angle is $(2x+20)^o$. Find the number of sides of the polygon. (3 marks)

11. Simplify $\frac{x-5}{x+5} - \frac{7x-35}{x-25}$ (3 marks)

12. The cost of a camera outside Kenya is US $1,000 Jane intends to buy one camera through an agent who deals in Japanese. The agent charges her a commission of 5% on the price of the camera and further 1260 Yen as importation tax. How much Ksh will she need to send to the agent to obtain the camera, given that (4 marks)

    1 U $ = 105.00 Yen
    1 US$ = Ksh 63.00

13. Given that **a** $\binom{2}{3}$ and **c** = $\binom{3}{5}$ and **a** + 2**b** = **c**. Find:

(i) **b** (2 marks)

(ii) Magnitude of (**a** + **b**) correct to 2 decimal places (2 marks)

14. A circle of radius 10.5cm has a sector whose angle at the centre of 12^o is cut off. Find the perimeter of the resulting sector. (2 marks)

15. Find all integral values of x which satisfy the inequalities $x + 11 > 4x - 19 \geq (2 - x)$

(3 marks)

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

SECTION II – 50
Attempt Only Five Questions

17. A passenger train travelling at 25Km/hr is moving in the same direction as the truck travelling at 30km/hr. The railway line runs parallel to the road and the truck takes 1 ½ minutes to overtake the train completely.

(a) Given that the truck is 5m long determine the length of the train in metres. (6 marks)

(b) The truck and the train continue moving parallel to each other at their original speeds. Calculate the distance between them after 4 minutes and 48 seconds after the truck overtake the train. (2 marks)

(c) The truck stopped 45 minutes after overtaking the train. How long did the train take to catch up with the truck? (2 marks)

18. The table below shows the distribution of marks scored by 40 students in an examination.

Class interval	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99
Frequency	2	3	6	11	8	x	2	1

(a) Find the value of x (1 mark)

(b) State the modal class (1 mark)

(c) Calculate the mean mark correct to 2 d.p (4 marks)

(d) Calculate the median mark (4 marks)

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

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

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

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

(d) On a certain day, the tank was filled with water. If the school has 500 students and each student uses an average of 40 litres of water per day, determine the number of days the student s would use the water. (2 marks)

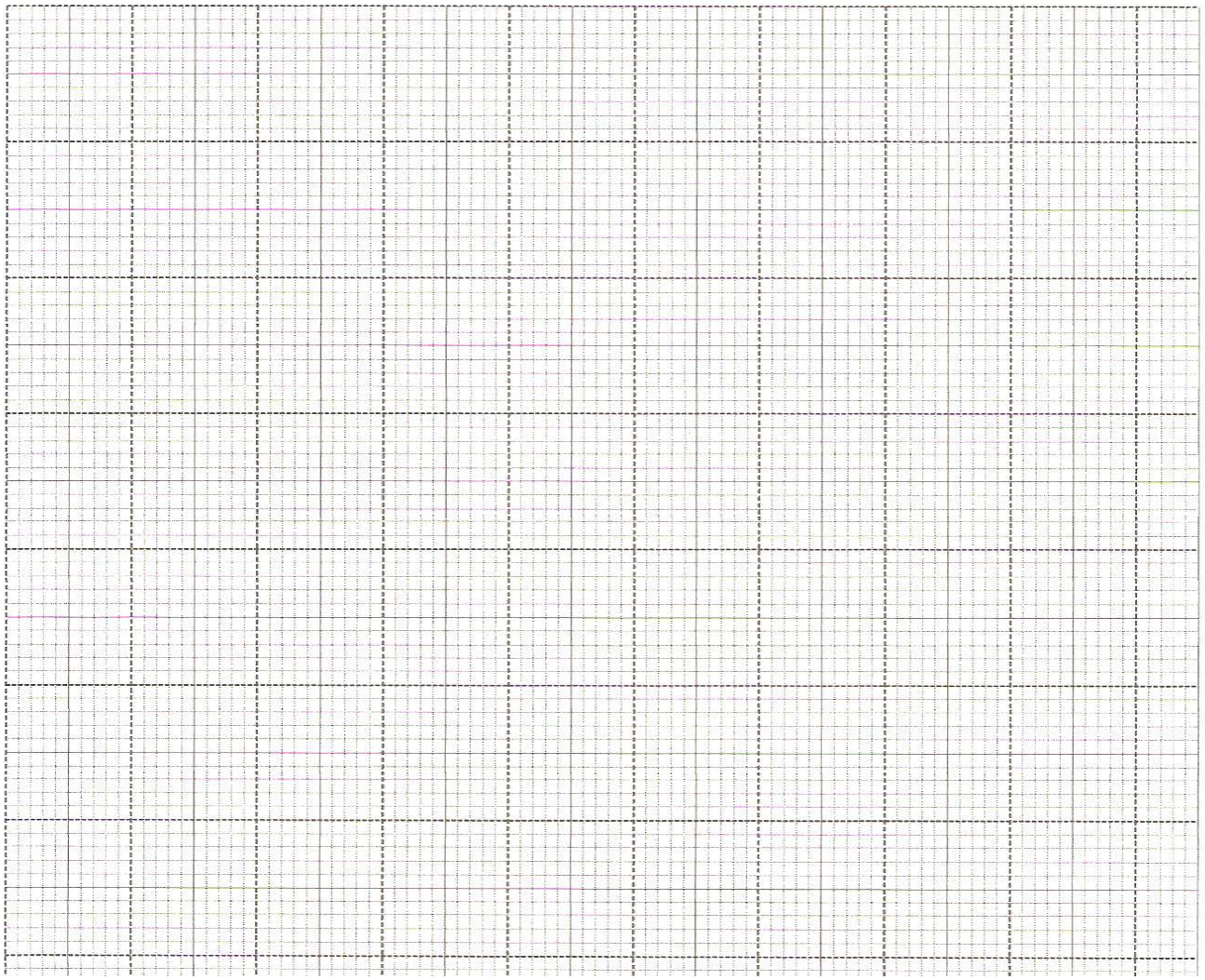
20. In Bomet country, a tailor bought a number of suits at a cost of sh 57,600 from wholesaler. Had he bought the same number of suits from a supermarket, it would have cost him sh 480 less per unit. This would have enabled him to buy four extra suits for the same amount of money.

(a) Find the number of suits the tailor bought. (7 marks)

(b) The tailor later sold each suit for sh 720 more than he paid for it. Determine the percentage profit he made. (3 marks)

21. A triangle BC with vertices A A(-4,2), B(-6,6) and C(-6,2) undergoes enlargement scale factor -1 and centre (-2,6) to produce triangle $A^IB^IC^I$.

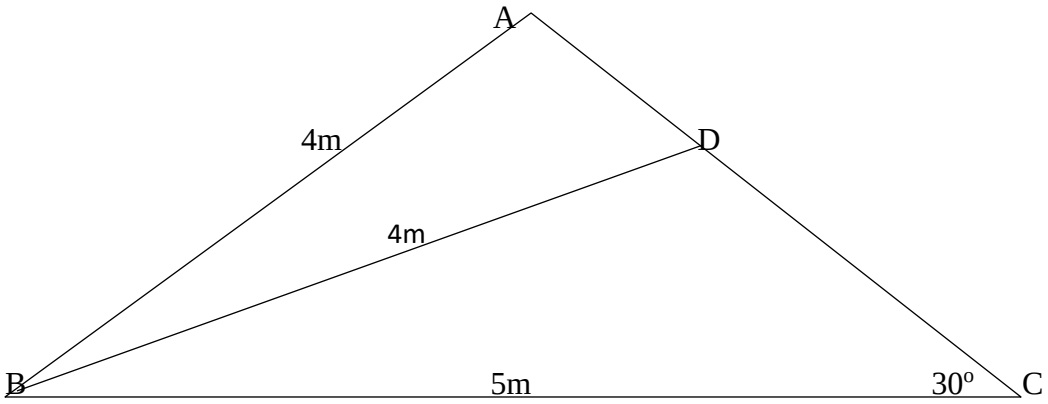
(a) On the grid provided draw triangle ABC and its image $A^IB^IC^I$, state the co-ordinates of $\Delta A^IB^IC^I$ (4 marks)



(b) Triangle $A^{I}B^{I}C^{I}$ is the reflected in the line y+x to give $A^{II}B^{II}C^{II}$. Draw triangle $A^{II}B^{II}C^{II}$ and state the co-ordinates of its vertices. (3 marks)

(c) If triangle $A^{II}B^{II}C^{II}$ is mapped onto a triangle whose co-ordinates are A^{III} (-4,-2), B^{III} (-6,-6) and C^{III} (-6,-2) by a rotation, find the centre and angle of rotation. (3 marks)

22. The figure below shows a piece of land ABC not drawn to scale. Angle BDC is obtuse.



Calculate correct to 2 decimal places

(a) Angle BC (3 marks)

(b) Length AD (3 marks)

(c) Length DC (2 marks)

(d) Area of triangle ABC (2 marks)

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

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

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

(b) If the farm is on sale at Ksh 80,000.00 per hectare, find how much it costs. (6 marks)

24. A trader bought 5 shirts and 2 trousers at a cost of sh 2400. If he had bought 2 shirts and 4 trousers, he would have spent sh.3200.

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

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

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

PREDICTION 2

Name…….Adm No……..Class…….

Index No…….. Signature……

121/1
MATHEMATICS ALT A
Paper 1
2 ½ Hours

INSTRUCTIONS TO CANDIDATES

- Write your name and Admission number in the spaces provided at the top of this page.
- This paper consists of two sections: Section I and Section II.
- Answer ***ALL*** questions from section I and ***ANY FIVE*** from section II
- All answers and workings must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTIONII

17	18	19	20	21	22	23	24	TOTAL

Grand total

SECTION 1 (50MARKS)

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

1. Without using tables, evaluate $\frac{0.51\ X\ 5700}{6.8\ X\ 0.0095}$ giving the answer in standard form.(3mks)

2. The sum of all the interior angles of a regular n-sided polygon is 2880^0. Calculate the value of n and the size of the exterior angles of the polygon. (3mks)

3. Find the equation of the line which passes through the point of intersection of the lines y + 2x = 8 and 2y – x = 6 and the point (4, 3). (4mks)

4. Express the inequalities $\frac{1}{3}$x 4 δ 7 + 2x δ 4 + ¼ x in the form p δ x δ q, where p and q are real numbers. (3mks)

5. A translation maps the point Q (5, -3) onto Q^1 (2, -5)

   (a) Determine the translation vector. (1 mk)

   (b) A point R^1 is the image of R (-2, -3) under the same translation. Find the length of Q^1R^1. (2mks)

6. George received 10,000 Euros from his brother who stays in France .He sent to his sister who stays in Japan 10,000 Yen .In addition George bought a car worth sh.200,000. Exchange rates :

	Buying	Selling
1 Euro	73.4226	73.52953
100 Japanese yen	62.8011	62.8822

How much was left in Kenya shillings. (3mks).

