NAME……………………………………………….. INDEX NUMBER………………………..…

SCHOOL……………………………………………… CANDIDATE'S SIGNATURE…………………

DATE……………………………………………..

121/2
MATHEMATICS
PAPER 2
JULY/AUGUST, 2014
TIME: 2½ HOURS

TRANS-NZOIA COUNTY JOINT EVALUATION EXAMINATION-2014
Kenya Certificate of Secondary Education

MATHEMATICS
PAPER 2
TIME: 2½ HRS.

INSTRUCTION TO CANDIDATE'S:
1. Write your **name**, **index number** and **school** in the spaces provided at the top of this page.
2. **Sign** and write the **date** of examination in spaces provided above.
3. This paper consists of **two** Sections; Section **I** and Section **II**.
4. Answer all the questions in Section **I** and any **FIVE** questions from Section **II**.
5. All answers and working must be written on the question paper in the spaces provided **below** each question.
6. Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.
7. Marks may be given for correct working even if the answer is wrong.
8. Non-programmable silent electronic calculators and **KNEC** Mathematical tables **may be** used, except where stated otherwise.
9. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

FOR EXAMINER'S USE ONLY:

SECTION I

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

SECTION II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

SECTION I: (50 MARKS)

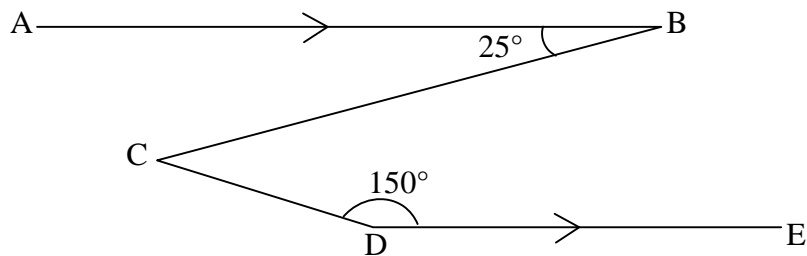Answer all the question in this section in the spaces provided:

1.   Using logarithm tables only, evaluate

$$\sqrt[3]{\frac{849.6 \times 2.41}{3941}}$$

(4 marks)

2.   Given that AB is parallel to DE. Calculate $\angle$BCD.   (3 marks)

3.   Simplify $(1 + \sqrt{3})(1 - \sqrt{3})$ and hence evaluate $\dfrac{1}{1 + \sqrt{3}}$ to 3 significant figures given

$\sqrt{3} = 1.7321$.   (3 marks)

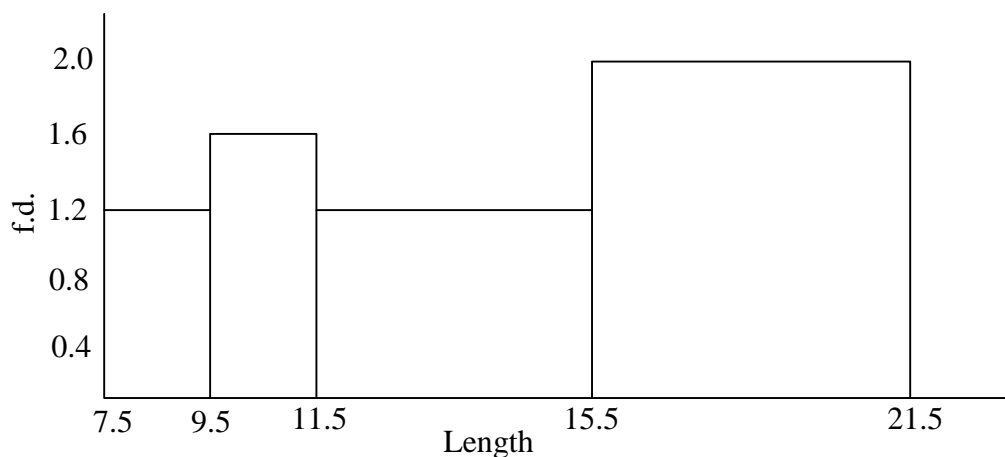4.   If (M + n) : (M – n) = 8: 3. Find the ratio M: n.   (3 marks)

5.   Evaluate without using a Mathematical table or a calculator.
     $Log_6\ 216 + [Log\ 42 - Log\ 6] \div Log\ 49$ (2 marks)

Mathematics Paper 2   *3*

6. Make q the subject of the formula:

$$P = \sqrt[3]{\frac{nq - m}{q}}$$

(3 marks)

7. The figure **below** shows a histogram

Use the histogram to complete the table **below**.

