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

SCHOOL: ………………………………………………. DATE: ……………………………

CANDIDATE'S SIGN…………………………………………..

121/2

MATHEMATICS

PAPER 2

JULY/AUGUST 2014

TIME: 2$^1/_2$ HOURS

KISUMU WEST DISTRICT JOINT EVALUATION EXAM

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

MATHEMATICS

PAPER 2

INSTRUCTIONS TO THE CANDIDATES

- *Write **your name, school** 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 any **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.*
- *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 1I GRAND TOTAL

Question	17	18	19	20	21	22	13	24	**Total**
Marks									

This paper consists of 16 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated

© Kisumu West District 2014   *form four*   1   *Mathematics 121/2*

Answer all questions in this section in the spaces provided.

1.   Use logarithm tables to evaluate

$$\sqrt[3]{\frac{58.32 \times (0.9823)^2}{693.5}}$$

(4mks)

2.   Make **t** the subject of the formula

(3mks)

$$x = \sqrt[3]{\frac{3h(t-h)}{t}}$$

3.   Simplify and rationalize the expression giving your answer the expression giving your answer is

the form of $a + b\eth\ \overline{c}$, where **a, b** and **c** are constants   (3mks)

$$\frac{11}{7-\sqrt{3}} \quad - \quad \frac{5}{7+\sqrt{3}}$$

4.   The measurements of the radius and height of a cylinder are given as 8cm and 9.5cm respectively. Calculate the percentage error in the volume of the cylinder.   (3mks)

5.   (a) Expand $(1 - 2x)^6$ in ascending powers of x upto x^3.   (2mks)

      (b) Hence evaluate $(1.02)^6$ to 4 d.p.   (2mks)

6.   (a) Construct $\triangle$**ABC** such that **AB** = 6cm, **BC** = 5cm and **AC** = 4cm.   (1mk)

      (b) Construct the locus of point **Q** inside the triangle **ABC** above such that the area of $\triangle$**ABQ** is 6cm^2.   (2mks)

7. A pilot leaves point **T**(60^0S, 10^0W) and flies due East for a distance of 960 nm to point **U**. Determine the position of **U**. (3mks)

8. Find the radius and centre of the circle whose equation is

$3x^2 + 3y^2 – 12x + 18y – 9 = 0.$ (3mks)

9. Quantity **Q** partly varies as quantity **R** and partly varies inversely as the square of **R**. Given that

Q= 3 when **R** = 1 and **Q** = 5 when **R** = ½

(i) Find an equation connecting **Q** and **R**. (3mks)

(ii) Find the value of **Q** when **R** = $^3/_2$ (1mk)

10.   Determine the integral values of x that satisfy the following inequalities.

$-18 – 3x \ge 2x - ½ \ge 20 – {}^{3x}/_2$ (3mks)
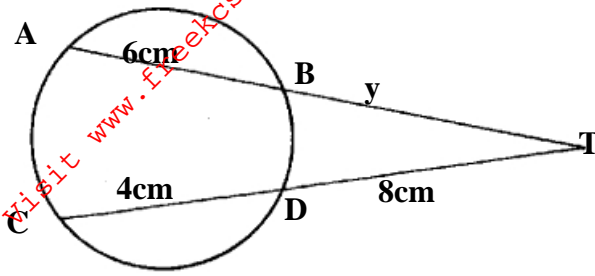
11.   The longest side of a right angled triangle is 25cm and the two sides containing the right angle are x cm and y cm. If one of the shorter sides exceeds the other by 17cm, obtain two equations in x and y and solve them.   (4mks)

12.   If $\mathbf{QA} = 2\mathbf{i} – 4\mathbf{k}$ and $\mathbf{QB} = -2\mathbf{i} + \mathbf{j} –\mathbf{k}$. Find the magnitude of $\mathbf{AB}$.   (2mks)

13. In the fig. below line **CD** = 4cm, line **DT** = 8cm and **AB** = 6cm. **AT** and **CT** are straight lines meeting at point **T.**

Find the value of **y**. (2mks)

14. In what ratio should grade **P** of tea costing sh. 450 per kg be mixed with grade **Q** of tea costing sh. 350 per kg so that a profit of 10% is made by selling the mixture at sh. 451 per kg? (3mks)

15. Find the values of θ between 0^0 and 180^0 such that $2\cos 3\theta = 3 \sin 3\theta$ (3mks)

16. Solve $8^x = 4^{2y+1}$ and $27^{2x} = 9^{y-3}$ giving your answers as an exact fraction. (3mks)

Answer any five questions in this section in the spaces provided.