7. Simplify the expression (3mks)

$$\frac{{}_{\times}{}^{2}-9y^{2}}{2x^{2}-\ 7\times y+\ 3y^{2}}$$

8. Kassim has a money box containing 100 mixed shs 5 and shs 10 coins with a total value of shs 600. How many of each type of coin does the box contain. (3mks)

9. Use square roots, reciprocal and square tables to evaluate to 4 significant figures the expression; (4 mks)

$$(0.06458)^{\frac{1}{2}} + \left(\frac{2}{0.4327}\right)^{2}$$

10. A boy walk directly from point Q towards the foot of a vertical flag post 200m away. After covering a distance of 140m, he observes the angle of elevation of the top of the flag post as 75°. Calculate the angle of depression of point Q from the top of the flag post. (3mks)

11. Two similar blocks have masses of 729g and 216g respectively. If the surface area of the smaller block is 300cm^2, calculate the surface area of the larger block. (3mks)

12. Evaluate $\int_{-1}^{2}(x^2+1)dx$ (3 mks)

13.A two digit number is such that 4 times the units digit exceeds the tens digit by 1. If the digits are reversed, the number formed is decreased by 45. Find the number. (3mks)

14. Given that the column vectors

$$p_{\smile} = (-3\ 4\ ), q_{\smile} = (16\ -4\ ), r_{\smile} = (9\ 6\ ) and that a_{\smile} = 2p_{\smile} - \frac{3}{4}q_{\smile} + \frac{2}{3}r_{\smile}$$

Express as a column vector and hence calculate its magnitude (3mks)

15.A liquid spray of mass 384g is packed in a cylindrical container of internal radius 3.2 cm. Given that the density of the liquid is 0.6g/cm^3, calculate to 2dp the height of the liquid in the container. (3 mks)

16.(a) Find the inverse of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$ (1 mk)

(b) Hence solve the simultaneous equation using the matrix method (2mks)

$4x + 3y = 6$

$3x + 5y = 5$

SECTION II

*Answer any **Five** Questions in this Section in the spaces provided*

17. Three businessladiesWanjiku, Muthoni and Njoki decided to buy a lorry. The marked price of the lorry was 2.8million shillings. The dealer agreed that the ladies could pay a deposit of 60% of the marked price and the rest to be paid within a year.The ladies raised the deposit in the ratio of 3:2:5 respectively. At the end of the year the lorry had realized 2.08million shillings which the three shared in the ratio of their contribution. However, they were required to contribute for the balance of the lorry from these earnings again in the ratio of their original contributions.

a) calculate amount to be paid as deposit (1mk)

b) How much did each contribute to pay for the deposit? (3mk)

c) How much did Njoki receive at the end of the year? (1mk)

d) Calculate the total amount Muthoni and Njoki contributed to pay for the balance. (3mk)

e) How much money did Wanjiku remain with after paying her share of the balance? (2mk)

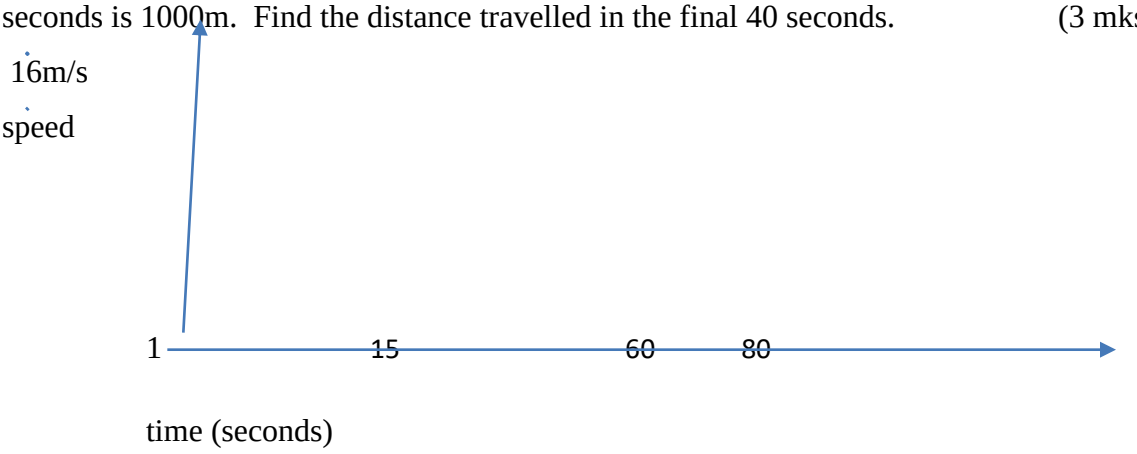
18. a) A bus left Kisumu at 9.30 am towards Nairobi at an average speed of 81km/hr. A matatu left Nairobi for Kisumu at 10.10 a.m at an average speed of 72km/hr. The distance between Kisumu and Nairobi is 360km. Determine:

(i) The time taken before the two vehicles met. (3mks)

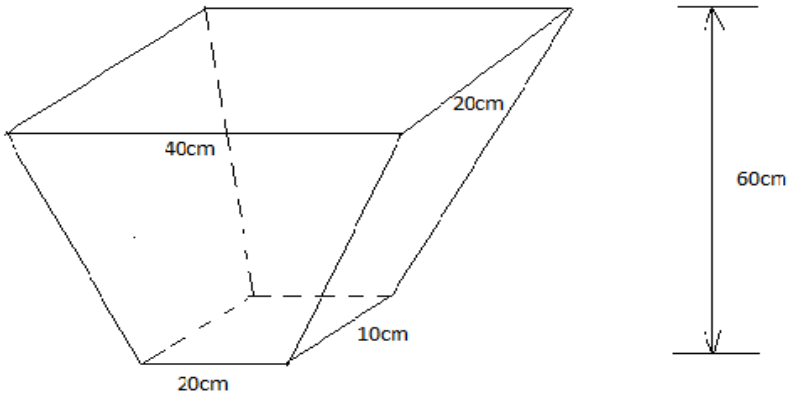
(ii) The distance between two vehicles 40 minutes after meeting. (2mks)

(iii) A car left Kisumu towards Nairobi at 9.50am at an average speed of 90km/hr. Determine the time the car caught up with the bus. (3mks)

(b) The figure below shows speed time graph of a journey. If total distance travelled in 80 seconds is 1000m. Find the distance travelled in the final 40 seconds. (3 mks)



19. The Figure shows a frustum of a right pyramid open container for storing water.



Calculate:

a) The height of the pyramid from which the frustum was cut from. (2mks)

b) The capacity of the frustum in litres (4mks)

c) The surface area of the frustum (4mks)

20. The table below represent marks in percentage scored by 50 students in a class

Marks	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84
Frequency	6	4	7	6	12	4	5	3	3

a) State the modal class (1mk)

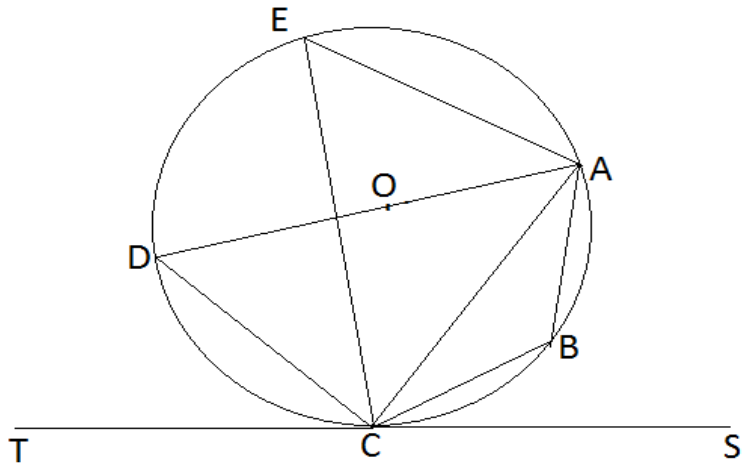
b) Estimate:

i. The mean mark (4 mks)

ii. the median. (3mks)

c) Calculate the percentage of students who scored between 50-64 marks (2 mks)

21. In the figure below DA is a diameter of the circle ABCDE centre O. TCS is a tangent to the circle at C, AB = BC and angle DAC = 38^0



Giving reasons, determine the following angles:

(a) < DCT (2 mks)

(b) <DEA (2 mks)

(c) <ACB (2 mks)

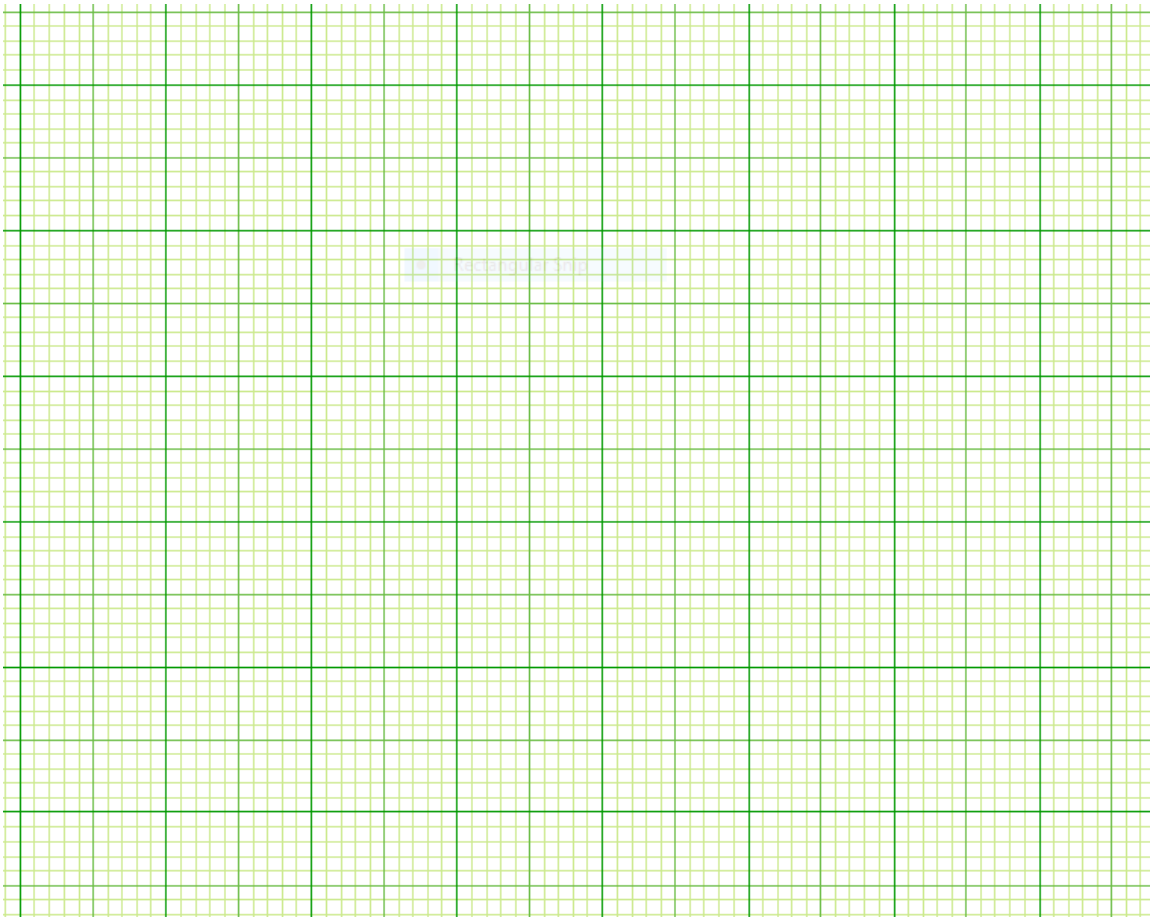
(d) <BDC (2 mks)

