Name…………………………………………….…….   Index No…………………/…….

School……………………………………….…………   Date …………………………..…

Candidate's Signature…………………….

121/2
MATHEMATICS
PAPER2
JULY / AUGUST, 2012
Time: 2 ½ Hours

BUTULA DISTRICT FORM FOUR JOINT MID YEAR EXAMINATION-2012
Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

1.   Write your name and index number in the spaces provided at the top of this page.
2.   Sign an write the date of the examination
3.   This paper consists of two sections: Section I and Section II.
4.   Answer ALL questions in section 1 and ONLY FIVE questions from section II
5.   Show all the steps in your calculations, giving your answers at each stage in the spaces   below
      each question.
6.   Marks may be given for correct working even if the answers are wrong.
7.   Non – Programmable silent electronic calculators and KNEC mathematical tables may be
      used, except were 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

This paper consists of 16 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated
and no questions are missing

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SECTION I (50 MARKS)
Answer ALL the Questions in this section in the spaces provided

1.   Three fifth of work is done on the first day, on the second day $\frac{2}{3}$ of the remainder is completed.

   If on the third day $\frac{7}{8}$ th of what remained is done. What fraction of work still remains to be done.

(3 marks)

2.   Solve the equation   (4 marks)
        3x—y=3
        $9x^2—y^2=45$

3.   Find, without using mathematical tables the values of x which satisfy the equation (4marks)
        $\text{Log}_2 (x^2-9)=3 \log_2 2+1$

4. Expand and simplify $(3x-y)^4$, hence use the first three terms of the expansion to approximate the value of $(6-0.2)^4$ (4 marks)

5. Given that $\dfrac{3}{2-\sqrt{18}} + \dfrac{5}{2+\sqrt{18}} = a + b\sqrt{c}$. Find the values of a, b and c. (3 marks)

6. $\dfrac{p^2 + 2pq + q^2}{p^3 - pq^2 + p^2q - q^3}$ (4 marks)

7. If Z varies jointly as x^2 and the square root of y and z = 18¾ when x = 5 and y = 9. Find z when x = 3 and y=16 (3 marks)

8 A stone is thrown vertically upwards from point 0. After t seconds, the stone is S metres from 0 Given that S= 29.4t — $4.9t^2$. Find the maximum height reached by the stone. (3 marks)

9. Find the rate at which shs. 18,000 invested at compound interest amount to shs 24,870 for 4 years.

(4 marks)

10. Ketepa tea worth Kshs 40 per Kg is mixed with Sasini tea worth Ksh 60 per kg in the ratio 3:1. In what ratio should this mixture be mixed with Kericho tea worth Kshs 50 per kg to produce a mixture worth Kshs 47 per kg? (3 marks)

11. The present ages of a father and his son are in the ratio 7: 2, and the son's age is 14. What will be

the ratio of their ages in 6 years time. (3 marks)

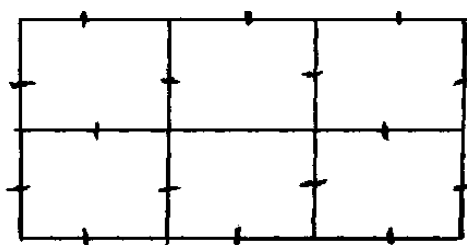12. Make P the subject $R = \sqrt{\dfrac{3T - (P - T)}{P}}$ (4 marks)

13. Find the value of m in the equation below $\left(\dfrac{1}{27}\right)^{m} \times (81)^{-1} = 243$ (3 marks)

14. A rectangle measures 8.6 cm and 4.8 cm. Find the limits within which the area of the rectangle lies hence find the percentage error in the area. (2 marks)
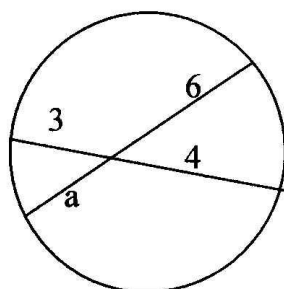
15. How many squares are in the figure below. (1mk)

