

NAME.....INDEX NO

CANDIDATE'S SIGNATURE

121/1

Date:

MATHEMATICS

PAPER 1

JULY/AUGUST-2015

TIME: 2½ HOURS

KAKAMEGA CENTRAL SUB-COUNTY JOINT EVALUATION EXAM-2015

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

121/1

MATHEMATICS

PAPER 1

TIME: 2½ HOURS

INSTRUCTIONS TO THE CANDIDATES

- Write **your name** and **index number** in the spaces provided above
- This paper contains two sections; **Section 1** and **Section 11**.
- Answer all the questions in **section 1** and only **five** questions from **Section 11**
- All workings and answers must be written on the question paper in the spaces provided below each question.
- Marks may be given for correct working **even if** the answer is wrong.
- Non programmable silent electronic calculators and KNEC Mathematical tables may be used **EXCEPT** where stated otherwise.
- Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.

FOR EXAMINERS'S USE ONLY

Section 1

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

Section 11

Question	17	18	19	20	21	22	23	24	Total
Marks									

GRAND TOTAL

This paper consists of printed pages.

Candidates should check the question paper to ascertain all the pages are printed as indicated

And no questions are missing.

SECTION 1 (50 MARKS)

Answer all questions in the spaces provided.

1. Evaluate $5\frac{1}{2} - 1\frac{1}{7} (1\frac{1}{5} + \frac{9}{10}) + \frac{1}{3}$ of $(\frac{2}{3} \div \frac{5}{6})$ (3mks)

2. The interior angles of hexagon are $(4x - 5)^\circ$, $(4x + 5)^\circ$, $3x^\circ$, $(4x + 26)^\circ$, $2x^\circ$ and $(2x + 5)^\circ$
Find the value of x (3mks)

3. The diagram below, not drawn to scale is a regular pentagon circumscribed in a circle of radius 10cm at centre O.

Find

a) The length of any side of the pentagon. (2mks)

b) The area of the shaded region (2mks)

4. Solve $4x - 3 \leq 6x - 1 < 3x + 16$ and state all the integral values (3mks)

5. 3 pens and 5 exercise books cost Shs. 111. 4 pens and 3 exercise books cost Kshs 18 less.
Determine the cost of each item (3mks)

6. The scale of a map is given as 1:50,000
Find the actual area in hectares of a region represented by a triangle of sides 6cm by 7cm by 8cm
(give your answer to the nearest whole number. (3mks)

7. A watch which loses a half –minute every hour was set to read the correct time at 0545h on Monday. Determine the time in the 12 hour system the watch will show on the following Friday at 1945h
(3mks)

8. 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 $\frac{3}{4}$ of this money. He changed the balance to US dollars after his stay. If he was not charged any commission for this last transaction, calculate to the nearest US dollars the amount he received. (3mks)

9. The table below shows marks obtained by a form three class in a certain school

Marks (x)	$8 \leq x < 9$	$9 \leq x < 11$	$11 \leq x < 13$	$13 \leq x < 16$	$16 \leq x < 20$	$20 \leq x < 21$
No. of students	2	6	8	3	2	1

Use the table below to represent the information on a histogram (3mks)

10. Use tables of reciprocals, squares and cube roots to evaluate the following (4mks)

$$\sqrt{\frac{3}{0.06047} + 23.9156^2}$$

11. The net of a solid is shown below

Diagram

a) Sketch the solid if ABCD is the base (1mk)

b) Calculate the angle that the slant height makes with the base. (2mks)

12. Solve for x in (4mks)

$$\left(\frac{4}{9}\right)^x \times (8)^{1-x} = 486$$

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

14. Simplify the expression

$$\frac{9t^2 - 25a^2}{6t^2 + 19at + 15a^2} \quad (3mks)$$

15. A square based brass plate is 2mm high and has a mass of 10.5kg. The density of the brass is 8.4 g/cm^3 .
Calculate the length of the plate in centimeters. (3mks)

16. A group of 10 soldiers set off with enough food to last 7 days. After 4 soldiers deserted, how many more days will the food last for the remaining soldiers? (3mks)

