NAME……………………………………………….. INDEX NO…………………............

121/1   CANDIDATE'S SIGN…..………...
MATHEMATICS ALT A
PAPER 1   DATE………..……………………..
JULY/AUGUST, 2015
TIME: 2½ HOURS

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2015

Kenya Certificate of Secondary Education
MATHEMATICS ALT A
PAPER 1
TIME: 2½ HOURS

INSTRUCTION TO CANDIDATE'S:
(a) *Write your name, index number 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.   Evaluate: $\dfrac{44 - -28}{12 \times -2} - \dfrac{8^2 \times -12 - 24}{96 \div -12 \times 9}$ (3 marks)

2.   A basket ball team play 10 matches in a tournament. The following are scores in each
     match.
     9, 15, 17, 16, 7, 20, 21, 15, 10, 12
     Determine:
     (a)   the mode.   (1 mark)

     (b)   the median.   (2 marks)

3.   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 marks)

4.   Given that Cos $(\chi + 20°) = 0.7660$, find χ for $0° \leq \chi \leq 360°$.   (3 marks)

5.   (a)   Express 1050 in terms of its prime factors.   (1 mark)

     (b)   Determine the smallest positive number such that 1050p is a perfect square.   (2 marks)

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

7.   A line P passes through the point (-2, 5) and has a gradient of $\dfrac{-3}{4}$. Another line Q is perpendicular to P and meets it at a point where $y = \dfrac{1}{2}$ find equation of Q.   (4 marks)

8.   Simplify the expression completely.

$$\dfrac{(\chi + 2y)(\chi - 2y) - (\chi - 2y)^2}{\chi^2 - 4y^2}$$ (3 marks)

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

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

10. A cylindrical pipe 5 metres long has an internal diameter 28 millimetres and an external diameter of 42 millimetres. The density of the material that makes the pipe is 1.45g/cm³. Calculate the mass of the pipe in kilograms. $\left(Take\ \pi = \dfrac{22}{7} \right).$ (4 marks)

11. Simplify: $\dfrac{32^{\frac{-1}{5}} \times 8100^{\frac{3}{4}}}{8^{\frac{-1}{2}} \times 5^{\frac{1}{2}} \times 4^{o} \times 4^{\frac{1}{4}}}$. (3 marks)

12. In the figure below PQRS is a rhombus, $\angle$SQR = 55°, $\angle$QST is a right angle and TPQ is a straight line.
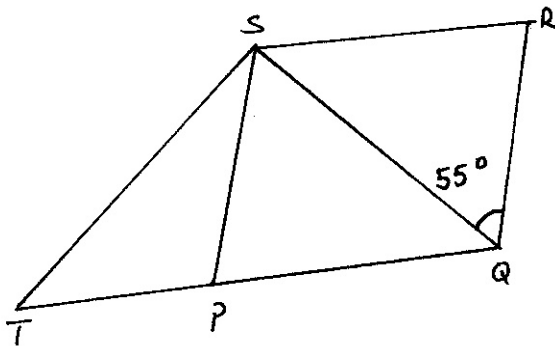

Find the size of the angle STQ. (3 marks)

13. The mass of a mixture A of beans and maize is 72kg. The ratio of beans to maize is 3: 5 respectively. Find the mass of maize in the mixture. (3 marks)

14. A square toilet is covered by a number of whole rectangular tiles of sides 60cm by 48cm. Calculate the least possible area of the room in square metres. (3 marks)