16. In the diagram below find the value of a. (2 marks)
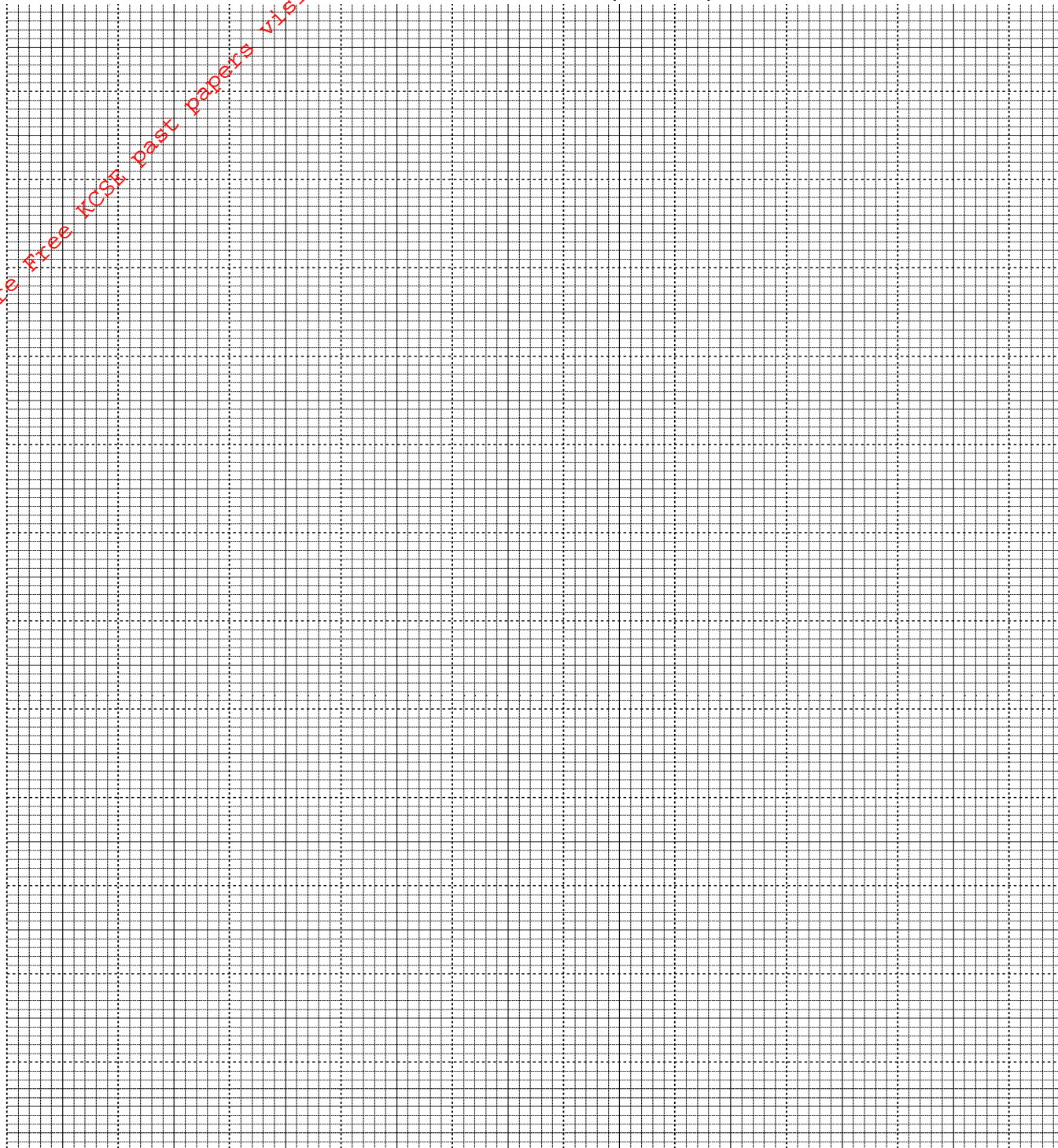
SECTION I (50 MARKS)
Answer ANY FIVE Questions from this section in the spaces provided

17. a) Copy and complete the table below for the equation $y = 4x^3 - 3x^2 - 6x$ (2 marks)

x	-1¼	-1	-½	0	½	1	1 ½	1 ¾
y	-5		1 ¾		-3 ¼		-2 ¼	

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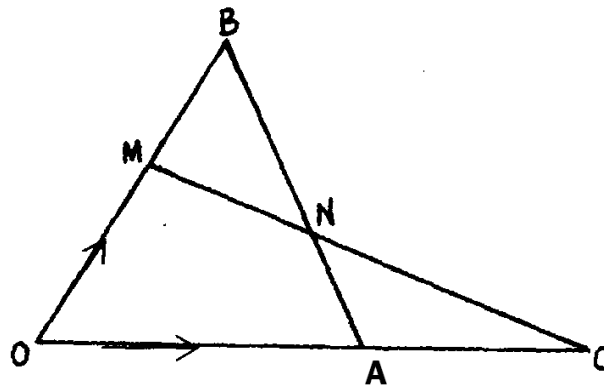
c) Use your graph to find the range of values of x for which $y \le -3$ (1 mark)