SECTION B (50 MARKS)

Answer ONLY FIVE questions in this section in the spaces provided

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 persons share if the profit made after three years was Kshs, 187,000. (4mks)

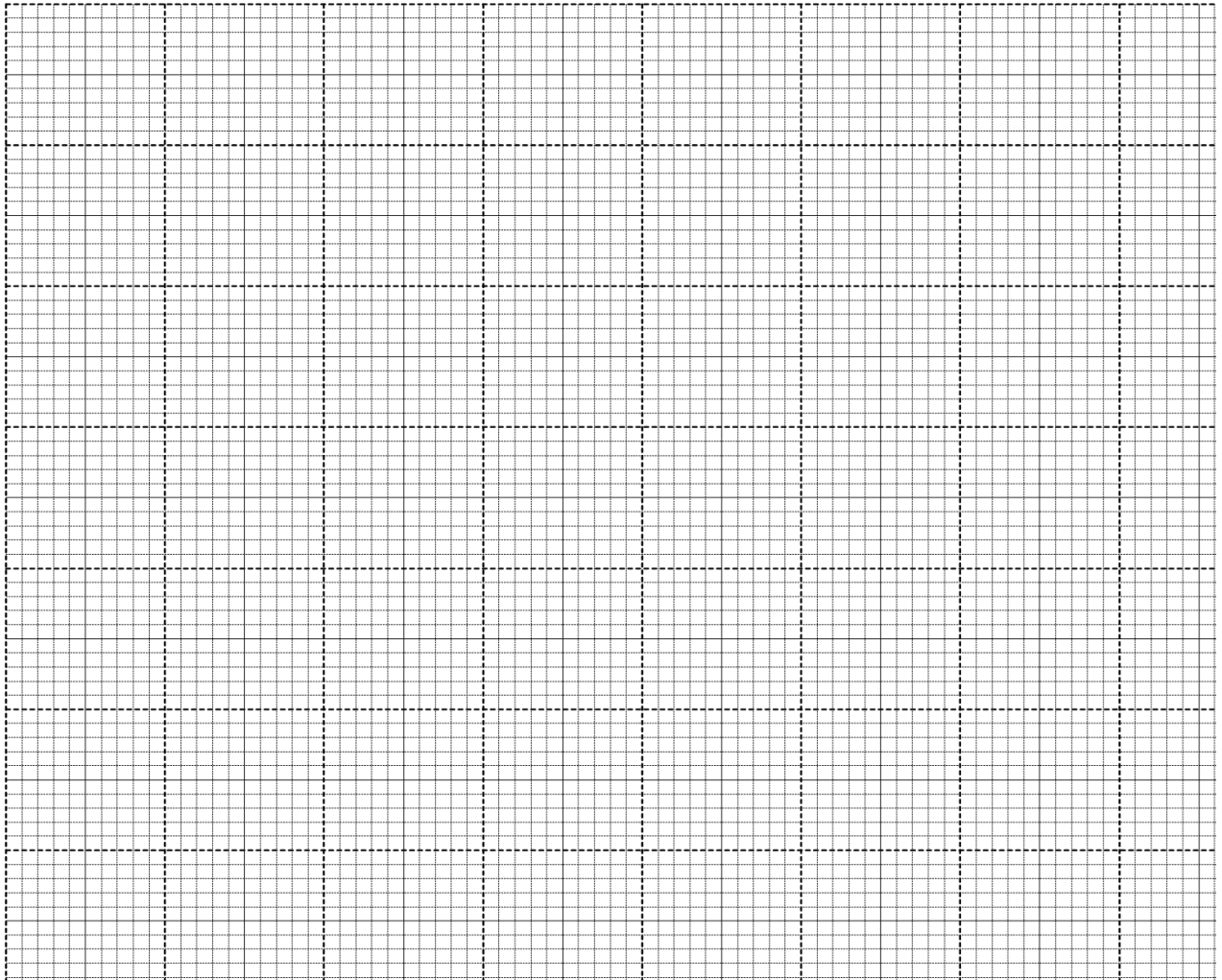
- c) If each of them invested their shares in the business, find their new individual investments at the beginning of the fourth year. (3mks)

18. In a certain mathematical relationship, the values of A and B are observed to satisfy the relationship $B = CA + KA^2$ where C and K are constants.