(e) <BOA (2 mks)

22. .(a) Complete the table below for the function $y = -2x^2 - 7x + 4$. (2 mks)

X	-5	-4	-3	-2	-1	0	1
$Y = -2x^2 - 7x + 4$							

(d) Draw the graph of $y = -2x^2 - 7x + 4$ for $-5 \leq x \leq 1$ (3mks



(c) Use your graph to solve

(i) $-2x^2 - 7x + 4 = 0$ (1 mk)

(ii) $-2x^2 - 4x - 2 = 0$ (2mks)

(iii) $x^2 + {}^{7}/_{x} - 1 = 0$ (2mks)

23.(a) Complete the table below for the function $y = x^2 + 3$ (2mks)

x	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
y	4		7			15.25	19		27		39

(b) Use the mid-ordinate rule with five strips to estimate the area bounded by the curve, the line $x = 1$ and the line $x = 6$. (2mks)

(c) Use integration to find the exact area in (b) above. (3mks)

(d) Calculate the percentage error arising from the use of mid-ordinate rule. (3mks)

24.Mwikali planned to spend sh. 16,800 to buy a number of bags of maize. When she went to the market, she discovered that the price of maize had increased by sh. 200 per bag. She could now afford to buy two bags less than she had planned to buy with the same amount of money.taking the original number of bags she intended to buy to be y:

(a) write an expression in terms of y for:

i) original price per bag (1 mk)

ii) price per bag after the increase in price. (1 mk)

b) Determine the number of bags that she originally intended to buy. (4 mks)

c) She later sold the maize at sh. 1750 per bag. Find the percent profit she made. (4 mks)

PREDICTION 3

NAME: ……..…….. INDEX NO: ……

SCHOOL: ……

CANDIDATE SIGN: ……

DATE: ……

121/1
MATHEMATICS
PAPER 1
TIME: 2 ½ HOURS

KCSE PREDICTION 3

INSTRUCTION

a) Write your name and index number in the spaces provided above.
b) Sign and write the date of the examination in the spaces provided above.
c) This paper consist of **TWO** sections: **section I** and **Section II.**
d) Answer **ALL t**he questions in **Section I** and only **five** questions from **section II.**
e) Show all the steps in your calculations, giving your answers at each stage in the stage in the spaces 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.

Section I

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

Section II

17	18	19	20	21	22	23	24	Total

Grand Total

SECTION 1: 50 MARKS. ANSWER ALL THE QUESTIONS

1. Evaluate: (3marks)

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

$\frac{12}{17}$ of $(1\frac{3}{7} - \frac{5}{8} \times \frac{2}{3})$

2. A Kenyan businessman bought goods from Japan worthy 2,950,000 Japanese yen. On arrival in Kenya, custom duty of 20% was charged on the value of the goods. If the exchange rate were as follows:-
1 US dollar = 118 Japanese Yen
1US dollar = 76 Kenyan shillings Calculate the duty paid in Kenyan shillings. (3Mks)

3. A rally car travelled for 2 hours 40 minutes at an average speed of 120km/h. the car consumes an average of 1 litre of fuel for every 4 kilometers. A litre of fuel costs Ksh.59. Calculate the amount of money spent on fuel. (3mks)

4. 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 contai(Take $\pi = \frac{22}{7}$). (4 mks)

5. Given that $\sin\theta = \frac{5}{13}$, find $\tan(90-\theta)$ in its simplest form. (2mks)

6. The equation of line L_1 is $2x - 5y - 10 = 0$. Find the equation of line L_2 perpendicular to L_1 and passing through (5, -2) express your equation in the form $y=mx + c$ (3mks)

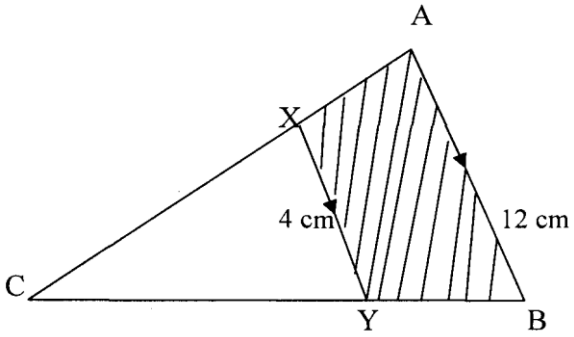
7. One interior angle of a polygon is equal to 80^0 and each of the other interior angles are 128°. Find the number of sides of the polygon. (3 mks)

8 . The length of a rectangle is (3x + 1) cm, its width is 3 cm shorter than its length. Given that the area of the rectangle is 28cm^2, find its length, (3 marks)

9. Simplify the expression. (3mks)

$$\frac{4x^2 - y^2}{3y^2 - 7xy + 2x^2}$$

10. In the figure below, lines AB and XY are parallel.



If the area of the shaded region is 36 cm^2, find the area of triangle CXY.
(3 marks)

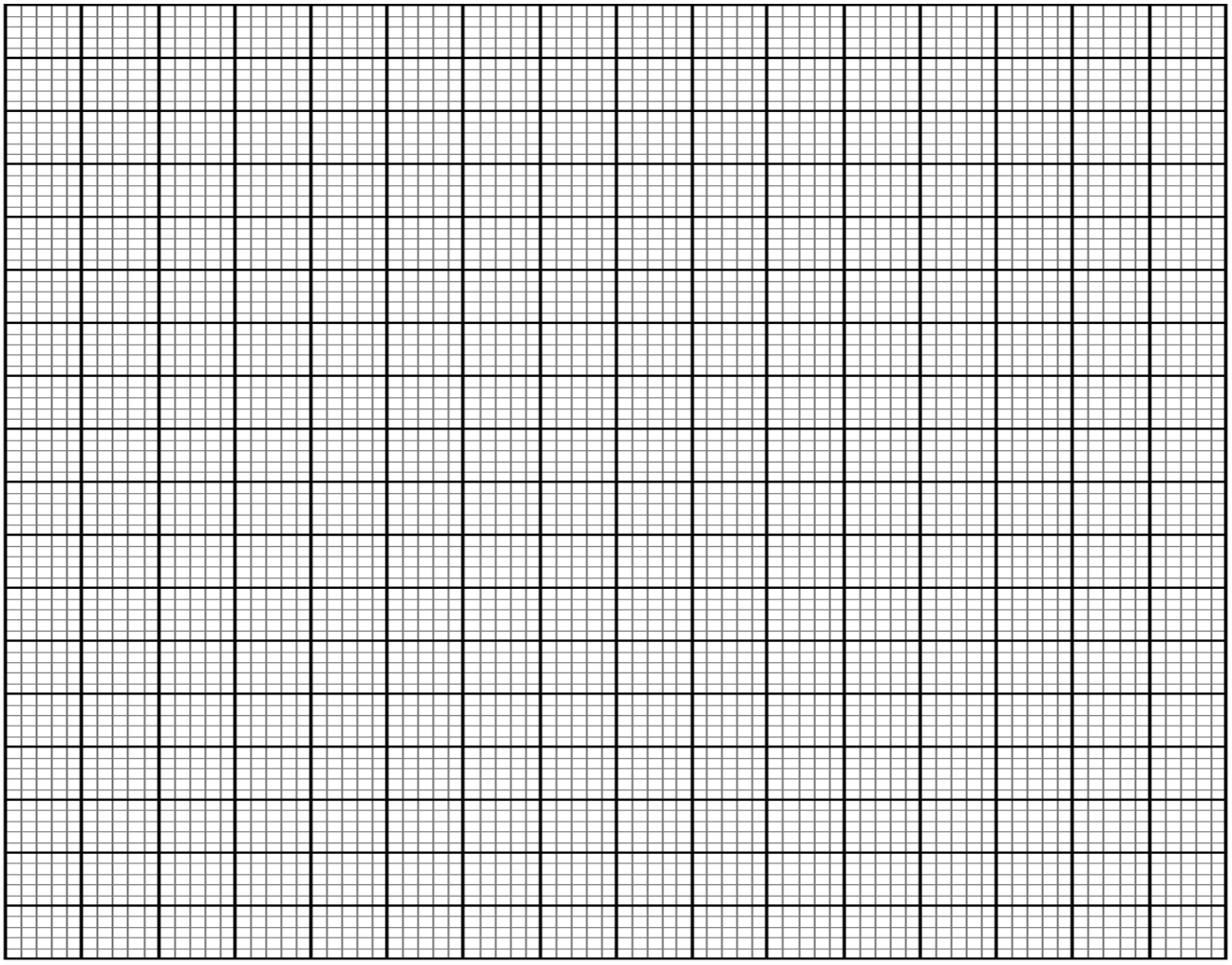
11. Using a pair of compasses and a ruler only construct a triangle ABC and such that AB= 4cm, BC =6cm and angle ABC=135^o. (2mks)

(b) Construct the height of triangle ABC in (a) above taking AB as the base, hence Calculate the area of triangle ABC. (2 mks)

12. The external length width and height of an open rectangular container are 41cm, 21cm and 15.5cm respectively. The thickness of the materials making the container is 5mm. If the container has 8 litres of water. Calculate the internal height above the water level. (3mks)

13. A triangle P with vertices x(2,4), Y(6,2) and z(4,8) is mapped onto triangle P^1 with vertices X^1 (10,0), Y^1(8, -4) and Z^1(14, -2) by a rotation.

a) On the grid provided, draw triangle P and its image (2mks)

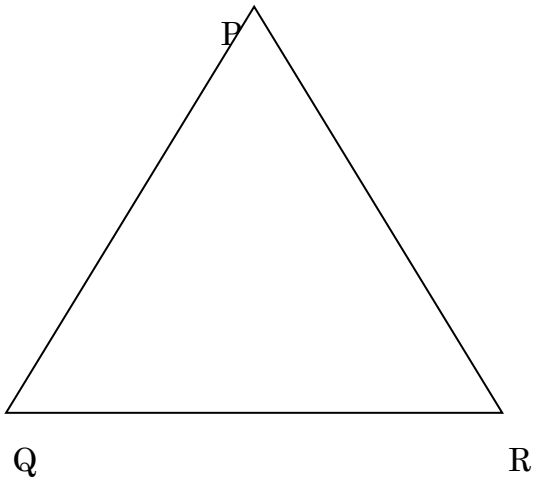


b) Determine the centre and angle of rotation that maps P onto P^1 (2mks)

14. Solve the following inequalities and state the integral values (3mks)

$2x - 2 \leq 3x + 1 < x + 11$

15. In the triangle PQR below, PQ =12cm, <PQR = 80^0 and <PRQ= 30^0



Calculate, to 4 s.f, the area of the triangle PQR (3mks)

16. A two digit number is such that the sum of digits in 13. When the digits are interchanged, the original number is increased by 9. Find the original number. (3mks)

SECTION II (50 MARKS)

Answer only five questions in this section

17. A straight line L_1 has a gradient ¯½ and passes through point P (-1, 3). Another line L_2 passes through the points Q (1, -3) and R (3, 5). Find.