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

     ii)   By drawing a suitable straight line graph on the same axes, solve the equation

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

18.   In the triangle OAB below, OA $= \underset{\sim}{a}$, OB $= \underset{\sim}{b}$ and OC $= \frac{3}{2}$ OA. M divides OB in the ratio 3:2

a)   Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$ only, the vextors

     i) $\overrightarrow{AB}$ (1 mark)

     ii) $\overrightarrow{MC}$ (1 mark)

b)   Given that MN=h**MC** and B= kBA, express vector MN in two different ways and

hence, find the value of h and k   (6 marks)

c)   Show that the points M,N and C are collinear.   (2 marks)

19.   Three darts players James, Charles and Beatrice are playing in a competition. The probability that James, Charles and Beatrice hit the bull's eye is 40%, 30% and 20% respectively.

   a)   Draw a probability tree diagram to show all the possible outcomes for the players

(4 marks)

   b)   Calculate the probability that:

      i)   James or Charles hit the bull's eye.   (2 marks)

      ii)   All the three fail to hit the bull's eye.   (2 marks)

      iii)   Only two fails to hit the bull's eye.   (2 marks)

20.   An aircraft leaves town P (30°S, 17°E) and moves directly northwards to Q(60°N, 17°E). It then moved at an average speed of 300 knots for 8 hours westwards to town R. Determine;

a)   The distance PQ in nautical miles.   (3 marks)

b)   The position of town R.   (3 marks)

c)   The local time at R if local time at Q is 3.12p.m   (2 marks)

d)   The total distance moved from P to R in kilometers. Take 1 nautical mile = 1.853

kilometres.

                                                                            (2 marks)

21. A tailor is required to make two types of skirts. Type A and type B. The total number of skirts must not exceed 500. Skirts of type B must not be less than skirts of type A. The tailor must make at least 200 skirts of type A. Let x represent the number of skirts of type A and Y represent the number of skirts of type B.

   a) Write down the inequalities that describe the given conditions above. (3 marks)