Below is a table of values of A and B.

A	1	2	3	4	5	6
B	3.2	6.75	10.8	15.1	20	25.2

- a) By drawing a suitable line graph, determine the values of C and K (7mks)



b) Hence write the relationship between A and B (2mks)

c) Determine the value of B when A = 7 (1mk)

19. A company employee earns a monthly basic salary of Kshs. 25,000 and is also given a taxable allowance amounting to Kshs. 10,480. Using the rate of taxation below

Monthly taxable income (Kshs.)	Rate in Kshs / pound
1 – 4350	2
4351 – 8900	3
8901 – 13455	4

13451 – 18005	5
18006 and above	6

a) Calculate the employees taxable income (2mks)

b) If the employee is entitled to a personal tax relief of Kshs. 800 per month, determine the net tax (5mks)

c) If the employee was given 40% increase in his income, calculate the percentage increase in his income tax (3mks)

20. 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 and comes to rest at a constant retardation of 1.5meters per second.

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)

21. A youth group decided to raise Kshs. 480,000 to buy a piece of land costing Kshs. 80,000 per hectare.

Before the actual payment was made, four of the members pulled out and each of those remaining had to pay an additional Kshs. 20,000.

a) If the original number of the group members was x write down

i) An expression of how much each was to contribute originally (1mk)

ii) An expression of how much the remaining members were to contribute after four pulled out. (1mk)

b) Determine the number of members who actually contributed towards the purchase of the land (5mks)

c) Calculate the ratio of the supposed original contribution to the new contribution (1mk)

d) If the land was sub-divided equally, find the size of land each member got (2mks)

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

Given that $\angle SUR = 25^\circ$ $\angle URP = 60^\circ$ $TU = UX$ and UX is parallel to the diameter; giving reasons calculate

a) Angle TOU (2mks)

b) Angle XUP (2mks)

c) Angle STR (2mks)

d) Reflex Angle SXU (2mks)

e) Angle RPU (2mks)

23. Four towns **P**, **Q**, **R**, and **S** are such that the town **Q** is 120 Km due to East of town **P**. Town **R** is 160km due north of town **Q**, town **S** is on a bearing of 330° from **Q** and on a bearing of 300° from **R**.

a) Using a ruler and a pair of compass only, show the relative position of towns **P**, **Q**, **R**, and **S**.

Take the scale of 1cm to rep. 50km.

(5mks)

b) Use the drawing to determine

i) The distance **SP** in Km

(2mks)

ii) The bearing of **S** from **P**

(1mk)

iii) How far north **S** is from line **QP** produced

(2mks)

24. A glass model of a rocket is made by sticking a circular cylinder of radius 3cm and height 4cm as show

a) Determine the volume of the model in cm^3 (4mks)

b) If the density of the glass is 2.6 g/cm^3
Calculate the mass of the model (2mks)

c) The model is now melted and recast into a solid sphere. Calculate the radius of the sphere to 4 significant figures. (4mks)

NAME..... INDEX NO

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PAPER 2
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121/2
MATHEMATICS
PAPER 2
TIME:2 ½ HOURS

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Section 1

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Marks																	

Section 1I

Question	17	18	19	20	21	22	23	24	Total
Marks									

GRAND TOTAL

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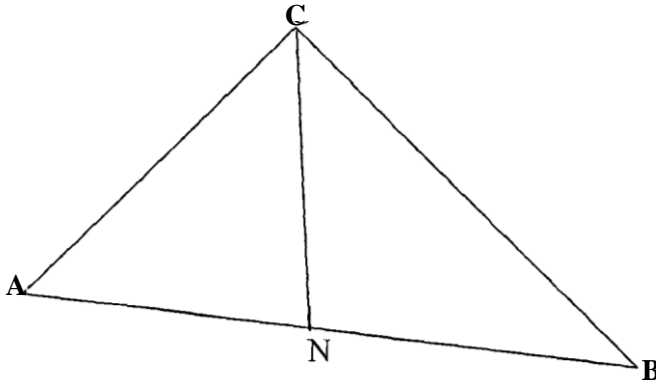
1. Solve by completing the square method $2x^2 - 7x + 6 = 0$ (3mks)

