121/1
MATHEMATICS (Alt.A)
FORM 4
MARCH/APRIL 2013
TIME: 2 $\frac{1}{2}$ HOURS

PENTAGON JOINT EXAMINATIONS - 2013
WARENG DISTRICT
The Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided above
2. Sign and write the date of examination in the spaces provided.
3. The paper contains two sections: Section **I** and **II**.
4. Answer all questions in section **I** and **strictly 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 calculations, giving your answers at each stage in the spaces 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.

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	

This paper consists of 15 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.

SECTION I (50 MARKS): *Attempt all the questions in this section*.

1. Simplify

$$\frac{2y^2 - 3xy - 2x^2}{4y^2 - x^2}$$

(3marks)

2. Without using tables or calculator evaluate $\log_2(x^2 - 9) = 3\log_2 2 + 1$ (3marks)

3. Without using a calculator, evaluate, $\dfrac{2\frac{1}{4} + \frac{3}{5} \div \frac{5}{6} \ of \ 2\frac{2}{5}}{1\frac{7}{10}}$, leaving your answer as a fraction in its simplest

form. (3marks)

4. Find the equation of a perpendicular bisector of a line AB if the coordinates of A and B are (-4,-2) and (6,2) respectively. (3marks)

5. Solve for x in the equation below; $5 \times 2^{2x+1} - 3 \times 2^x - 34 = 0$ (3marks)

6. The figure below is a velocity –time graph for a car.
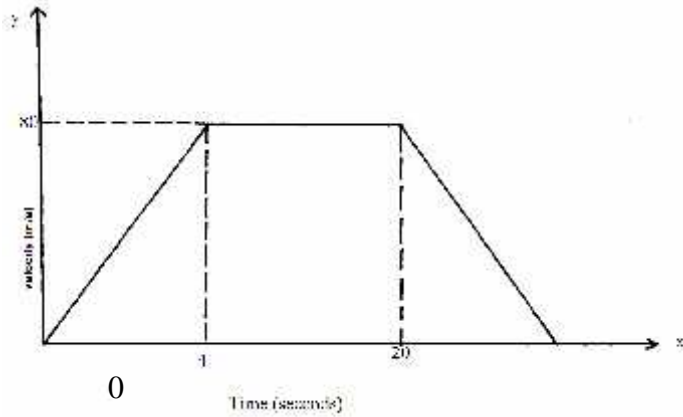
(a) Find the total distance traveled by the car? (2mks)

(b)   Calculate the deceleration of the car.   (2marks)

7.   Use the reciprocal tables, square tables and cube tables to evaluate;   (3marks)

$$\frac{5}{(26.52)^2} - \frac{3}{(0.00482)^{\frac{1}{2}} + 2.734^3}$$

8.   The surface area of two cylindrical water tanks are $50m^2$ and $162m^2$ respectively. Given that the volume of water in the second tank is $36450m^3$, find the volume of water in the first tank if it's half full.   (4marks)
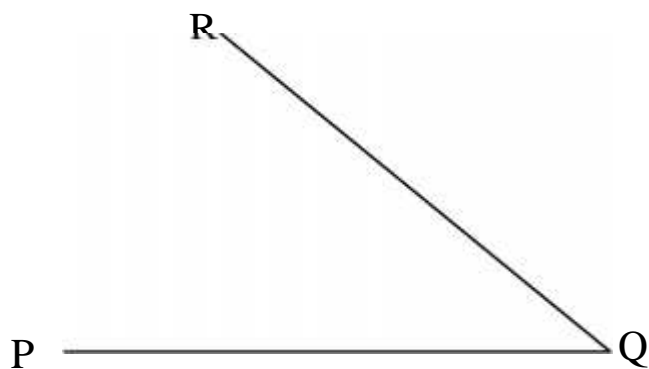
9.   Find the inequalities that define the region R shown in the figure below   (4marks)
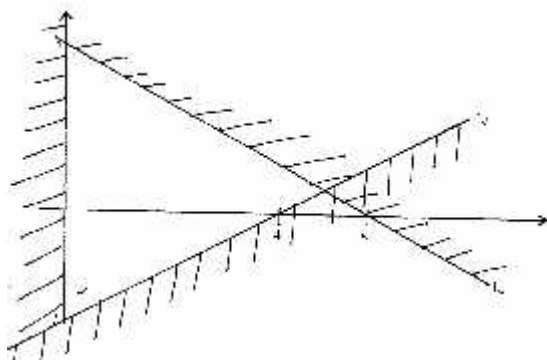
10. The diagram below shows part of the quadrilateral PQRS.