17.   Income tax is charged on annual income at the rates shown below.

Taxable annual income	Rate sh / £
1 - 2300	2
2301 - 4600	3
4601 - 6900	5
6901 - 9200	7
9201 - 11, 500	9
11501 and above	10

Single relief ksh. 1056 per month.

Insurance relief ksh. 480 per month.

Mr. Onyango is single and earns sh. 13800. He lives in a company house for which he pays a nominal rent of ksh. 1500 per month. In addition to his salary he get a house allowance of ksh. 8000 per month and a non – taxable allowance of sh. 5000 per month.

Calculate

(b) Mr. Onyango's taxable income   (2mks)

(ii) Mr. Onyango's net tax per month in Kenya shillings.   (5mks)
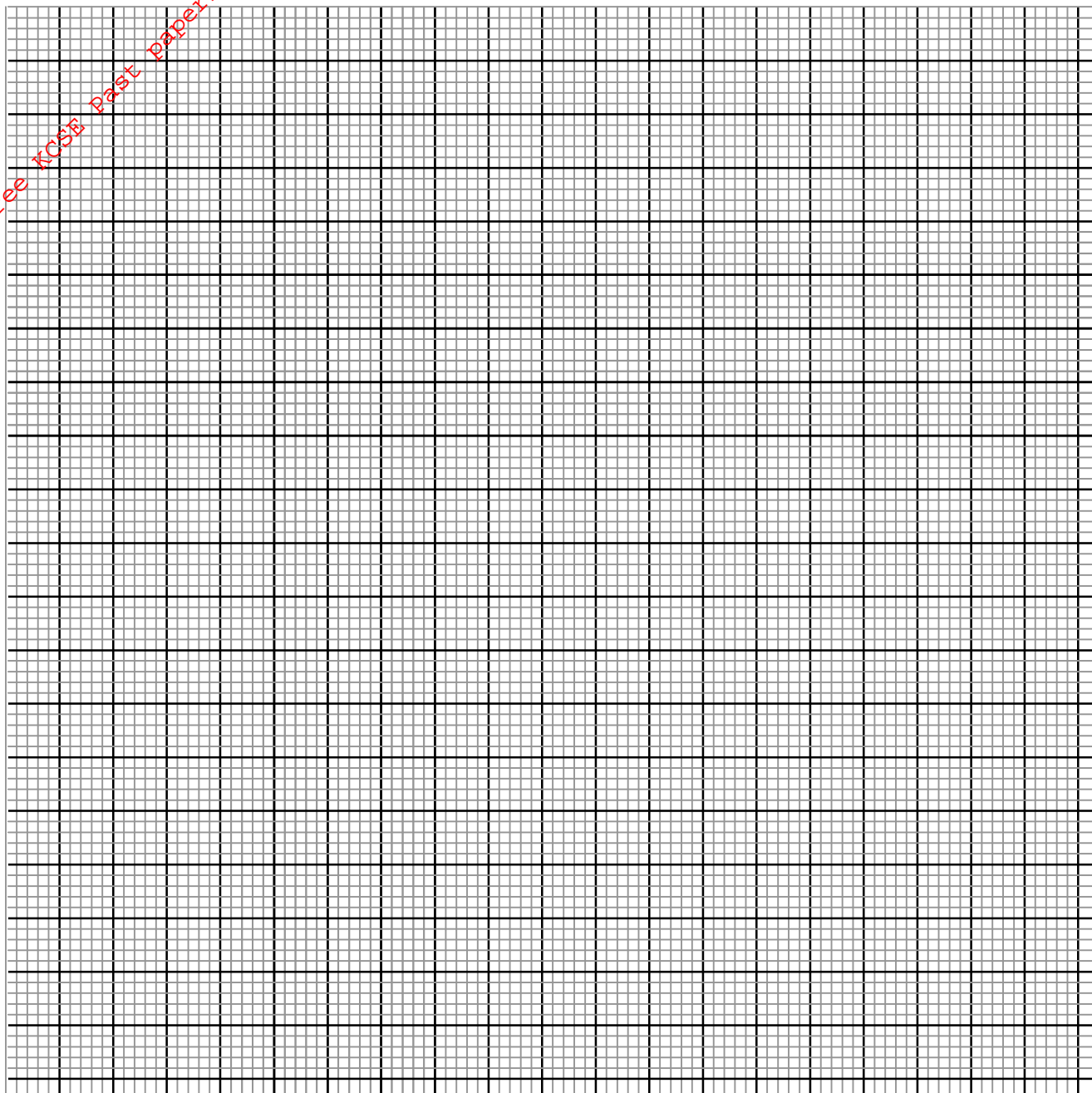

(iii) Calculate Mr. Onyango's net monthly salary in Kenya shillings.   (3mks)