2. Determine the term independent of x in the expansion of (3mks)

$$\left(3x + \frac{1}{8x}\right)^4$$

3. Make n the subject of the formula $\frac{r}{p} = \frac{m}{\sqrt{n-1}}$ (3mks)

4. The figure below $\angle A=62^\circ$ $\angle B = 41^\circ$ $BC=8.4\text{cm}$ and CN is the bisector of $\angle ACB$



Calculate the length of CN to 1 decimal place.

(3mks)

5. (a) Find the inverse of the matrix $\begin{pmatrix} 4 & -1 \\ -3 & 2 \end{pmatrix}$

(1mk)

(b) Hence solve the simultaneous equations

(2mks)

$$4x - y = 8$$

$$-3x - 2y = -1$$

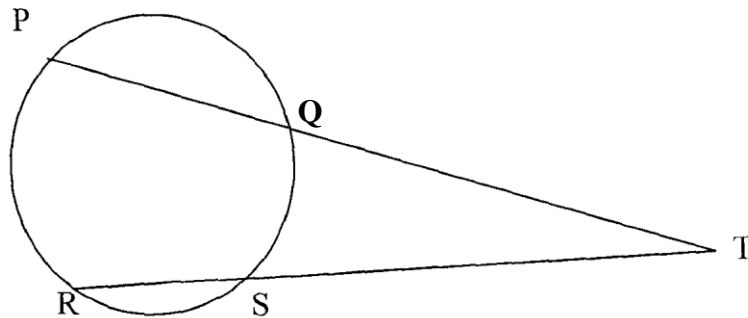
6. Simplify $\frac{1}{\sqrt{2}-1} - \frac{\sqrt{2}}{\sqrt{2}+1}$ (3mks)

7. Find the G.C.D of $21a^4x^3y$, $35a^2x^4y$ and $28a^3xy^4$ (3mks)

8. By correcting each number to one significant figure, approximate the value of 578×0.005 . Hence calculate the percentage error arising from the approximate (3mks)

9. The position vector of A and B are $a=4i+4j-k6$ and $b=10i+4j+12k$ D is a point on AB such that $\overline{AD}:\overline{DB}$ is 2:1. Find the co ordinates of D (3mks)

10. The figure below shows a circle centre O, with chords \overline{PQ} and \overline{RS} produced to meet externally at T. Given $\overline{RT}=24\text{cm}$, $\overline{PQ}=7\text{cm}$, $\overline{QT}=9\text{cm}$ find ST (2mks)



11. Without using logarithm tables find the value of x in the equation (3mks)

$$\log x^3 + \log 5x = 5 \log 2 - \log \frac{2}{5}$$

12. The points with co-ordinates (6,1) and (-4,9) are the ends of a diameter of a circle centre A

(a) Find the co ordinates of the centre (1mk)

(b) Determine the equation of the circle in the form $x^2+y^2+ax+by=C$ where a,b and c are constants (3mks)

13. A quantity V is partly constant and partly varies inversely as the square of W. If W=2 when V=14 and W=3 when V=9, write an equation connecting V and W hence find V when W=6 (4mks)

14. There are two grades of tea, 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 Ksh.75 per Kg
(3mks)

15. Calculate the amount obtained if Sh.60,000 is invested for 2 years at the rate of 8% per annum compounded semi-annually
(3mks)

16. The masses in kilogram of 20 bags of maize were; (4mks)

90 94 96 99 95 102 105 95 96 102 99 105
90 94 99 98 100 96 102 105

Using an assumed mean of 96Kg, calculate the mean mass per bag of the maize

SECTION B (50 MARKS)

Answer any five questions from the section in the spaces.