Length χcm	Class width	Frequency density	Frequency
$7.5 \leq \times < 9.5$		1.2	24
$9.5 \leq \times < 11.5$			
$11.5 \leq \times < 15.5$			
$15.5 \leq \times < 21.5$			

(4 marks)

8. If A = 2.3, B = 8.7 and C = 2.0 find the % error in $\frac{A + B}{C}$.

(3 marks)

9. Simplify:

$$\frac{2t^2 + t - 6}{t^2 - 4} + \frac{1}{t - 2}$$

(4 marks)

10. Obtain the binomial expansion of $(1 - 2\chi)^5$ and use your expansion to evaluate $[0.98]^5$ correct to 5d.p. (3 marks)

11. After being given a discount of sh.5 on every book I bought, I was able to buy 2 more books than before I was given the discount with sh.200. What was the price of one book before the discount? (4 marks)

12. Find the centre and radius of a circle with equation:
$\chi^2 + y^2 - 6\chi + 8y - 11 = 0$ (3 marks)

13. A car was valued at Ksh.3000000 in January. Each year its value decreased by 12% of its value at the beginning of the year. Find the value of the car in January 2004 giving your answer correct to 4s.f. (3 marks)

14. Two similar containers have capacities of 1000 litres and 1728 litres respectively. If it costs Ksh.750 to paint the outside surface of the smaller container, how much will it cost to paint the outside of the larger container. (3 marks)

15. A point (-5, 4) is mapped onto (-1, -1) by a translation T. Find the image of (-4, 5) under the same translation. (2 marks)

16. The gradient of the curve $y = a\chi^2 + b\chi$ at the origin is equal to 8. Find the value of a and b if the curve has a maximum turning point at $\chi = 4$. (3 marks)

SECTION II: (50 MARKS)

Attempt **ONLY FIVE** questions from this section.

17. A plane S flies from a point P(40°N, 45°W) to a point Q(35°N, 45°W) and then onto a point T((35°N, 135°E).
     (a)   Given that the radius of the earth is 6370km, find the distance from P to Q in km. (2 marks)

     (b)   Find in nm;
             (i)   the shortest distance between Q and T.   (2 marks)

             (ii)   the longest distance between Q and T (to the nearest tens).   (2 marks)

     (c)   Find the difference in time taken when S flies along the shortest and longest
             routes if its speed is 420 knots.   (4 marks)