15. Form the inequalities represented by region R.
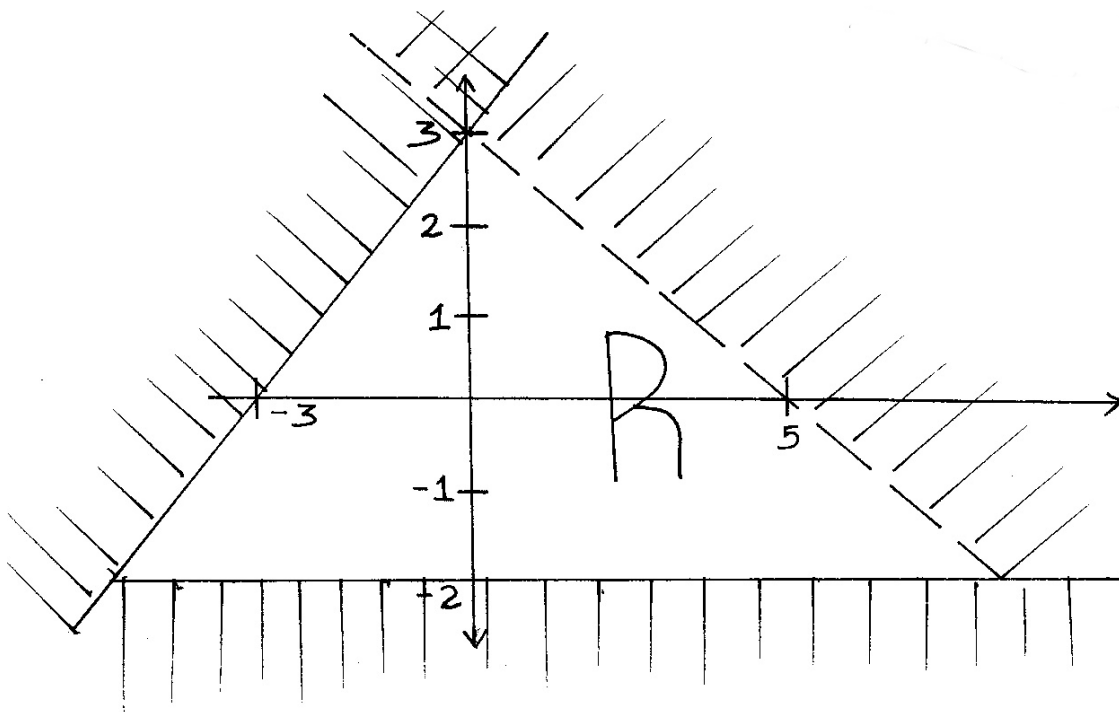
16. A point C is on a line PQ where PQ = 9cm. C divides PQ such that $PC = \dfrac{4}{7}PQ$.

By construction locate C. (3 marks)

SECTION B: (50 MARKS)

Answer any FIVE questions from this section in the spaces provided.

17. A construction company requires to transport 288 tonnes of stones to sites P and Q. The company pays 48,000 to transport 48 tonnes of stones for every 28km. Joyce transported 96 tonnes to site P, 49km away.
    (a) Find how much she was paid.   (3 marks)

    (b) Joyce spends Ksh.6000 to transport every 8 tonnes of stones to site P. Calculate her total profit.   (3 marks)

(c)   Kimani transported the remaining stones to site **Q**, 84km away. If he made 44% profit, find his transport cost.   (4 marks)

18.   (a)   A square carpet is laid on the floor of a room so that one of its sides is against a side of a room. If leaves strips of uncovered floor 1m wide along the two opposite sides and 2m wide along the remaining side. If the area of the room is 64m², find the dimensions of the carpet.   (6 marks)

(b)   Solve the equation: $\dfrac{y + 3}{24} = \dfrac{1}{y - 2}$.   (4 marks)

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

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

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

(d)   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 marks)

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

Mathematics Paper 1   *10*   *Cekenas Joint Mock*

20.   A truck left town X at 11.45am and travelled towards town Y at an average speed of 60km/hr. A car left town X at 2.15pm on the same day and travelled along the same road at an average speed of 100km/hr. The distance between the two towns is 500km.
      (a)   Calculate the time of the day when the car overtook the truck.   (4 marks)

(b)   The distance from Y when the car overtook the truck.   (3 marks)

(c)   After overtaking the bus, both vehicles continued towards Y at their original speeds. Find how long the car had to wait at town Y before the truck arrived.   (3 marks)

Mathematics Paper 1   *11*   *Cekenas Joint Mock*

21.   The displacement S metres of a moving particle after t seconds is given by
        $S = 2t^3 - 5t^2 + 4t + 2$

Determine

(a)   the velocity of the particle when $t = 2$.   (3 marks)

(b)   the value(s) of t when the particle is momentarily at rest.   (3 marks)

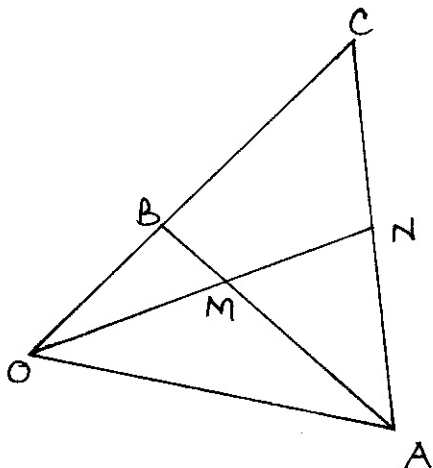(c)   the displacement when the particle is momentarily at rest.   (2 marks)