17. A tank has two inlet taps P and Q and the outer taps R. When empty, the tank can be filled by the tap P alone in $4\frac{1}{2}$ hours or by tap Q alone in 3 hours when full, the tank can emptied in 2 hours by tap R. The tank is initially empty. Find the time taken to fill the tank

(a)(i) If tap R is closed and taps P and Q are opened at the same time (2mks)

(ii) If all the three taps are opened at the same time (2mks)

(b) The tank is initially empty and the three taps are opened as follows

P at 8:00am

Q at 8.45am

R at 9.00am

(i) Find the fraction of the tank that would be filled by 9.00am (3mks)

(ii) Find the time the tank would be fully filled up (3mks)

18. The table below shows marks obtained by 120 students in the maths test

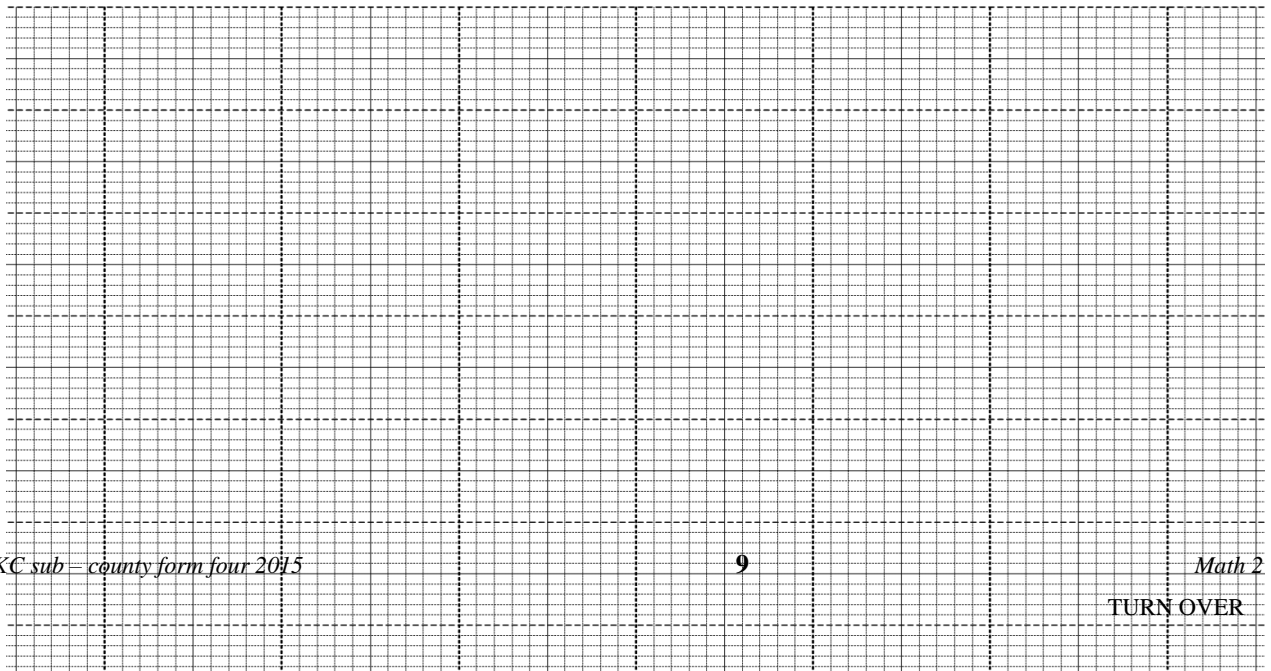
Marks	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
No. of students	5	6	8	13	25	23	17	10	8	5

(a) Calculate:

(i) The mean mark using 27 as assumed mean (2mks)

(ii) The standard deviation of the marks (3mks)

(b) On the grid provided, draw the Ogive of the above data and use it to estimate



(i) Median (4mks)

(ii) Interquartile range (1mk)