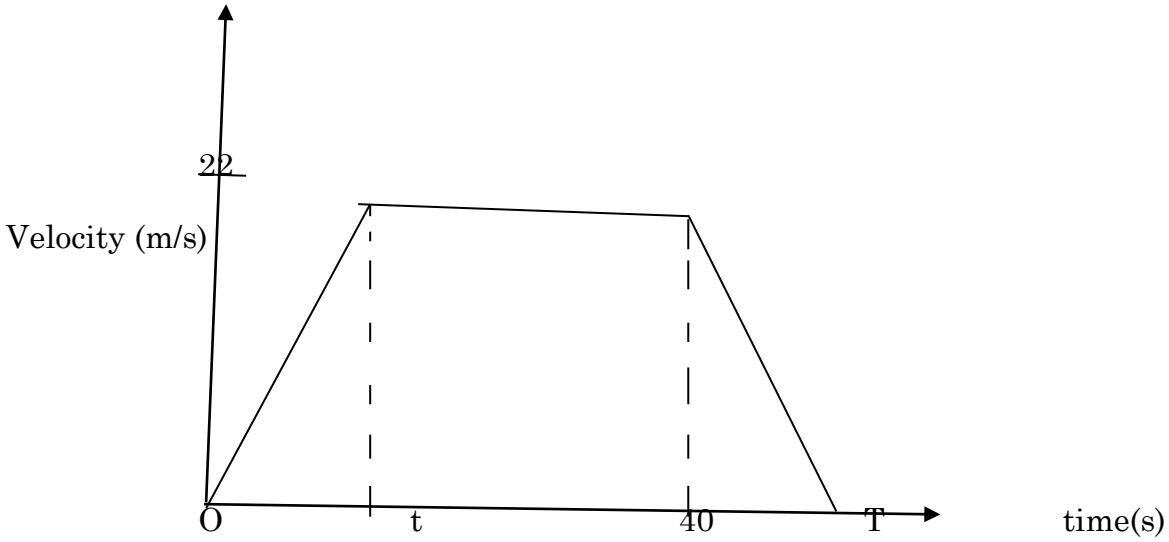
(a) The equation of L_1. (2mks)

(b) The equation of L_2 in the from ax+by+c=0 (2mks)

(c) The equation of a line passing through a point S (0, 1.5) and is perpendicular to L_2. (3mks)

d) The point of intersection of a line passing through S and L_2 3mks

18. The figure below shows a velocity – time graph of a car journey.



The car starts from rest and accelerates at $2.75m/s^2$ for t seconds until its speed is 22m/s. It then travels at this velocity until 40 seconds after starting. Its breaks bring it uniformly to rest. The total journey is 847m long and takes T seconds. Calculate the

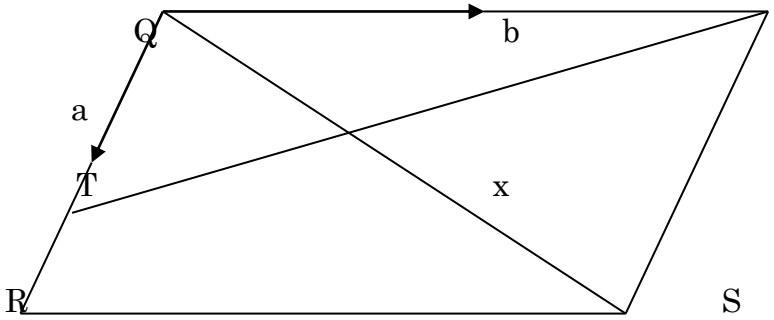
(i) Value of t (3mks)

(ii) Distance travelled during the first t seconds (2mks)

(iii) Value of T (3mks)

(iv) Final deceleration (2mks)

19. In the figure below, QT = a and QP = b.



(a) Express the vector PT in terms of a and b. (1mk)

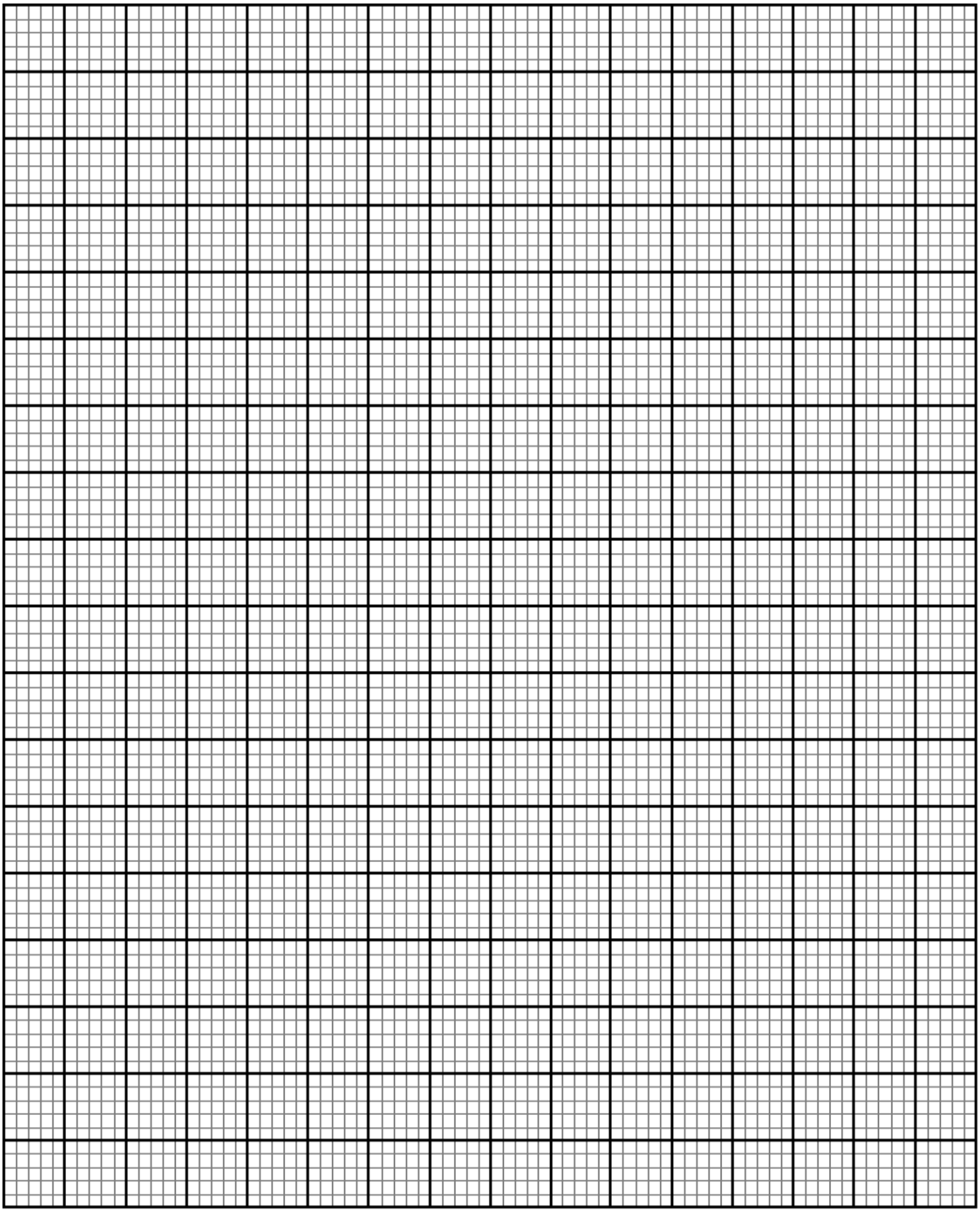
(b) If PX = kPT, express QX in terms of a, b and k, where k is a scala. (3mks)

(c) If QR = 3$\underset{\sim}{a}$ and RS = 2$\underset{\sim}{b}$, write down an expression for QS in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$. (1mk)

(d) If QX = tQS, use your result in (b) and (c) to find the value of k and t. (4mks)

(e) Find the ratio PX : XT. (1mk)

20. A triangle with A(-4, 2), B(-6, 6) and C(-6, 2) is enlarged by a scale factor -1 and centre (-2, 6) to produce triangle $A^1B^1C^1$.
    a) Draw triangle ABC and $A^1B^1C^1$.and state its coordinates 4mks



b) Triangle $A^1B^1C^1$ is then reflected in the line $y = \chi$ to give triangle $A^{11}B^{11}C^{11}$.draw $A^{11}B^{11}C^{11}$.and state its coordinates 3mks

c) If triangle $A^{11}B^{11}C^{11}$ is mapped onto $A^{111}B^{111}C^{111}$ whose co-ordinates are $A^{111}(0, -2)$, $B^{111}(4, -4)$ and $C^{111}(0, -4)$ by a rotation. Find the centre and angle of rotation. (3mks)

21. Four towns P, R, T and S are such that R is 80km directly to the north of P and T is on a bearing of 290° from P at a distance of 65km. S is on a bearing of 330° from T and a distance of 30 km. Using a scale of 1cm to represent 10km, make an accurate scale drawing to show the relative position of the towns. (4mks)

Find:

(a) The distance and the bearing of R from T (3mks)

(b) The distance and the bearing of S from R (2mks)

(c) The bearing of P from S (lmk)

22. Four towns A, B, C and D are such that B is 80km directly North of A and C is on a bearing of 300^0 from A at a distance of 50km. D is on a bearing of 345^0 from C at a distance of 30km.

a) Using a scale of 1cm rep 10km, draw the relative positions of the towns (4mks)

b) Find:

(i) The distance and bearing of B from C (2mks)

(ii) The distance and bearing of B from D (2mks)

(iii) Calculate the distance of ABCD (2mks)

23. A school in Meru Central decided to buy x calculators for its students for a total cost of ksh. 16,200. The supplier agreed to offer a discount of ksh. 60 per calculator. The school was then able to get three extra calculators for the same amount of money.

(a) Write an expression in terms of x , for the

(i) Original price of each calculator (1mk)

(ii) Price of each calculator after the discount (1mk)

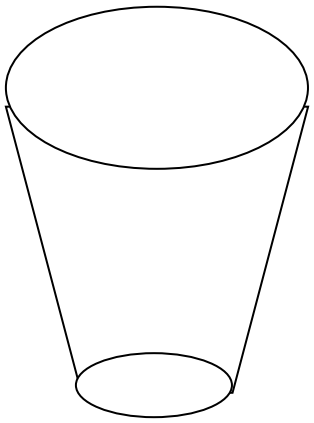
b) Form an equation in x and hence determine the number of calculators the school bought (5mks)

c) Calculate the discount offered to the school as a percentage (3mks)

24. 20.A solid is made up of a conical frustum and a hemispherical top. The slant height of the frustum is 8cm and its base radius is 3.5cm. If the radius of the hemispherical top is 4.2cm.