(d)   the acceleration of the particle when t = 5.   (2 marks)

Mathematics Paper 1   *12*   *Cekenas Joint Mock*

22.   In the figure below, $O\underset{\sim}{A} = \underset{\sim}{a}$, $O\underset{\sim}{B} = \underset{\sim}{b}$ and $O\underset{\sim}{C} = 3O\underset{\sim}{B}$.

(a)   Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$.

(i) $A\underset{\sim}{B}$ (1 mark)

(ii) $A\underset{\sim}{C}$ (1 mark)

(b)   Given that $A\underset{\sim}{M} = \dfrac{3}{4}A\underset{\sim}{B}$ and $A\underset{\sim}{N} = \dfrac{1}{2}A\underset{\sim}{C}$, express $O\underset{\sim}{M}$ and $O\underset{\sim}{N}$ in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$.   (4 marks)

(c)   Hence show that O, M and N are collinear.   (4 marks)

Mathematics Paper 1   *13*   *Cekenas Joint Mock*

23.   Triangle ABC has vertices A (1, 2), B (2, 3) and C (4, 1) while triangle $A^1B^1C^1$ has vertices A^1(1, -2), B^1(2, -3) and C^1(4, -1).

(a)   Draw triangle ABC and $A^1B^1C^1$ on the same grid.   (2 marks)

(b)   Describe fully a single transformation that maps triangle ABC onto triangle $A^1B^1C^1$.   (2 marks)

(c)   On the same grid draw triangle $A^{11}B^{11}C^{11}$ the image of triangle ABC under a reflection in line $Y = -\chi$.   (2 marks)

(d)   Draw $\Delta A^{111}B^{111}C^{111}$ such that it can be mapped onto triangle ABC by a negative quarter turn about the origin.   (2 marks)

(e)   Find the matrix of transformation that maps triangle ABC onto triangle
       A¹¹¹B¹¹¹C¹¹¹.   (2 marks)

Mathematics Paper 1   *14*   *Cekenas Joint Mock*

24.   Arc of a circle of radius 40cm subtends an angle of 126° at the centre of the circle.
       (a)   Calculate:
              (i)   the length of the arc.   (2 marks)

        (ii)   the area of the sector.   (2 marks)

(b)   The sector is folded to form a cone.
        Calculate:
        (i)   the radius of the base of the cone.   (2 marks)

        (ii)   the height of the cone.   (2 marks)

        (iii)   the capacity of the cone in litres.   (2 marks)

NAME…………………………………………….. **INDEX NO**……………………...........

121/2   **CANDIDATE'S SIGN**…..…………...
MATHEMATICS ALT A
PAPER 2   **DATE**……….…………………………..
JULY/AUGUST, 2015
TIME: 2½ HOURS

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2015

Kenya Certificate of Secondary Education
MATHEMATICS ALT A
PAPER 2
TIME: 2½ HOURS

INSTRUCTION TO CANDIDATE'S:
(a) *Write your name, index number 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.   Simplify: $\dfrac{2\frac{1}{4} - 1\frac{2}{3}}{\frac{1}{6} - \left(\frac{-1}{3}\right)^2} - \frac{5}{8}$ *of* 3 .   (4 marks)

2.   (a)   Expand $(2 + \chi)^4$.   (1 mark)

      (b)   Use the expansion in (a) above to. Find the value $(2.01)^4$ to 4d.p.

3.   Solve for y in the equation.   (3 marks)
      $\text{Log}_{10}(3y + 2) - 1 = \text{Log}_{10}(y - 4)$.

4. Make P the subject of the formula. (3 marks)

$$E + \chi = \chi + \sqrt{\frac{P - 3u}{y - 3\chi P}} \ .$$

5. Points P, Q and R are points on the circumference of a circle. If PQ = PR = 13cm and QR = 10cm, what is the radius of the circle. (3 marks)

6. Find the radius and the centre of the circle whose equation is: (3 marks)
$3\chi^2 + 3y^2 - 6\chi + 12y + 3 = 0$.

7. Find C that divide AB externally in the ratio 5: 2, given that
A (3, -6, 9) and B (-15, 3, 12). (3 marks)

8. A two digit number is formed from the first four prime numbers.

    (a)   Draw the table to show the possible out comes.   (2 marks)