19. The probability of a candidate passing her secondary examination is $\frac{4}{5}$. If she passes his examination the probability of her joining the university is $\frac{2}{3}$. If she fails her examination, the probability of her joining the university is $\frac{1}{4}$. If she joins the university the probability of her getting a job is $\frac{6}{7}$ and if she does not join the university the probability of her getting a job is $\frac{2}{9}$. Using a tree diagram, find,

(a) The probability that she fails her examination (3mks)

(b) Find the probability that she got a job after failing her secondary examination (2mks)

(c) The probability that she joins university (2mks)

(d) The probability that she did not get a job (3mks)

20. (a) Given the transformation matrices $T_1 \begin{pmatrix} 2 & 1 \\ -1 & -2 \end{pmatrix}$ and $T_2 = \begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix}$ and that transformation T_1 followed by T_2 can be replaced by a single transformation T .

Write down the matrix T (2mks)

(b) Find the inverse of matrix T (2mks)

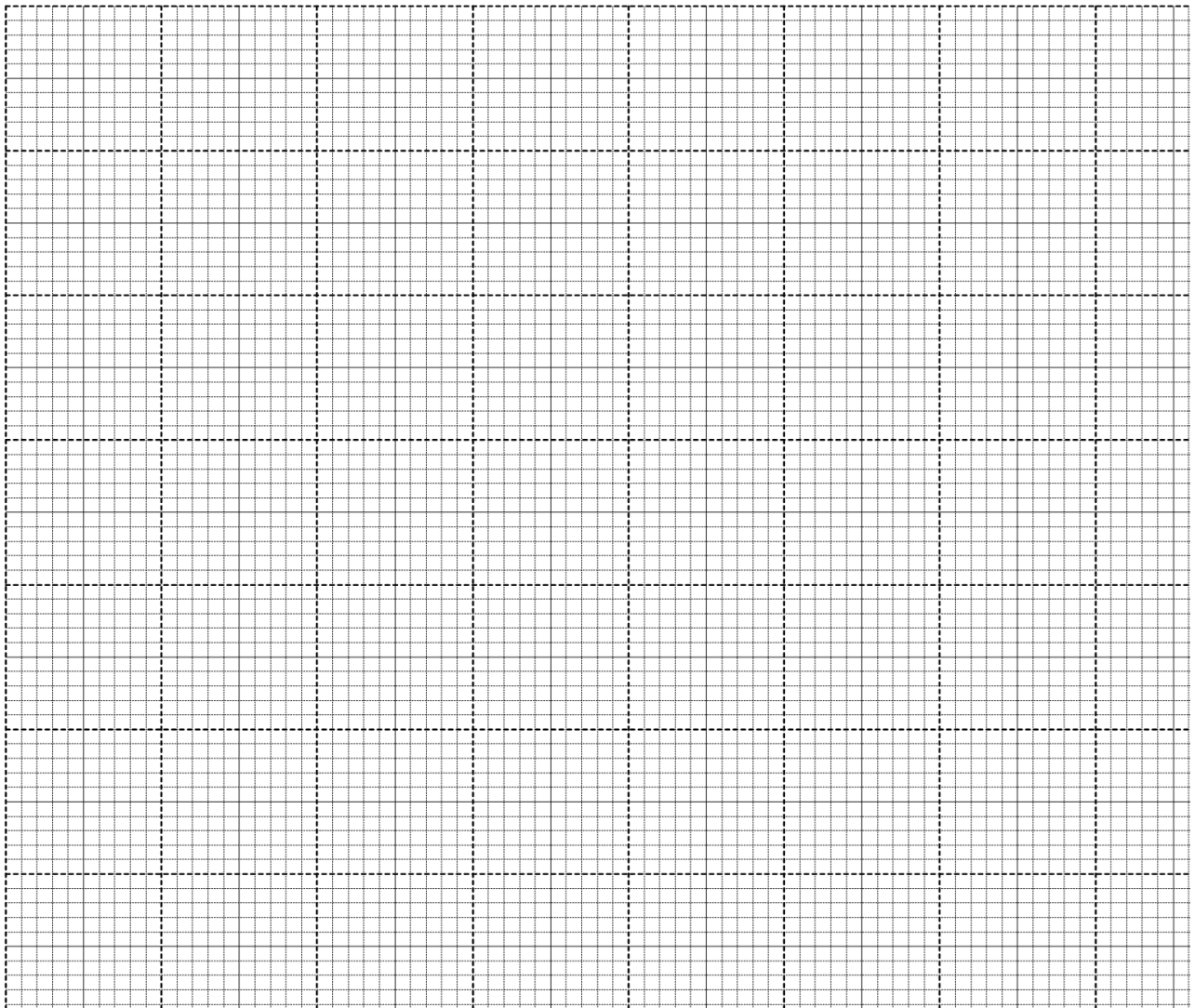
(c) The points $A''(7,-11)$ $B''(-7,-13)$, $C''(8,8)$ are the images of points A, B, C and D respectively under transformation T_1 followed by T_2 write down the coordinate of A, B, C and D (4mks)