(a) Find the area of:

(i) The circular base. (2 Marks)



(ii) The curved surface of the frustum (3 Marks)

(iii) The hemispherical surface (3 Marks)

(b) A similar solid has a total surface area of 81.51cm^2. Determine the radius of its base. (2 Marks)

PREDICTION 4

Name…….Adm No……..
Class…… Index No…….. Signature……

121/1
Mathematics Paper 1
Form 4
2 ½ Hours

KCSE PREDICTION 4

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

INSTRUCTIONS TO CANDIDATES

- Write your name and Admission number in the spaces provided at the top of this page.
- This paper consists of two sections: Section I and Section II.
- Answer ***ALL*** questions from section I and ***ANY FIVE*** from section II
- All answers and workings must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTION II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

SECTION A (50 marks)

1. Without using a calculator or tables, evaluate:

$$\left(\frac{2\frac{1}{4} \div \frac{5}{4} + \left(\frac{-2}{3}\right)^3}{\frac{5}{7} - 2\frac{2}{3} of\ 3 + \frac{-3}{8}}\right)^{-2}$$ **(3 marks)**

2. Solve the equation for x. $5^{2x+1} + 5^{2x} - 750 = 0$ **(3 marks)**

3. Simplify $\frac{8mn-6m+8n^2-6n}{8n-6}$ **(3 marks)**

4. Use squares, square roots and reciprocals tables to evaluate the following giving your answer to 2 decimal places. **(4 marks)**

$$\frac{1}{\sqrt{20.52}} + \frac{2}{(6.23)^2}$$

5. Susan made a loss of 20% by selling a blender at sh. 2,400. What profit would she have made had she sold it at sh. 3300? **(3 marks)**

6. Solve for x and y using substitution method:

   $\frac{1}{3}(x + y) - 2 = 0$

   $\frac{1}{4}(x - y) = 1$ **(3 marks)**

7. The number of sides of two regular polygons differs by one. If the sum of the interior angles of these polygons is in the ratio 2:3, calculate the number of sides of each polygon and name them. **(3 marks)**

8. Solve for x in the following equation: $Sin\left(\frac{1}{2}\ x - 10^0\right) = Cos2x$ **(3 marks)**

9. A vehicle moves at an initial speed of 20m/s with a constant acceleration of 2m/s2 for five seconds before breaks are applied. If the car comes to rest under constant deceleration 4 seconds, determine the total distance travelled during the 9 seconds **(3 marks)**

10. Simplify completely the expression

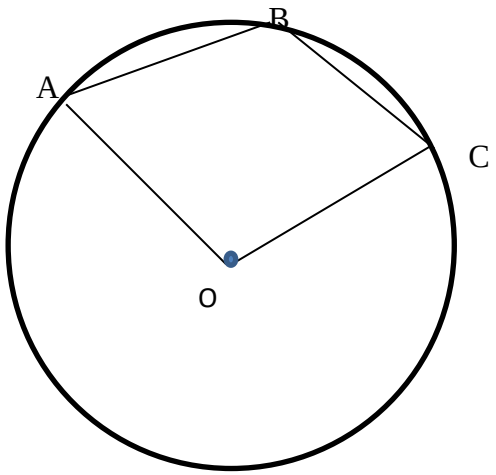
$$\frac{\frac{1}{9}x^2 - \frac{1}{25}y^2}{\frac{1}{9}x^2 + \frac{2}{25}xy + \frac{1}{25}y^2}$$

(4 marks)

11. A point P divides the line AB shown below internally in the ratio 2:3. By construction, find the position P and measure AB.

(3 marks)

12. In the figure below, O is the centre of the circle and reflects angle AOC =142^0. Find angle ABC. **(3 marks)**

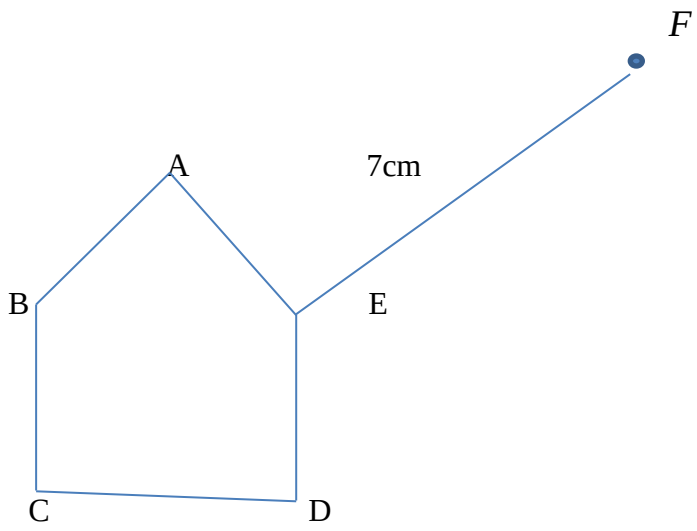


13. A tourist arrived in Kenya with 10,000 US dollars which he converted to Ksh on arrival. He spent Kshs.428,500 and converted the remaining amount to Sterling pounds. How much did he receive in Sterling pounds? The currency exchange rate of the day was as follows; **(3 marks)**

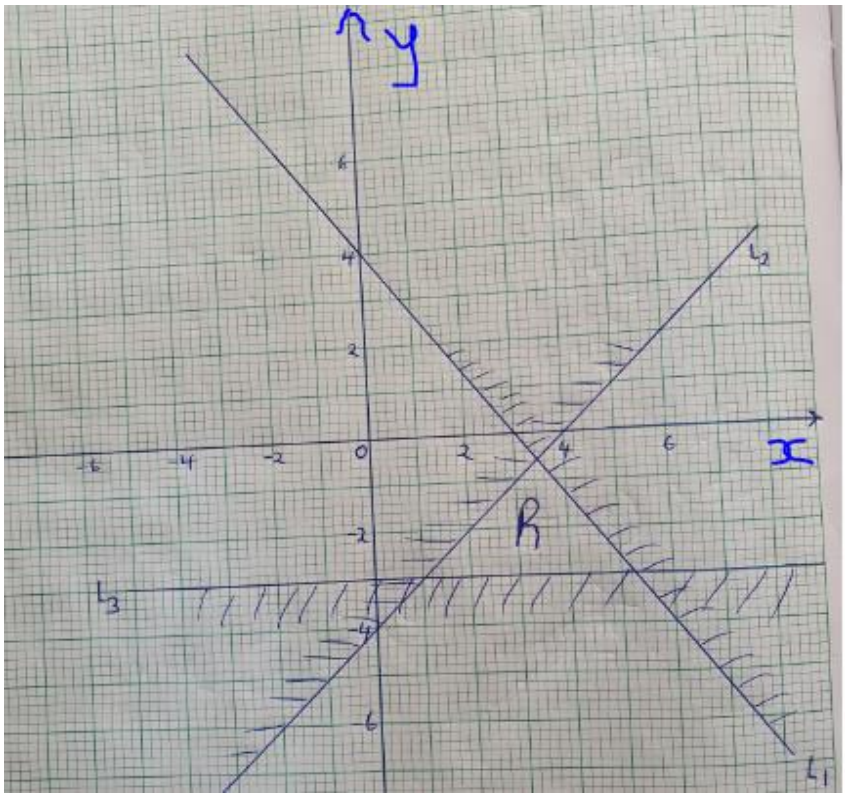
Currency	Buying	Selling
1 Sterling pound	135.50	135.97
1US dollar	72.23	72.65

14. Adam harvested 200 bags of wheat from 2 ha of his farm. How many bags of wheat would he harvest from 16 ha if he maintained the rate? **(3 marks)**

15. Complete the solid below whose length is 7cm **(3 marks)**



16. Write down three inequalities which fully describe the unshaded region R in the figure below **(3 marks)**



SECTION B (50 marks)

17. Three points P, Q and S are pm the vertices of a triangular plain field. P is 400m from Q on a bearing of 300^0 and R of 550m directly south of P.

(a) Using a scale of 1 cm to represent 100m on the ground, draw a diagram to show the position of the points. **(3 marks)**

(b) Use the scale drawing to determine;

(i) The distance and bearing of Q from R. **(2 marks)**

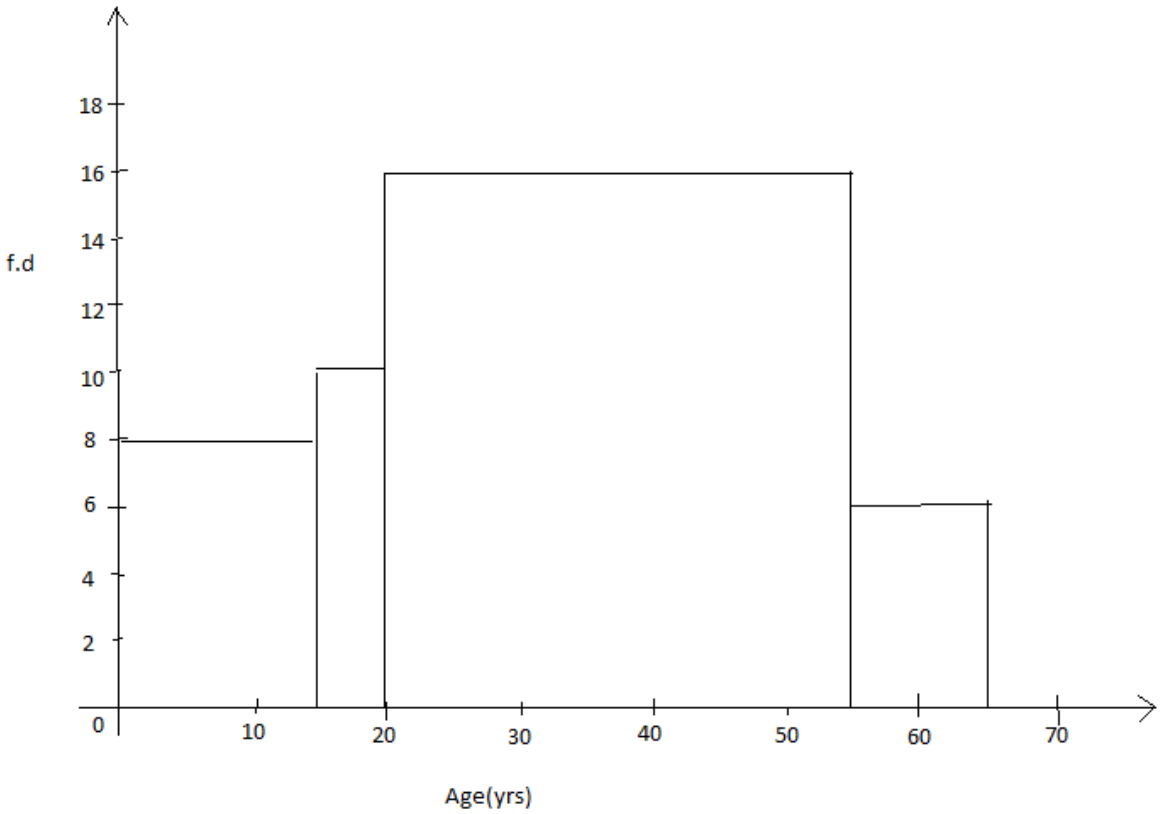
(ii) The bearing and distance of point S from P given that point S is directly 600m East of R. **(3 marks)**