    (b)   Calculate the probability that a number chosen from the two digits is even number.   (2 marks)

9. A dam containing 4158m³ of water is to be drained. A pump is connected to a pipe of radius 3.5cm and machine operate for 8 hours per day. Water flows through the pipe at the rate of 1.5m per second. Find the number of days it takes to drain the dam.   (4 marks)

10. The population of two town Kana and Jane for three years were as follows:

    Kana   40,000,   48000,   56000
    Jane   40,000,   48000,   57600

    Calculate the difference in population of the two after six years.

11.   The gradient of a curve at any point given by $2\chi - 1$. Given that the curve passes through point (1, 5). Find the equation of the curve.   (3 marks)

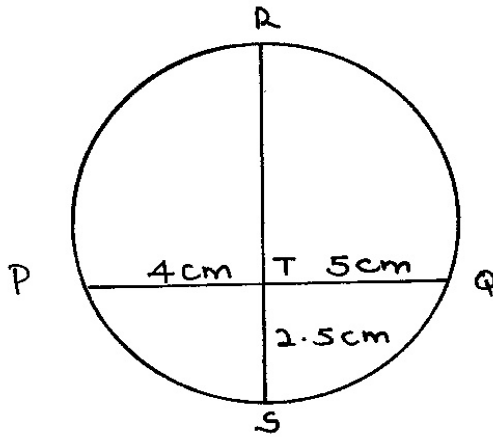12.   Simplify: $\dfrac{3}{\sqrt{7} - \sqrt{2}} - \dfrac{2}{\sqrt{7} + \sqrt{2}}$.   (3 marks)

13.   Given that AB = 6cm construct locus of P such that angle $\angle APB = 90$.   (2 marks)
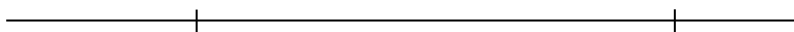
14.   A car valued at Ksh.500,000 in January 2008. Each year, it value depreciates at 12%p.a. Find after how long would the value depreciate to Ksh.250,000.   (3 marks)

15.   In below figure PT = 4cm and TQ = 5cm and TS = 2.5cm find TR by calculation.
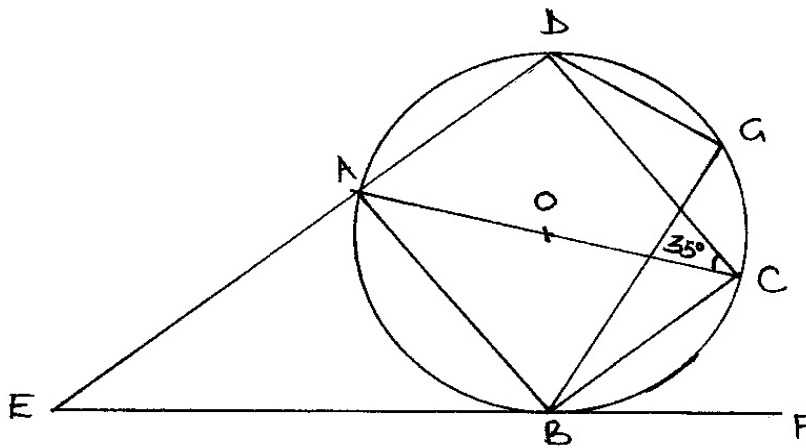
(2 marks)

16.   Given that $2 \leq A \leq 4$ and $0.1 \leq B \leq 0.2$. Find the minimum value of $\dfrac{AB}{A - B}$.   (3 marks)

SECTION B: (50 MARKS)

Answer any FIVE questions from this section in the spaces provided.

17.   Two towns A and B lie on the same parallel of latitudes 60°N. If the longitudes of
        A and B are 42°W and 29°E respectively.
        (a)   Find the distance between A and B in nautical miles along the parallel of
                latitude.   (2 marks)

        (b)   Find the local time at A if at B is 1.00pm.   (2 marks)

        (c)   Find the distance between A and B in km. $\left(Take\ \pi = \dfrac{22}{7}\ and\ R = 6370km \right)$. (2 marks)

        (d)   If C is another town due South of A and 10010km away from A, Find the
                co-ordinate of C.   (4 marks)

18. In the figure below AOC is a diameter of the circle centre O. AB = BC and
∠ACD = 35°, EBF is a tangent to the circle at B. G is a point on minor arc CD.