18. The table below shows the mark scored by students in a maths exam.

Class	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89
No. of students	3	17	27	23	8	2

(a) Draw a cumulative frequency curve and use your graph to find

    (i) The median

    (ii) The quartile deviation

    (iii) The number of students who scored above 67.   (6mks)

(b) Use an assumed mean of 64.5 to calculate the standard deviation of the above data.   (4mks)

19.   An arithmetic progression has the first term as **x** and the common difference as **d**,
        (a) Write down in terms of **x** and **d**, the 3rd , 9th and 25th terms of the progression.   (1mk)

        (b) The progression is increasing and the 3rd, 9th and 25th terms forms the first three consecutive
            terms of a geometric series. If the sum of the 7th and twice the 6th term of the arithmetic
            progression is 78, calculate:
            (i) The first term and the common difference of the A.P   (6mks)

            (ii) The sum of the first nine terms of the A.P   (3mks)

20.   The figure below shows a right pyramid with a square block at its base. The sides of the base are 40cm and the height of the base is 30cm. **M** is the mid-point of **QR** such that **PM** = 29cm.
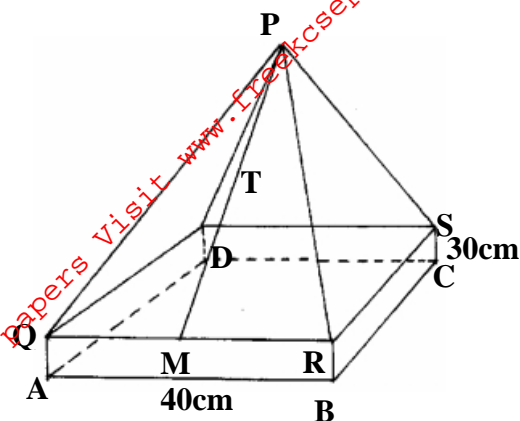
Calculate:

(a) The vertical height of vertex **P** from plane **ABCD**.   (3mks)

(b) The angle between planes **PQR** and **PST**.   (2mks)

(c) The projection of the line **RP** on the plane **QRST**   (3mks)

(d) The angle between planes **QRCD** and **ABCD**   (2mks)

21.   The manager of a hotel has enough money to buy a total of 120 crates of soft drinks of two brands
         novida and alvaro. The number of novida crates has to be less than twice the number of alvaro
         crates. There must be at most 90 crates of novida but at least 15 crates but not more than 60 crates
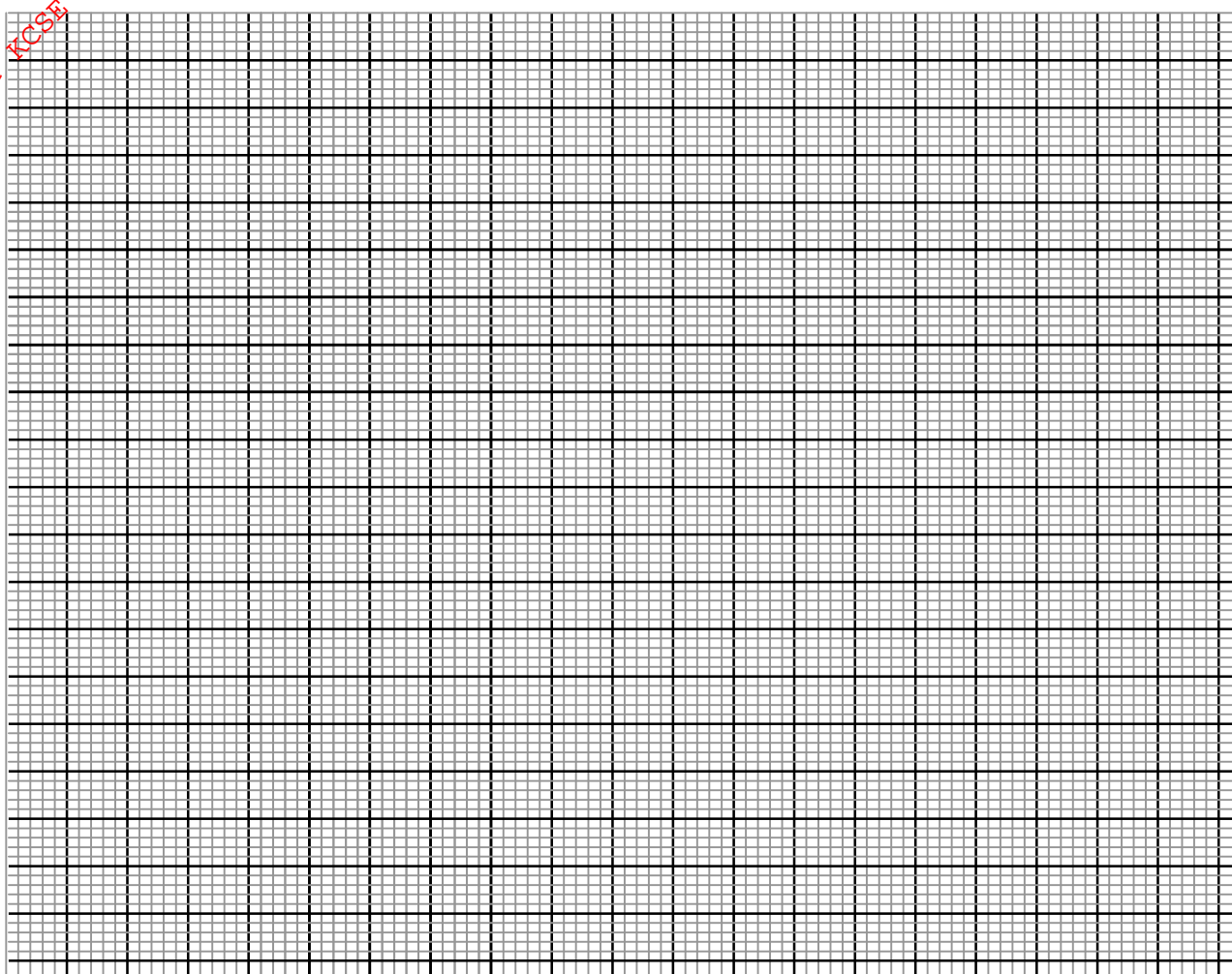   of alvaro.
    (a) Let **x** be the number of novida crates and **y** be the number of alvaro crates
         (i) Represent the information using inequalities.   (3mks)