(iii) The bearing and distance of Q from S. **(2 marks)**

18. A bus travelling at a speed of 80km/hr left Mombasa at 8.00am for Nairobi. Two hours later, a car travelling at a speed of 100km/hr left Nairobi for Mombasa.
    (a) Given that the distance between both cities is 500km, find the time of the day when the two vehicles met. **(6 marks)**

    (b) After meeting, the speed of both vehicles dropped to 60km/hr due to traffic jam. At what time did each vehicle arrive at its destination? **(4 marks)**

19. The figure below represents an histogram of heights against age brackets of members of a village.



Using the figure above,

a) Develop a frequency distribution table **(3marks)**

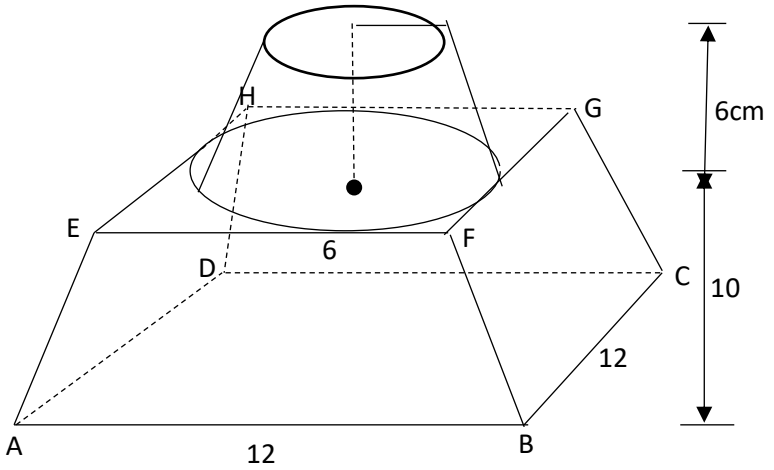
b) Using the table in (a) above find;

i. The mean**.** **(3marks)**

ii. The median class **(1mark)**

iii. The median **(3marks)**

20. The diagram below shows a container base made of a frustum of a square pyramid. The top is a solid frustum of a cone.



AB = BC = 12 cm

EF = 6

Height of 10 and 6 cm respectively.

(a) Calculate the surface area of the bottom solid. **(5 marks)**

(b) Calculate the surface area of the top side. **(4 marks)**

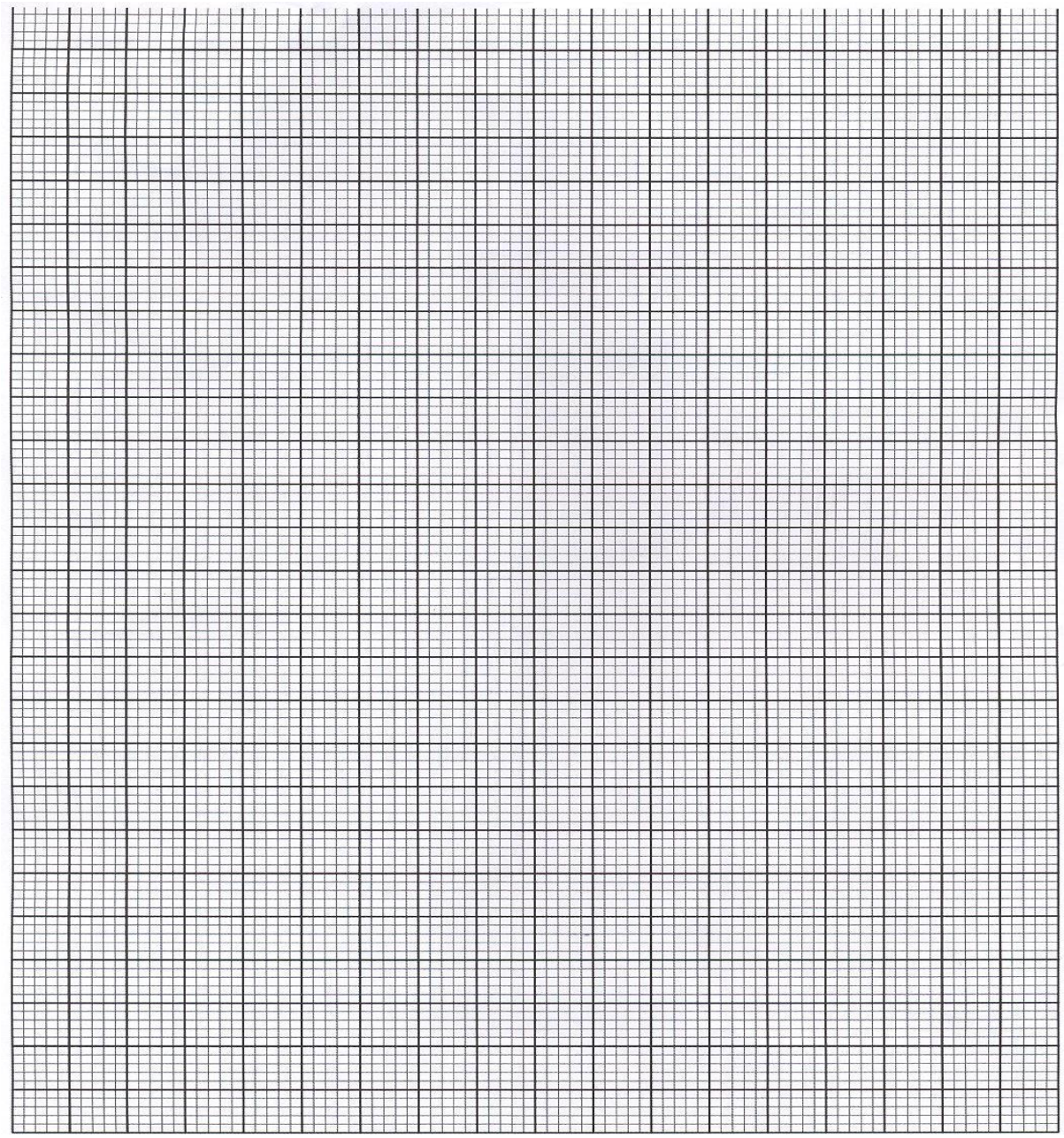
(c) Calculate the total area. **(1 mark)**

21. a).Complete the table below for the function

y=-$x^2 + 10x$ **(2marks)**

X	-1	0	1	2	3	4	5	6	8	10
Y			9			24				0

b) On the grid provided draw the graph of y=-$x^2 + 10x$ **(3marks)**



c) Using the graph above solves the equations:

i) 10x-$x^2 = 0$ **(2marks)**

ii) $x^2 - 7x - 8 = 0$ **(3marks)**

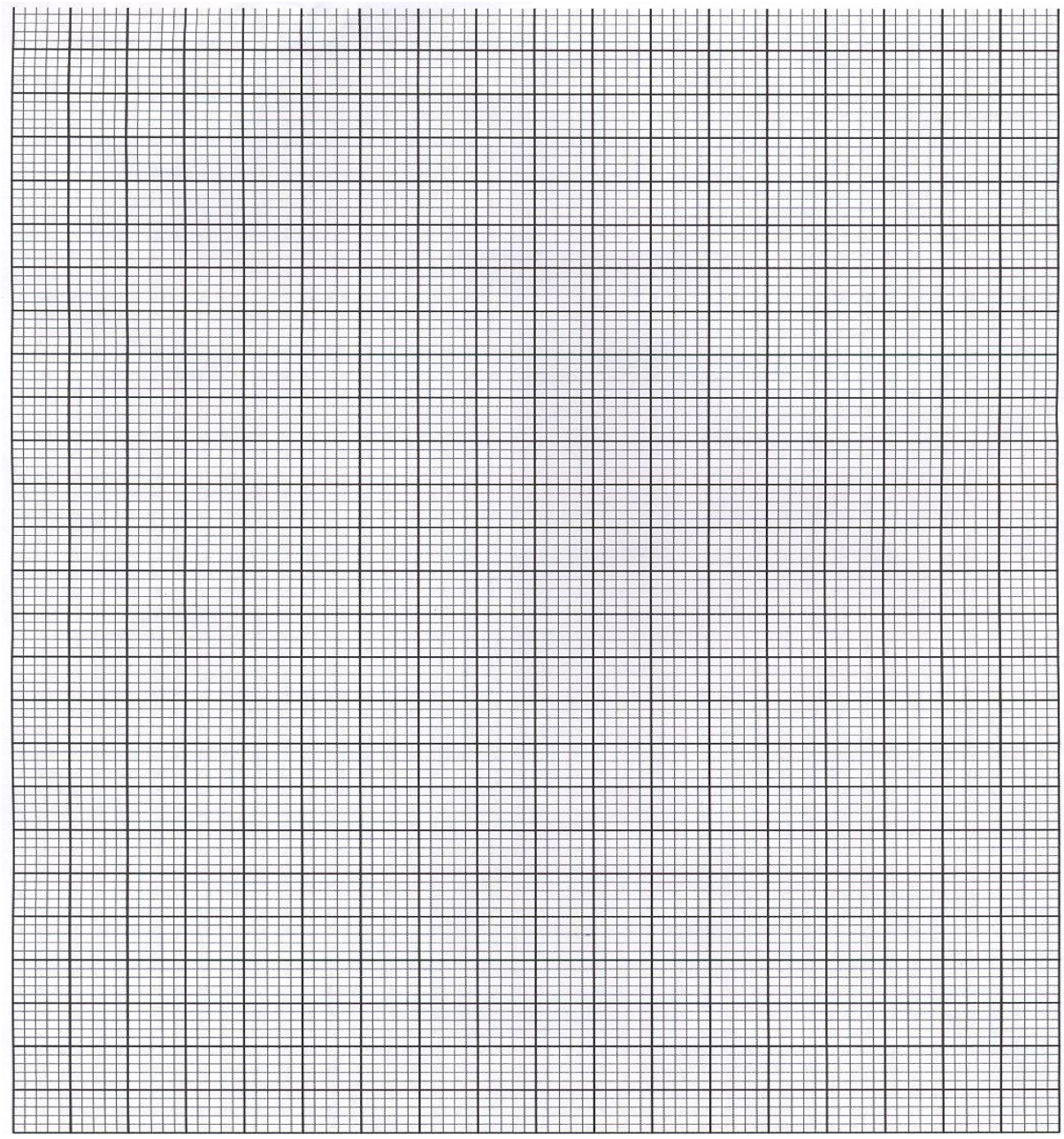
22. Two lines L_1=2y-3x-6 and L_2=3y+x-20=0 intersect at point A.

i. Find the coordinates of A **(3marks)**

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

iii. Another line L_4 is parallel to l1 and passes through (-1,3). Find the x-intercept and the y-intercept of L_4. **(4marks)**

23. (a) PQRS is a quadrilateral with vertices P(1,4), Q(2,1), R(2,3) and S(6,4). On the grid provided, plot the quadrilateral. **(1 mark)**



(b) Draw P'Q'R'S' the image of PQRS under a positive quarter turn about the origin and write down its co-ordinates. **(3 marks)**

(c) Draw P"Q"R"S" the image of P'Q'R'S' under an enlargement scale factor -1 and center (0,0) and write down its co-ordinates. **(3 marks)**

(d) Determine the matrix of a single transformation that maps PQRS onto P"Q"R"S **(3 marks)**

24. A curve whose equation is $3y = 9 - 18x + \frac{27}{2}x^2 - 3x^3$ turns at points P and R.

a) Find the coordinates of P and R **(5 marks)**

b) Determine the nature of points P and R **(3 marks)**

c) Sketch the curve **(2 marks)**

PREDICTION 5

Name…….. Class ….……

Sign ……..…… ADM NO……

KCSE PREDICTION 5

MATHEMATICS
PAPER 1
TIME: 2 ½ HOURS

Instructions to candidates

1. Write your name, index and class number in the spaces provided above.
2. The paper consists of two sections**:** ***section I*** and ***section II*****.**
3. Answer **all** the questions in **section I** and any **five** in **section II**
4. Section I has **sixteen** questions and section two has **eight** questions
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question
7. KNEC Mathematical table and silent non-programmable calculators may be used.