Calculate the size of the following angles giving reasons in each case.

(a) ∠BCD. (2 marks)

(b) Obtuse angle BOD. (2 marks)

(c) ∠BAD. (2 marks)

(d) ∠CGD. (2 marks)

(e)   ∠AEB.   (2 marks)

19.   (a)   Complete the table below for the function $y = 3\chi^2 - 2\chi - 1$ for $-3 \leq \chi \leq 4$.

χ	-3	-2	-1	0	1	2	3	4
$y = 3\chi^2 - 2\chi - 1$		15				7		

(2 marks)

(b)   Draw the graph of $y = 3\chi^2 - 2\chi - 1$.   (3 marks)
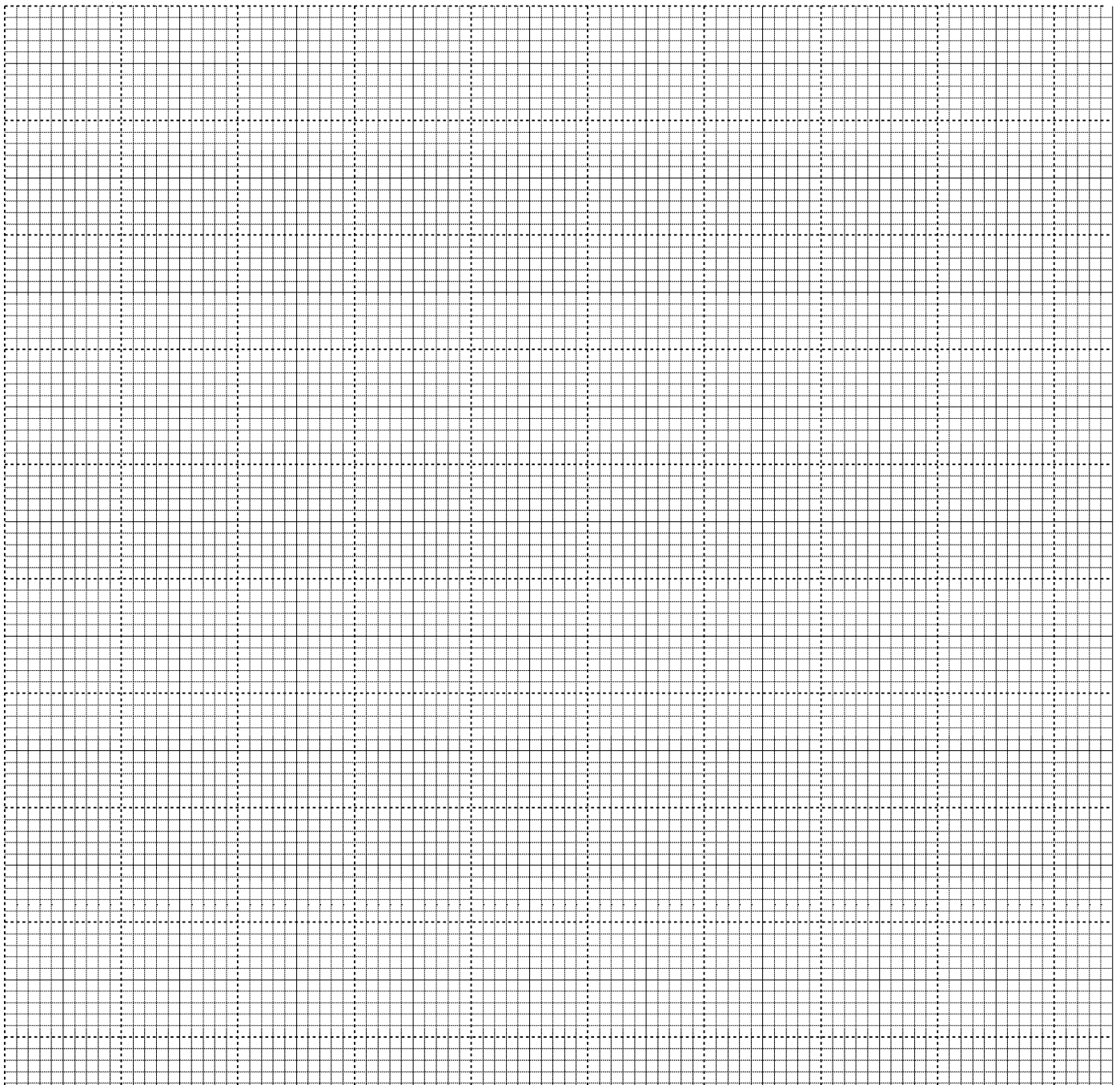
(c)   Draw the line $y = 3\chi + 1$ on the same axis hence find the values of χ for which $y = 3\chi + 1$ and y $3\chi^2 - 2\chi - 1$ are equal.   (3 marks)