18.   In the figure **below**, O is the centre of the circle. PQ and PR are tangents to the circle at P and R respectively. Angle PQS = 40° and angle QRS = 30°. RTU is a straight line.
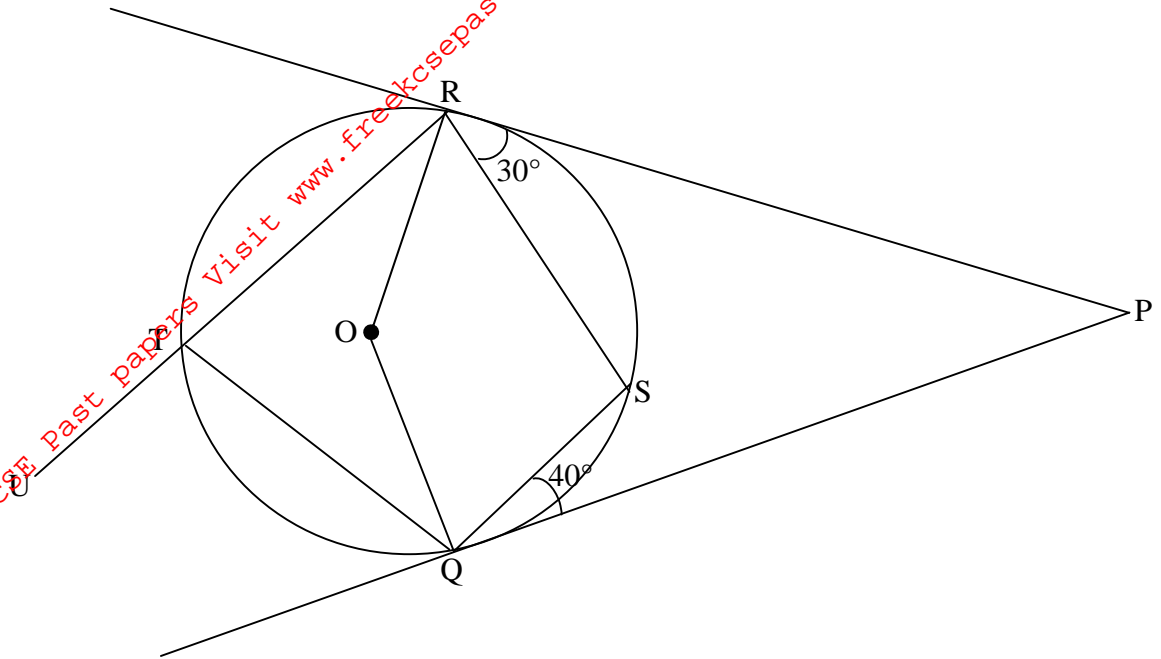
Find giving reasons the angles
(i)   QRS.   (2 marks)
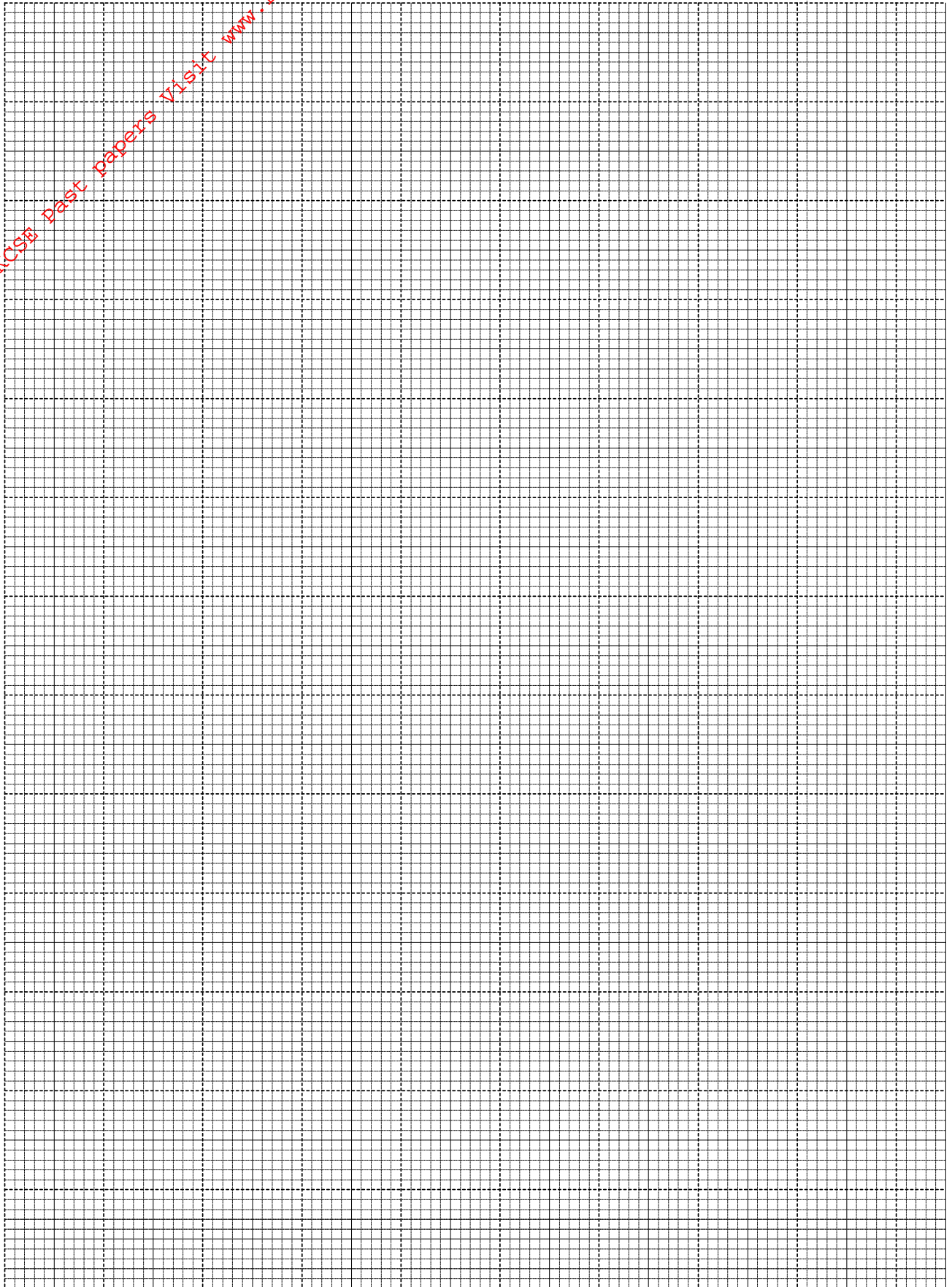
(ii)   RTQ.   (2 marks)