   b) On the grid provided, draw the three inequalities and shade the unwanted regions. (3marks)
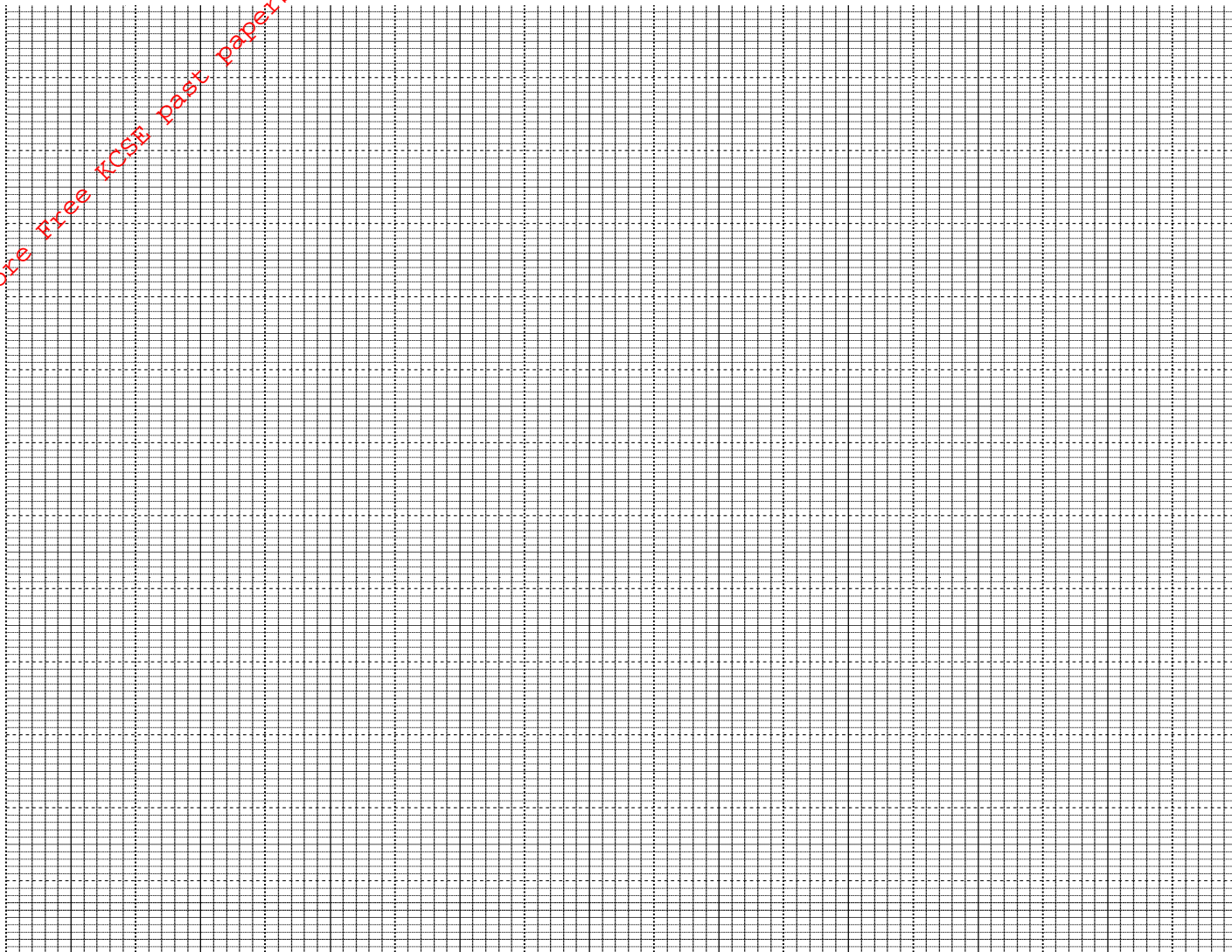
   c) Profits were as follows
      Type A, Kshs. 900 per skirt
      Type B, Kshs. 700 per skirt
      Determine the maximum possible profits (4 marks)

22. The figure below shows solid frustum of pyramid with a square top of side 8cm and a square base of side 12cm. The slant edge of the frustum is 9cm
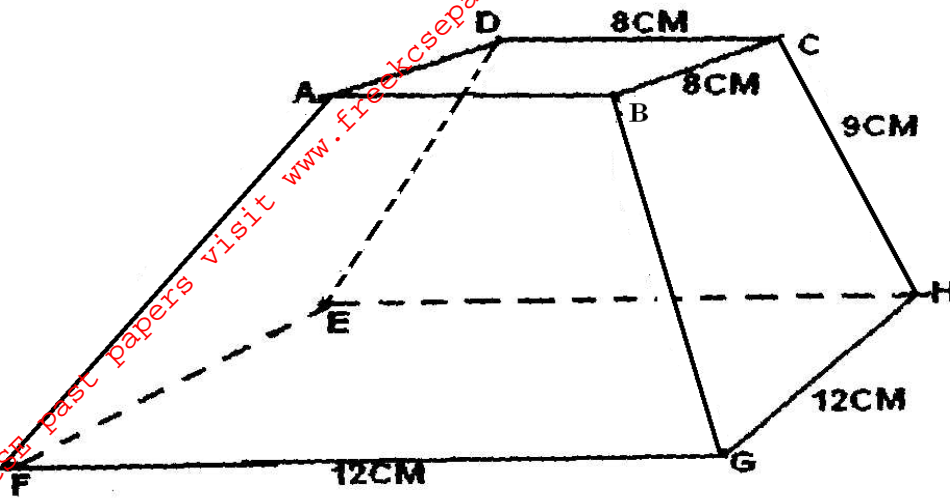

a) Calculate the total surface area of the frustrum. (4 marks)

b) Calculate the volume of the solid frustrum. (4 marks)

c) Calculate the angle between the Planes BCHG and the base EFGH. (2 marks)