(d)   Write down the simplified quadratic equation whose roots are the solutions of the simultaneous equation in (c) above.   (2 marks)

20.   The diagram below shows a right pyramid VPQRS with V as the vertex and a rectangular base PQRS. PQ = 3cm, QR = 4cm. The height of the pyramid is 6cm. PM = MQ and OQ = NR.
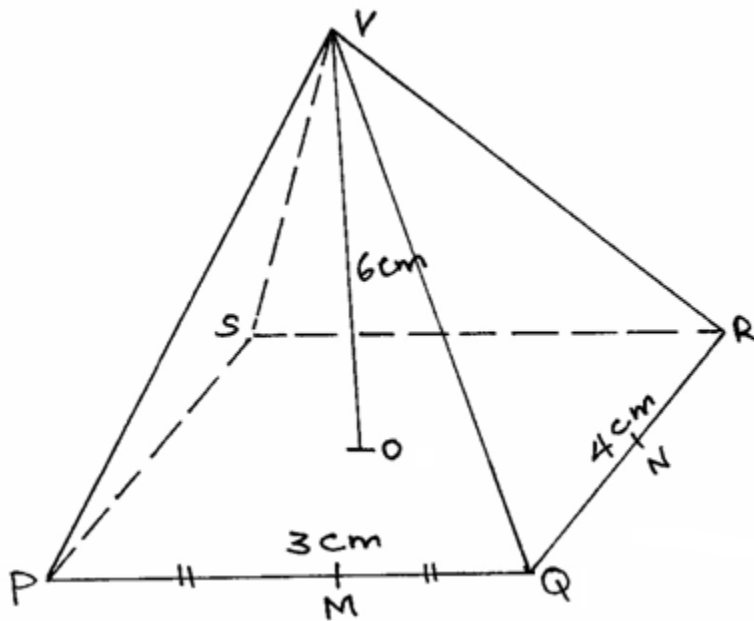
(a)   Calculate.
(i)   the length PV.   (3 marks)
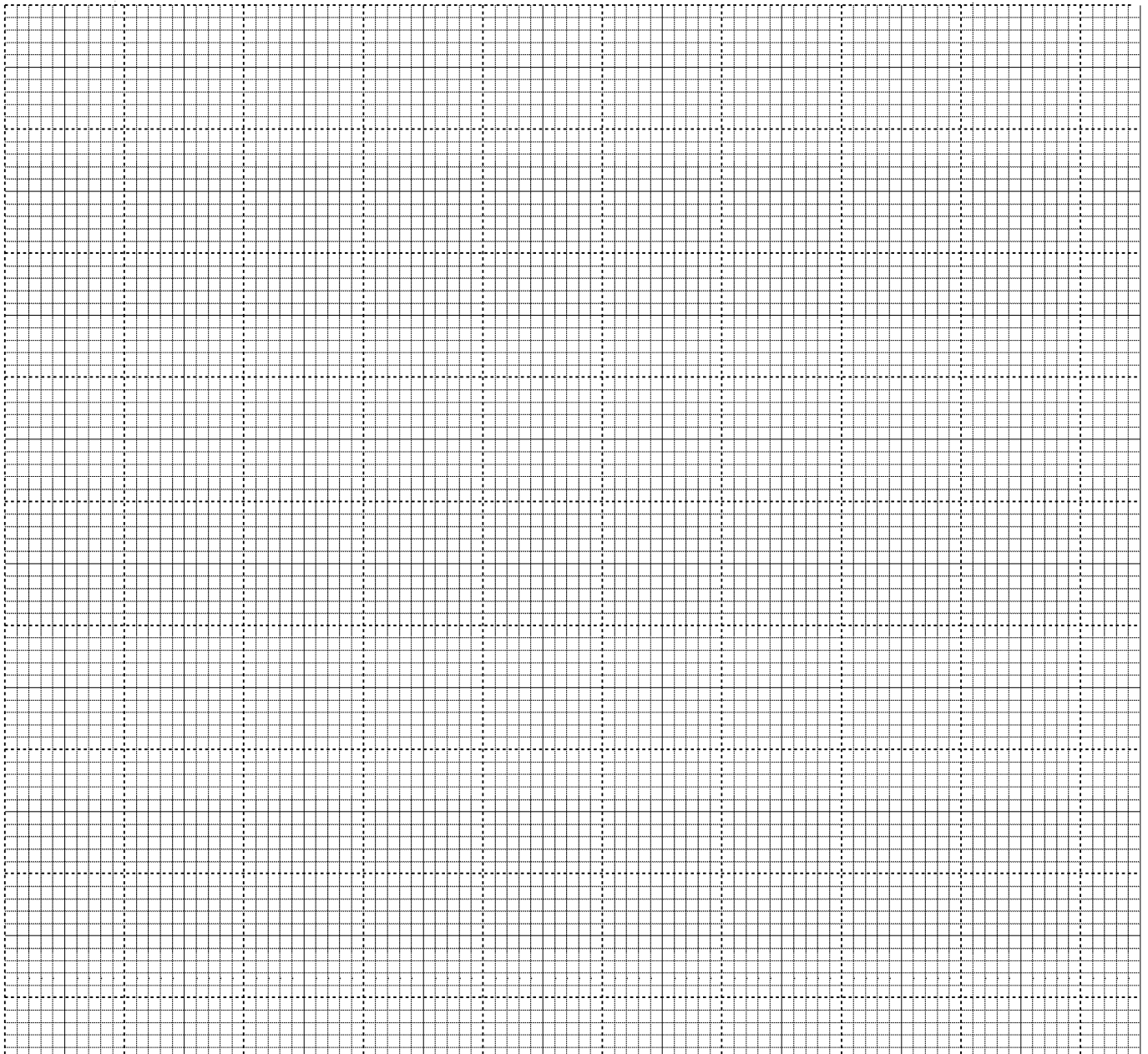
(ii)   the angle between face VPQ and the base.   (2 marks)