(iii)   RPQ.   (2 marks)

(iv)   Reflex angle QOR.   (2 marks)

(v)   TRO given that TR = TQ.   (2 marks)

19. The data **below** shows the masses in grams of 50 potatoes.

Mass (g)	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75 - 84	85 - 94
No. of potatoes	3	6	16	12	8	4	1

(a)   On the grid provided draw a cumulative frequency curve for the data.   (4 marks

(b)   Use the graph in (a) above to determine:

    (i)   The 60th percentile mass.   (2 marks)

    (ii)   Percentage of potatoes whose masses lie in the range 53g to 68g.   (3 marks)

    (iii)   Median mass.   (1 mark)

20. Matrix P is given by $\begin{pmatrix} 4 & 7 \\ 5 & 8 \end{pmatrix}$

(a) Find the inverse of P. (2 marks)

(b) Two Schools Theri and Kimathi purchased beans at sh.B per bag and maize at sh.M per bag. Theri purchased 8 bags of beans and 14 bags of maize for sh.47,600. Kimathi purchased 10 bags of beans and 16 bags of maize for sh.57,400.

(i) Form a matrix equation to represent the information above. (2 marks)

(ii) Use the inverse matrix of P to find the prices of one bag of each item. (4 marks)

(c) The price of beans later went up by 5% and that of maize remained constant. Theri bought the same quantity of beans but spent the same total amount of money as before as before on the two items. State the new ratio of beans to maize. (2 marks)

21.   Mr. Karanja owns a bicycle which he sometimes rides to go to work. Out of the 21 working days in a month he only rides to work for 18 days. If he rides to work the probability that he is bitten by a rabid dog is $\frac{4}{15}$ otherwise it is only $\frac{1}{13}$. When he is bitten by the dog the probability that he will get treatment is $\frac{4}{5}$ and if he does not get treatment the probability that he will get rabies is $\frac{5}{7}$.

(a)   Draw a tree diagram to show the events.   (3 marks)

(b)   Using the tree diagram in (a) above determine the probability that
       (i)   Karanja will not be bitten by a rabid dog.   (2 marks)

   (ii)   He will get rabies.   (2 marks)

       (iii) He will not get rabies.   (3 marks)

22. In an examination consisting of two papers A and B both marked out of 100, a candidate is given χ marks in Paper A and y marks in Paper B. A pass mark is obtained if $\chi + 2y$ is at least 150 but candidates must score over 30 marks in Paper A and 40 marks in Paper B.
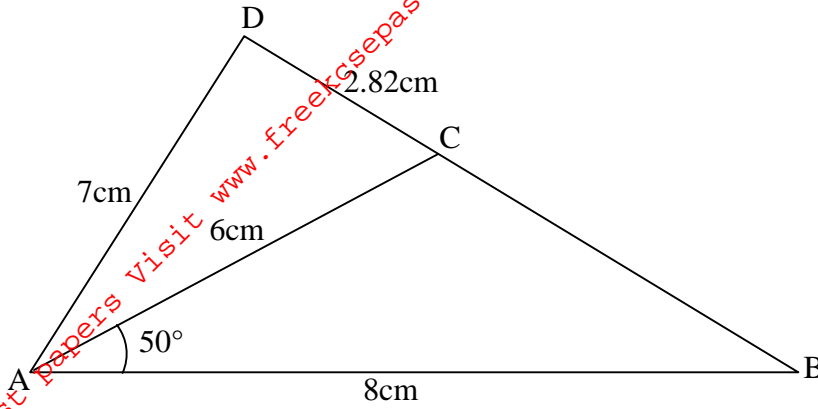
(a) Form the inequalities to represent the conditions above. (3 marks)