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

1. Evaluate: (3 mks)

$$\left(\frac{\left(1\frac{3}{7}-\frac{5}{8}\right)x\,\frac{2}{3}}{\frac{3}{4}+1\frac{5}{7}\div\frac{4}{7}\,of\,2\frac{1}{3}}\right)^{-2}$$

2. Mr. Kamau son and daughter needed clothes. The son clothes were costing Ksh 324 while the daughter clothes were costing Ksh 220. Mr Kamau wanted to give them equal amounts of money. Calculate the least amount of money he would spend on the two and how many clothes each will buy. (3 mks)

3. Use reciprocal tables to find the value of $(0.325)^{-1}$ hence evaluate $\frac{\left(\sqrt[3]{0.000125}\right)}{0.325}$, give your answer to 4 s.f. (3 mks)

4. A type of paper is 40cm long, 32 cm wide and 0.8 mm thick. The paper costs sh 10 per m^2. Find the total cost of a pile of such paper of height 4.8m. (4 mks)

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

6. Solve for x in the equation: (3 mks)

$$\frac{x-3}{4} - \frac{x+3}{6} = \frac{x}{3}$$

7. A salesman earns 3% commission for selling a chair and 4% commission for selling a table. A chair fetches K£ 75. One time, he sold ten more chairs than tables and earned seven thousand, two hundred Kenya shillings as commission. Find the number of tables and chairs sold. (4 mks)

8. Using the three quadratic identities only factorise and simplify: (3 mks)

$$\frac{(x-y)^2-(x+y)^2}{(x^2+y^2)^2-(x^2-y^2)^2}$$

9. Two numbers are in the ratio 3 : 5. When 4 is added to each the ratio becomes 2 : 3. What are the numbers? (3 mks)

10. Given that Sin $(x + 4^0) = \text{Cos } (3x)^0$. Find tan $(x + 40^0)$ to 4 s.f. (3 mks)

11. In a regular polygon, the exterior angle is $^1/_3$ of its supplement. Find the number of sides of this polygon. (3 mks)

12. Find the area of a segment of a circle whose arc subtends an angle of $22\ ½^0$ on the circumference of a circle, radius 10cm. (3 mks)

13. An airplane leaves point A (60^0S, 10^0W) and travels due East for a distance of 960 nautical miles to point B. determine the position of B and the time difference between points A and B. (3 mks)

14. Mr. Onyango's piece of land is in a form of triangle whose dimensions are 1200M, 1800M and 1500M respectively. Find the area of this land in ha. (Give your answer to the nearest whole number). (3 mks)

15. Two men each working for 8 hours a day can cultivate an acre of land in 4 days. How long would 6 men, each working 4 hours a day take to cultivate 4 acres? (3 mks)

16. Find the equation of a straight line which is perpendicular to the line $8x + 2y - 3 = 0$ given that they intersect at $y = 0$ leaving your answer in a double intercept form. (3 mks)

SECTION B

17. (a) Use the mid-ordinate rule to estimate the area bounded by the curve $y = x + 3x^{-1}$, the x-axis, lines $x = 1$ and $x = 6$. (4 mks)

(b) Find the exact area of the region in (a) above. (3 mks)

(c) Calculate the percentage error in area when mid-ordinate rule is used. (3 mks)

18. A car whose initial value is Ksh 600,000 depreciates at a rate of 12% p.a. Determine:
    (a) Its value after 5 years. (4 mks)

    (b) Its value of depreciation after 5 years. (2 mks)

    (c) The number of year it will take for the value of the car to be Ksh 300,000 (3 mks)

19. A square whose vertices are P (1,1) Q (2,1) R(2,2) and S (1,2) is given an enlargement with centre at (0,0). Find the images of the vertices if the scale factors are: (3 mks)

(i) -1

(ii) ½

(iii) 3

(b) If the image of the vertices of the same square after enlargement are P^1 (1,1), Q^1 (5,1), R^1(5,5) and S^1 (1,5) find:

(i) the centre of enlargement (2 mks)

(ii) the scale factor of the enlargement (2 mks)

20. On the graph paper provided plot the point P (2,2) Q (2,5) and R (4,4).

(a) Join them to form a triangle PQR. (1 mk)

(b) Reflect the triangle PQR in the line X = 0 and label the image as P^1 Q^1 R^1. (2 mks)

(c) Triangle PQR is given a translation by vector. T $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$ to P^{11} Q^{11} R^{11}. Plot the triangle P^{11} Q^{11} R^{11}. (3 mks)

(d) Rotate triangle P^{11} Q^{11} R^{11} about the origin through -90^0. State the coordinates of P^{111} Q^{111} R^{111}. (3 mks)

(e) Identify two pair of triangles that are direct congruence. (1 mk)

21. Three warships P, Q and R are at sea such that ship Q is 400 km on a bearing of $N30^0$ E from ship P. ship R is 750 km from ship Q and on a bearing of $S60^0E$ from ship Q. an enemy warship is sighted 1000 km due south of ship Q.

(a) Use scale drawing to locate the position of ships P, Q, R and S. (4 mks)

(b) Find the compass bearing of: (2 mks)
   (i) Ship P from ship S
   (ii) Ship S from ship R

(c) Use scale drawing to determine: (2 mks)
   (i) The distance of S from P
   (ii) The distance of R from S

(d) Find the bearing of: (2 mks)
   (i) Q from R
   (ii) P from Q

22. The table below shows the amount in shillings of pocket money given to students in a particular school.

Pocket money (Kshs)	201 – 219	220 – 229	230 – 239	240 – 249	250 – 259	260 – 269	270 – 279	280 – 289	290 – 299
No. of students	5	13	23	32	26	20	15	12	4

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

(b) Calculate the mean amount of pocket money given to these students to the nearest shilling. (4 mks)

(c) Use the same axes to draw a histogram and a frequency polygon on the grid provided. (5 mks)

23. Given that points X (0,-2), Y (4, 2) and Z (x,6);

(a) Write down the column vector $\overrightarrow{XY}$. (1 mk)

(b) (i) Find $\left|\overrightarrow{XY}\right|$ leaving your answer in index form. (3 mks)

(ii) Given that $\left|\overrightarrow{XZ}\right|$ = 11.3170, find the coordinates of Z. (3 mks)

(c) Find the mid-point of the line YZ. (3 mks)

24. A bus and a matatu left Voi from Mombasa, 240 km away at 8.00 am. They travelled at 90 km/h and 120 km/h respectively. After 20 minutes the matatu had a puncture which took 30 minutes to mend. It then continued with the journey.

(a) How far from Voi did the catch up with the bus. (6 mks)

(b) At what time did the matatu catch up with the bus? (2 mks)

(c) At what time did the bud reach Mombasa? (2 mks)

PREDICTION 6

NAME:…… INDEX NO.……..……..…

SIGNATURE: ……..... ……. DATE: .....

121/1
MATHEMATICS
PAPER 1
TIME: 2 ½ HOURS

KCSE PREDICTION 6
Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

- Write your name and Admission number in the spaces provided at the top of this page.
- This paper consists of two sections: Section I and Section II.
- Answer ALL questions in section 1 and ONLY FIVE questions from section II
- All answers and workings must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTION II **GRAND TOTAL**

17	18	19	20	21	22	23	24	TOTAL

This paper consists of 15 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no pages are missing.

SECTION I (50 marks)

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

1. Without using mathematical tables or calculators, ***evaluate*** $\sqrt{\frac{1408 \times 0.594 \times 0.012}{6.05 \times 125}}$ leaving your answer as a simplified fraction (3mks)

2. Two similar solids have surface areas $48cm^2$ and $108cm^2$respectively. Find the volume of the smaller solid if the bigger one has a volume of $162cm^3$. (3mks)

3. A triangle flower garden has an area of $28m^2$. Two of its edges are 14 metres and 8 metres. Find the angle between the two edges. (2mks)

4. A watch which looses a half a minute every hour.It was set read the correct time at 0445hr on Monday. Determine in twelve hour system the time the watch will show on Friday at 1845hr the same week. (3mks)

5. Find the least whole number by which $2^5 \times 5^4 \times 7^3$ must be multiplied with to get a perfect cube. What is the cube root of the resulting number? (3mks)

6. A woman went on a journey by walking, bus and matatu. She went by bus $\frac{4}{5}$of the distance, then by matatu for $\frac{2}{3}$ of the rest of the distance. The distance by bus was 55km more than the distance walked. Find the total distance. (3mks).

7. Simplify the expression: $\frac{9t^2 - 25a^2}{6t^2 + 19at + 15a^2}$ (3mks).

8. Solve the simultaneous equations

X y = 4 and x + y = 5 (4mks)

9. The size of an interior angle of regular polygon is $3x^o$. While its exterior angle is $(x - 20)^o$. Find the number of sides of the polygon. (3mks)

10. A Kenya company received US Dollars M. The money was converted into Kenya Shillings in a bank which buys and sells foreign currencies.

	Buying (in Ksh)	Selling (in (Ksh)
1 Sterling Pound	125.78	126.64
1 Us Dollar	75.66	75.86

(a) If the company received Ksh.15, 132,000, calculate the amount, M received in US Dollar.