(b)   (i)   the slant height VM and VN.   (2 marks)

      (ii)   What is the surface area of the pyramid?   (3 marks)

21.   On the same axes, draw this graph of $y = 2 \sin \chi$ and $y = 3 \sin (\chi + 30°)$ for the domain $-360° \leq \chi \leq 360°$.   (5 marks)

From your graph determine.

(a)　the period of each of the functions.　　　　　　　　(1 mark)
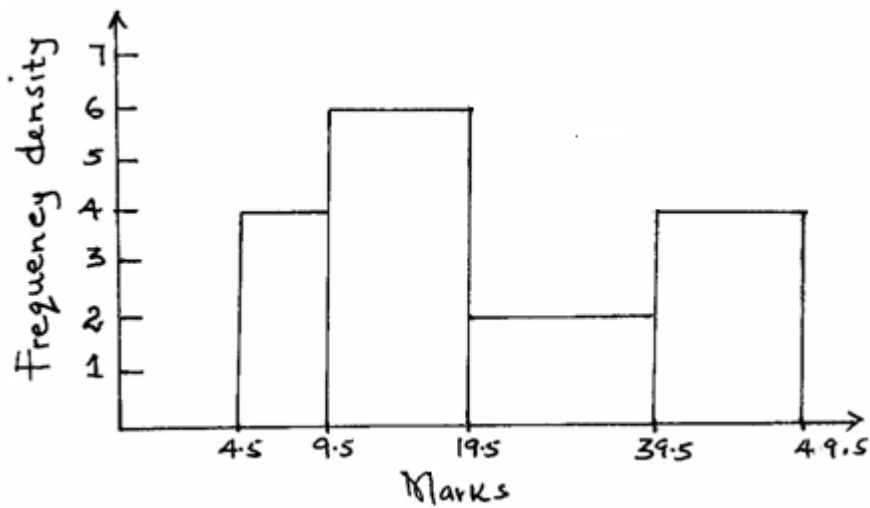
(b)　the amplitude of each of the functions.　　　　　　　　(1 mark)

(c)　the solution to 2 Sin χ = 3 Sin (χ + 30°).　　　　　　　　(1 mark)