23. The data below shows the masses in grams of 50 passion fruits.

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

a) On the grid provided, draw a cumulative frequency curve for the data.   (4 marks)
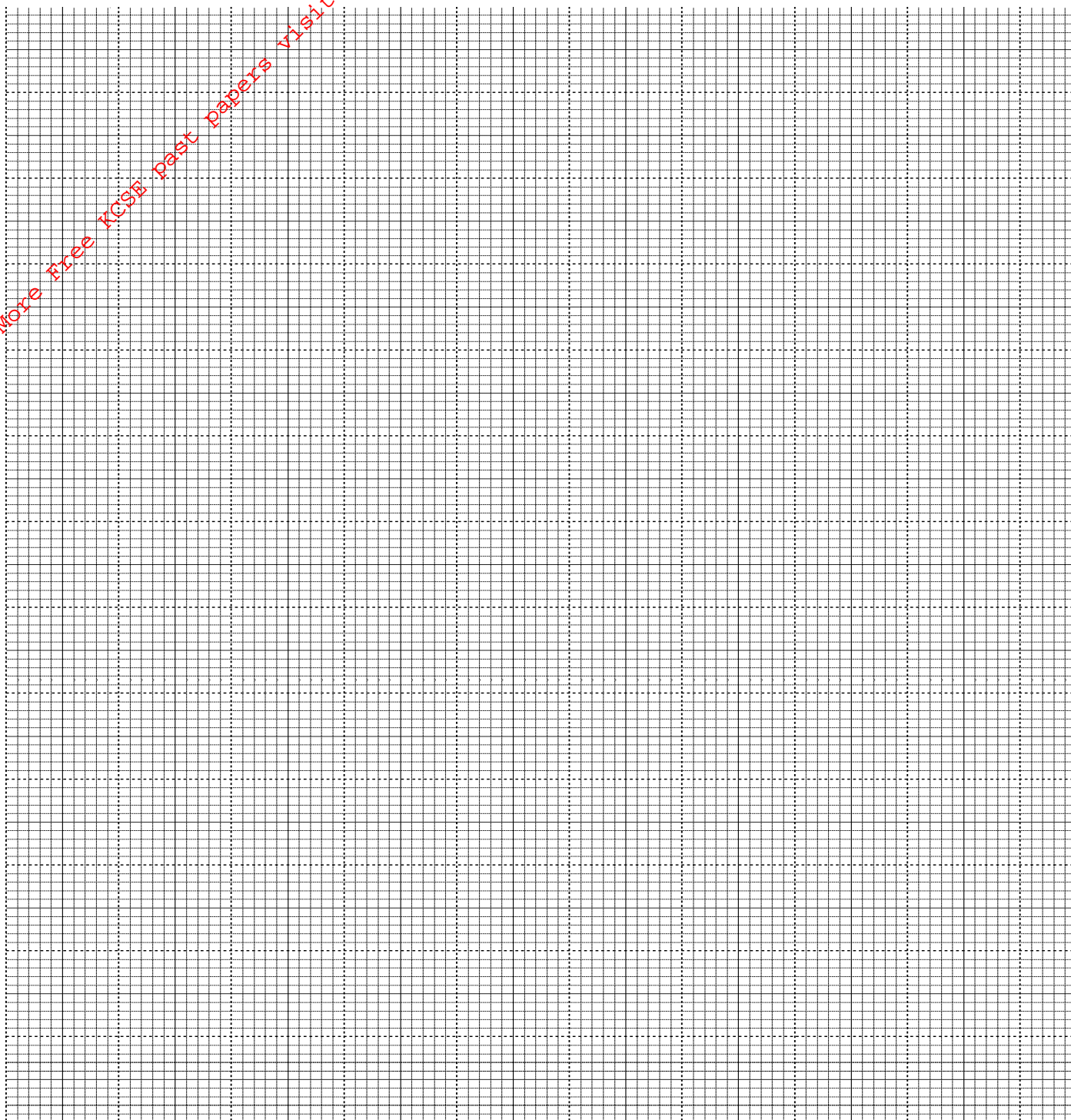
b) Use the graph in (a) above to determine
   i) The 64th percentile   (1 mark)

ii)   The quartile deviation   (3 marks)

iii)   The percentage of passion fruits whose masses lie in the range 41g to 89g.

(2 marks)

24.   Using a ruler and a pair of compasses only, construct triangle PQR such that PQ=5cm, QR=4 cm and angle PQR=120^0. Measure PR. On the diagram, construct a circle centre O which passes through the vertices of the triangle PQR. Measure the radius of the circle. Measure the shortest distance from the centre of the circle to the lines PQ and QR.   (10 marks)