(b) Represent these inequalities graphically. (4 marks)
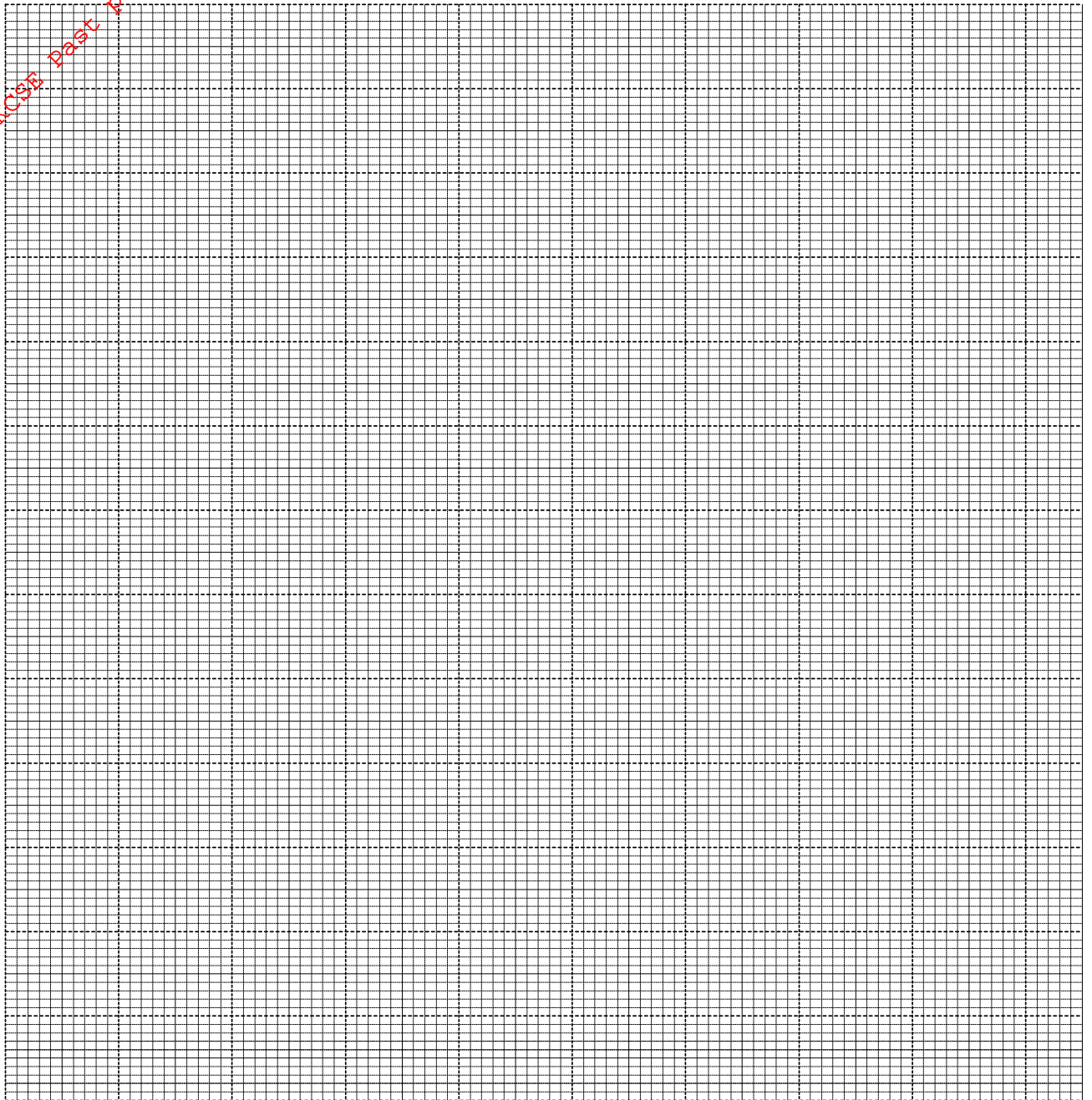
(c) Find the lowest values of $\chi + y$ for any candidate who passes and give the corresponding values of χ and y. (3 marks)

23.   In the figure **below** (not drawn to scale) AB = 8cm, AC = 6cm, AD = 7cm, CD = 2.82cm and angle CAB = 50°.

D

2.82cm

C

7cm

6cm

50°

A   B

8cm

Calculate (to 2d.p.)

(a)   the length BC.   (3 marks)

(b)   the size of angle ABC.   (3 marks)

(c)   size of angle CAD.   (3 marks)

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

24. (a) Three variables P, R and S are such that P varies directly as R and inversely as cube of S. When R = 10, S = 2 and P = 2.5, find R when P = 15 and S = 5. (3 marks)

(b) Two variables P and L are such that P varies partly as L and partly varies as the square root of L. Determine the relationship between P and L given that L = 16 when P = 500 and L = 25 when P = 800. (4 marks)

(c) R varies as the square of S. If S is increased by 10%, find the ratio of the new value of R to the original R. (3 marks)