(d)   the transformation that maps the graph of $y = 2 \sin \chi$ onto the graph
of $y = 3 \sin (\chi + 30°)$.   (2 marks)

22.   The diagram below shows a histogram marks obtained in a certain test.

(a)   Develop a frequency distribution table for the data if the first class 5-9 has
a frequency of 8.   (3 marks)

    (b)   Estimate the mean.   (3 marks)

    (c)   Calculate interquatile range.   (4 marks)

Mathematics Paper 2   *14*   *Cekenas Joint Mock*

23.   The cost C, of producing n items varies partly as n and partly as the inverse of n.
       To produce two items it cost 50Sh and to produce six items it costs 70Sh.
       Find
       (a)   the constants of proportionality and hence write the equation connecting
               C and n.   (5 marks)

       (b)   the cost of producing 12 items.   (2 marks)

(c)   the number of items produced at a cost of 106Sh.   (3 marks)

Mathematics Paper 2   *15*   *Cekenas Joint Mock*

24.   An auto spare dealer sells two types of lubricant A and B in his shop. While purchasing
        type A cost Sh.40 per 100ml tin and type B cost Sh.60 per 100ml tin. He decided to
        buy at least 30 tins altogether of type A and B with Sh.1500 available. He decides that
        at least one third of the tins should be of type B. He buys χ tins of type A and y tins
        of type B.
        (a)   Write down three inequalities, which represent the above information. (3 marks)

        (b) On a graph paper, draw a graph to show the three inequalities (a) above. (3 marks)
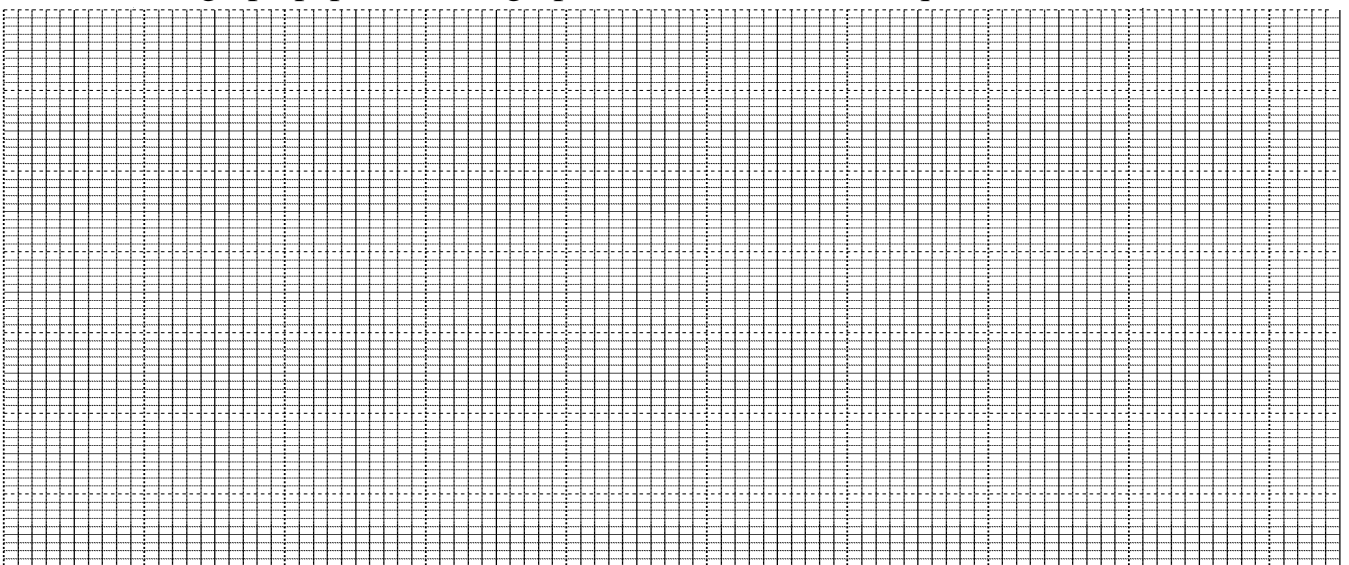
(c)   Determine how many tins of each type that he should buy to maximize his profit if he makes a profit of Sh.10 of each type A and a profit of Sh.20 on each type B tin.   (2 marks)

(d)   Calculate maximum possible profit.   (2 marks)