(d) Find the co ordinates of A'B'C' and D' the images of A,B,C and D respectively under transformation T2 (2mks)

21. (a) Complete the table below given that $y=2 \sin 2x$ and $y= 3 \cos (x+45)$ (2mks)

Y°	0	20°	40°	60°	80°	100°	120°	140°	160°	180°
2 Sin 2x	0.0		1.97		0.68	-0.68	-1.73		-1.28	0.00
3 Cos (x+45)	2.12	1.27		-0.78		-2.46			-2.72	-2.12

(b) Use the data on the table above to draw the graph of $y=2 \sin 2x$ and $y=3 \cos (x+45^\circ)$ (5mks)



(c) State the amplitude and the period of the curve $y=2 \sin 2x$ (2mks)

(d) Use the graphs to solve the equation $2 \sin 2x - 3 \cos (x+45^\circ) = 0$ for $0^\circ \leq x \leq 180^\circ$ (1mk)

22. (a) The first term of a G.P is 4. If the common ratio is 2, find the greatest number of terms that will give a sum less than 40 (4mks)

(b) The 2nd, 4th and 7th terms of a A.P are the first 3 consecutive terms of a G.P. Find

(i) The common ratio (3mks)

(ii) The sum of the first eight terms of the G.P if the common difference of AP is 2 (3mks)

23. (a) Without a set square or a protractor construct triangle ABC such that $\overline{AB} = \overline{AC} = 5.4$ and angle $\angle ABC = 30^\circ$

(b) Measure \overline{BC}

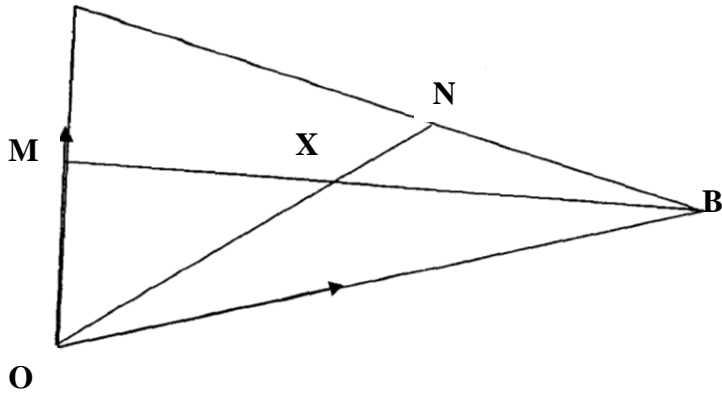
(c) A point P is always on the same side of BC as A. Draw the locus of P such that angle BAC is always twice $\angle BPC$ (3mks)

(c) Drop a perpendicular from A to meet BC at D measure AD (1mk)

(d) Calculate the area of triangle ABC (1mk)

24. In the figure below $OA = \mathbf{a}$ and $OB = \mathbf{b}$. M is the midpoint of OA and $AN:NB = 2:1$

A



(a) Express in terms of **a** and **b**

(i) **BA** (1mk)

(iii) **BN** (1mk)

iii **ON** 2mks

(b) Given that $\vec{BX} = h\vec{BM}$ and $\vec{OX} = k\vec{ON}$ determine the values of **h** and **k** (6mks)