(2mks)

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

11. A plot in a shape of rectangle measurers 608m by 264m. Equidistance fencing posts are Placed along its length and breadth as far apart as possible. Determine

a) The maximum distance between the posts. (1mk)

b) The number of posts used. (2mks)

12. Given that $\sin (x - 30)^0 - \text{Cos } (4x)^0$. Find the $\tan (2x+30)^0$ (3mks)

13. A trader sold a dress for Ksh 7200 allowing a discount of 10% on the marked price. If the discount had not been allowed the trader would have made a profit of 25% on the sale of the suit. Calculate the price at which the trader bought the dress. (3mks)

14. In august, Joyce donated $\frac{1}{6}th$ of her salary to a children's home while Chui donated $\frac{1}{5}th$ of his salary to the same children's home. Their total donation for August was Kshs 14820. In September, Joyce donated $\frac{1}{8}th$ of her salary to the children's home while Chui donated $\frac{1}{12}th$ of his salary to the children's home. The total donation for September was Kshs 8675. Calculate Chui's monthly salary. (4mks)

15.Simplify completely $\frac{3^{n+3}-3^{n+1}}{4\times 3^{n+2}}$ (3mks)

16.In what ratio should grade **A** tea costing Sh. 180 per kg be mixed with grade **B** tea costing Sh. 300 per kg to produce Nganomu Tea which when sold at Kshs 270 a profit of 20% is realized? (3mks)

SECTION II (50 MARKS)

Answer any five questions from this section in the spaces provided

. 17. Atambo poured spirit into a test tube which has hemispherical bottom of inner radius 1.5cm. He noted that the spirit is 8cm high.

(a) What is the area of surface in contact with spirit? (4mks)

(b) Calculate volume of spirit in the test tube. (4mks)

(c) If Atembo obtained the mass of the spirit as 10g. Calculate the density of the spirit. (2mks).

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

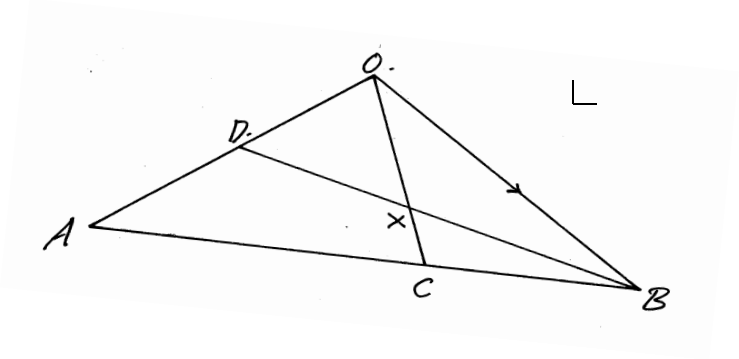
(a) The time the bus arrived at Eldoret. (2mks)

(b) The time of the day the two met. (4mks)

(c) The distance of the bus from Eldoret when the car arrived in Nairobi. (2mks)

(d) The distance from Nairobi when the two met. (2mks)

19. The figure below C is a point on AB such that AC**:** CB=3:1 and D is the mid –point of OA. OC and BD intersect at X.



Given that **OA** = **a** and **OB** = **b**

(a) Write the vectors below in terms of **a** and**b**.

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

(ii) **OC** (2mks)

(iii) **BD** (1mk)

(b) If **BX** = h **BD**, express **OX** in terms of **a**, **b**, and h. (1mk)

(c) If **OX** = K**OL**, find h and k. (4mks)

(d) Hence express **OX** in terms of **a** and**b** only. (1mk).

20. (a) Using a ruler and a pair of compasses only, draw a triangle ABC such that AB = 5cm,BC = 8cm and <ABC = 60^o. Measure AC and <CAB. (4mks)

(b) Find a point O in Δ ABC such that OA = OB = OC. (2mks).

(c) Construct a perpendicular from A to BC to meet BC at D. Measure AD. Hence calculate the area of the Δ ABC (4mks)

21. A boy started walking due East from a dormitory 100m South of a bore-hole. He walked to the school library from which the bearing of the bore-hole is 315^{o}. He then walked on a bearing of 030^{o} to the water tank. From the water tank he went west to the bore-hole.

(a) Using a scale of 1cm to represent 20m, construct a diagram to show the positions of the tank, borehole, dormitory and library. (5mks).

(b) Find the distance and bearing of the bore-hole from the water tank. (3mks)

(c) Calculate the total distance covered by the boy. (2mks).

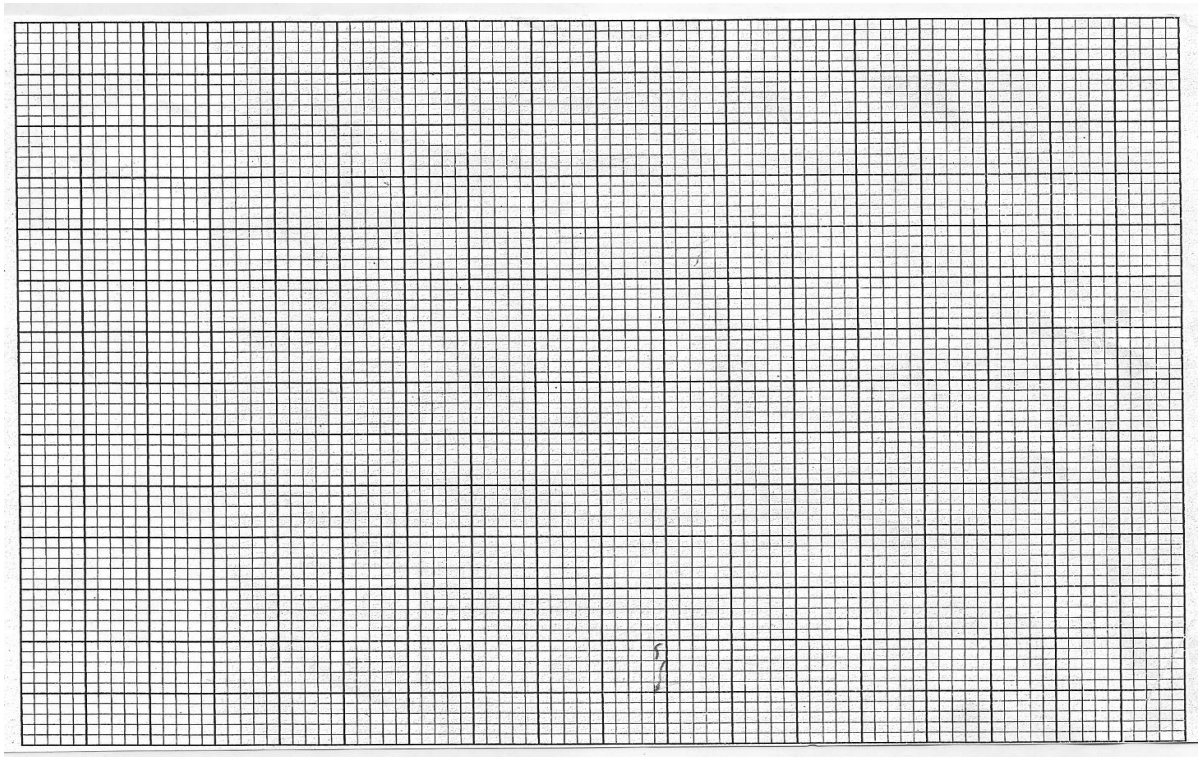
22. The table below shows the amount in shillings of pocket money given to students in a particular school.

Pocket Money (Ksh)	210 – 219	220- 229	230- 239	240- 249	250- 259	260- 269	270- 279	280- 289	290- 299
No. of Students	5	13	23	32	26	20	15	12	4

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

(b) Calculate the mean amount of pocket money given to these students to the nearest shilling. (4mks).

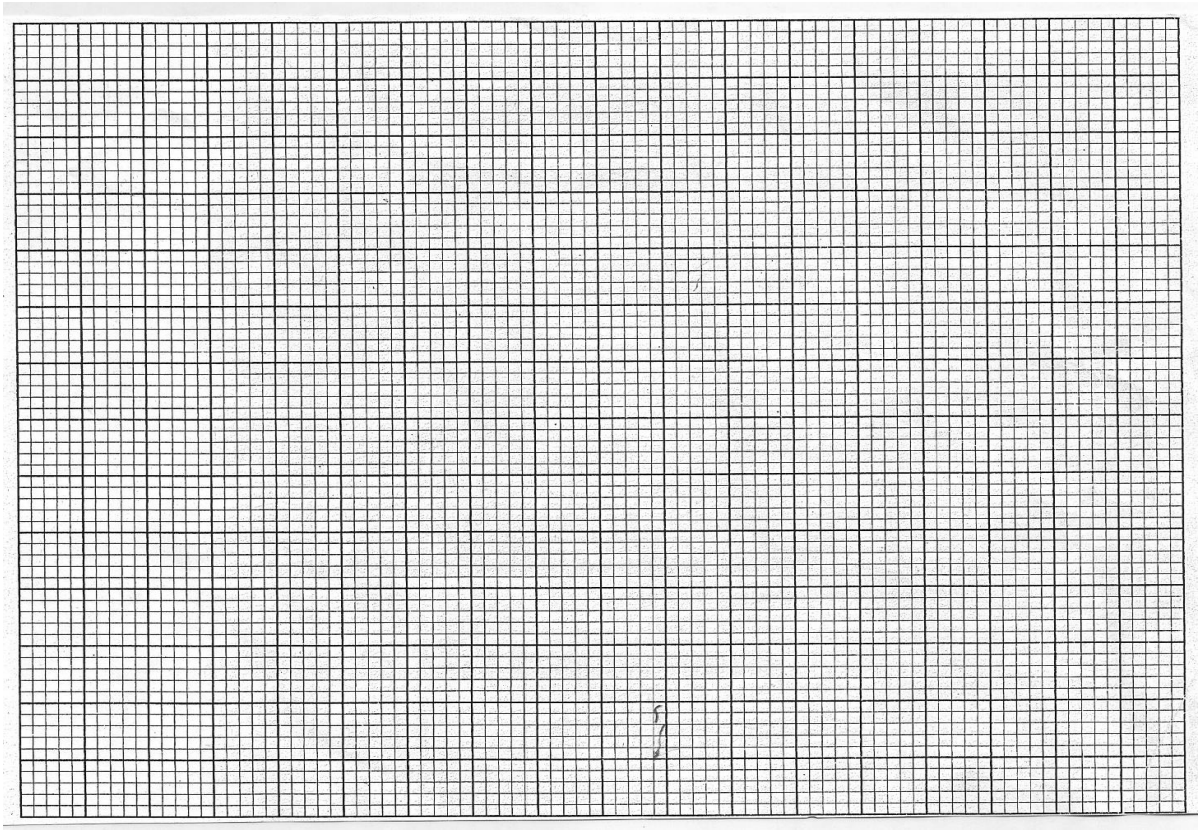
(c) Use the same axes to draw a histogram and a frequency polygon on the grid provided (5mks)



23. (a)Given that $y = 7 + 3\chi - \chi^2$, complete the table **below**. (2mks)

χ	-3	-2	-1	0	1	2	3	4	5	6
y	-11			7						-11

(b)On the grid provided and using a suitable scale draw the graph of $y = 7 + 3\chi - \chi^2$.(3mks)



(b)On the same grid draw the straight line and use your graph to solve the equation

$\chi^2 - 4\chi - 3 = 0$. (3mks)

(c)Determine the coordinates of the turning point of the curve. (2mks)

24. A straight line L_1 has a gradient $^{-}½$ and passes through point P (-1, 3). Another line L_2 passes through the points Q (1, -3) and R (4, 5). Find.

(a) The equation of L_1. (2mks)

(b) The gradient of L_2. (1mk)

(c) The equation of L_2. (2mks)

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

(e) The equation of a line through R parallel to L_1. (2mks)