         (ii) Plot the graph of the above inequalities.   (3mks)

    (b)   The profit from a crate of novida is 75 and that of alvaro is 50. Find the number of crates of
          each type that he should buy to make maximum profit.   (2mks)

    (c) Due to inflation the profit on a crate of novida reduced by 20% and that on a crate of alvaro
         increased by 80%. Find the difference in the maximum profit that can be made by the hotel as a
         result of these changes.   (2mks)

22.   Given that $y = 2\sin 2x$ and $y = 3\cos(x + 45^0)$

(a) Complete the table below.

| x	0^0	20^0	40^0	60^0	80^0	100^0	120^0	140^0	160^0	180^0
$2\sin x$	0		1.97		0.68	-0.68	-1.73		-1.28	0.00
$3\cos(x+45^0)$	2.12	1.27		-0.78		-2.46			-2.72	-2.12

(b) Use the data to draw the graphs of $y = 2\sin 2x$ and $y = 3\cos(x + 45^o)$ for $0^o \le x \le 180^o$. On the same axes. (3mks)

(c) State the amplitude and period of each curve. (2mks)

(d) Use the graph to solve the equation $2\sin 2x - 3\cos(x + 45^0) = 0$ for $0^0 ½ x ½ 180^0$ (2mks)

23.   (a) Given that **BC** is a tangent to the circle and that angle **ABC** = 110^0 and angle **CBD** = 50^0.
        Calculate giving reasons
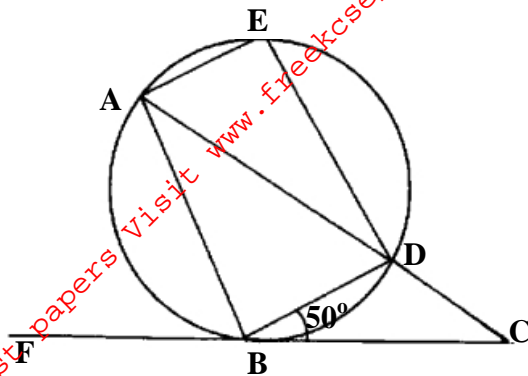
        (i) Angle **AED**   (2mks)

        (ii) Angle **BAD**   (2mks)

        (iii) Angle **DCB**   (2mks)

        (b) Given that **BD** = 3cm and **DC** = 5cm. Find the area of triangle **BDC**.   (4mks)

24. On a given day, the probability that it is windy is $^3/_5$. When it is windy, the probability that a kite is flown sticks on at tree is $^3/_4$, otherwise it is $^1/_5$

   (a) Represent this information on a tree diagram. (3mks)

   (b) Find the probability that the:

   (i) Kite is flown on a windy day. (2mks)

   (ii) Kite is flown (3mks)

   (iii) Kite is not flown (3mks)