Given that 2RS=RQ and that PQRS is a cyclic quadrilateral, complete the diagram. (3marks)

11. Solve the following inequality and represent your solution on a number line. (3marks)

$3 + x - 4(x - 3) \le 30$

12. Evaluate the following without using mathematical tables or calculator. (3 marks)

$$\frac{Sin30^0\,Tan240^0\,Cos60^0}{Cos120^0\,Sin45^0}$$

13. The equation of a circle is given by $2x^2+16x+2y^2-4y-2=0$. Determine the radius and centre of the circle.
(3 marks)

14. A Kenyan businessman bought goods from Japan worth 2,950,000 Japanese Yen. On arrival in Kenya, custom duty of 20% was changed on the value of the goods.
If the exchange rates were as follows:-

   1 us dollar $= 118$ Japanese yen

     1 us dollar $= 76$ Kenya shillings

Calculate the duty paid in Kenya shillings. (2 marks)

15. A positive two digit number is such that the product of the digits is 24. When the digits are reversed, the number formed is greater than original number by 18. Find the number. (3 marks)

16. The figure below (not drawn to scale) has points P, Q, R and S on the circumference of the circle centre O, such that PQ is parallel to SR and angle SRQ = 125°.
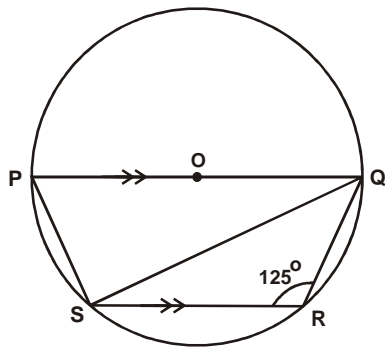
Determine the size of angle:-

a) QOS obtuse (1 mark)

b) QPS (1 mark)

c) SQR (1 mark)

17.   Triangle ABC has vertices A(-5,-3),B(-3,-5) and C(-3,-1).

a)   Plot triangle ABC and its image $A^1B^1C^1$ under reflection in the line y=-x.   (3marks)

a) $A^{II}B^{II}C^{II}$ is the image of $A^1B^1C^1$ under rotation centre (0,0) through a positive quarter turn. Plot $A^{11}B^{11}C^{11}$ and state its co-ordinates.   (2marks)

b) $A^3B^3C^3$ with coordinates A^3(7.5,-4.5),B^3(4.5,-7.5) and C^3(4.5,-1.5) is the image of $A^{11}B^{11}C^{11}$ under a certain transformation. Plot $A^3B^3C^3$ and describe this transformation.   (2marks)

c) A^4(5,-1.5) is the image of A^3 under translation. State the co-ordinates of B^4 and C^4.
    (2marks)

18. . . . . ^{0} heading towards Island L. Two navy destroyers sail from a

noval base N to intercept the ship. Destroyer A sails such that it covers the shortest distance possible.

Destroyer B sails on a bearing of 020^0 to L. If the bearing of N from M is 100^0 and distance NM=300Km,

Using a scale of 1cm to represent 50Km, determine

i)   the positions of M,N and L.   (2marks)

(ii)   the distance travelled by destroyer A.   (2 marks)

iii)   the distance travelled by destroyer B.   (2 marks)

iv)   the bearing of N from L.   (2 marks)

19.   A country bus left town A at 11.45 am and traveled towards town B at an average speed of 60km/h. A matatu left town B at 1.15 pm, on the same day and traveled towards town A along the same road at an average speed of 90km/h. The distance between the two towns is 540km. Determine;

(a)   The time of day when the two vehicles met   (4marks)

(b)   How far from town A they met   (2marks)

(c)   How far outside town B the bus was when the matatu reached town A   (4marks)

20. A group of people planned to contribute equally towards a water project which needed kshs. 2,000,000 to complete. However, 40 members of the group withdrew from the project. As a result, each of the remaining members were to contribute ksh 2500 more.

(a) Find the original number of members in the group. (5marks)

(b) Forty five percent of the value of the project was funded by Constituency Development Fund (CDF). Calculate the amount that would be made by each of the remaining members of the group. (3marks)

(c) Members contribution were in terms of labour provided and money contributed. The ratio of the value of labour to the money contributed was 6:19, calculate the total amount of money contributed by the members (2marks)

21. A frequency distribution of marks obtained by 120 candidates is to be represented in a histogram. The table below shows the grouped marks , frequencies for all the groups and also the area and height of the rectangle for the group 30 – 60 marks.

Marks	1 – 10	11-30	31 – 60	61 – 70	71 – 100
Frequency	12	40	36	8	24
Area of rectangle			180		
Height of rectangle			6		

a) i)   Complete the table.   (4marks)

   ii)   On the grid provided below, draw the histogram.   (2marks)
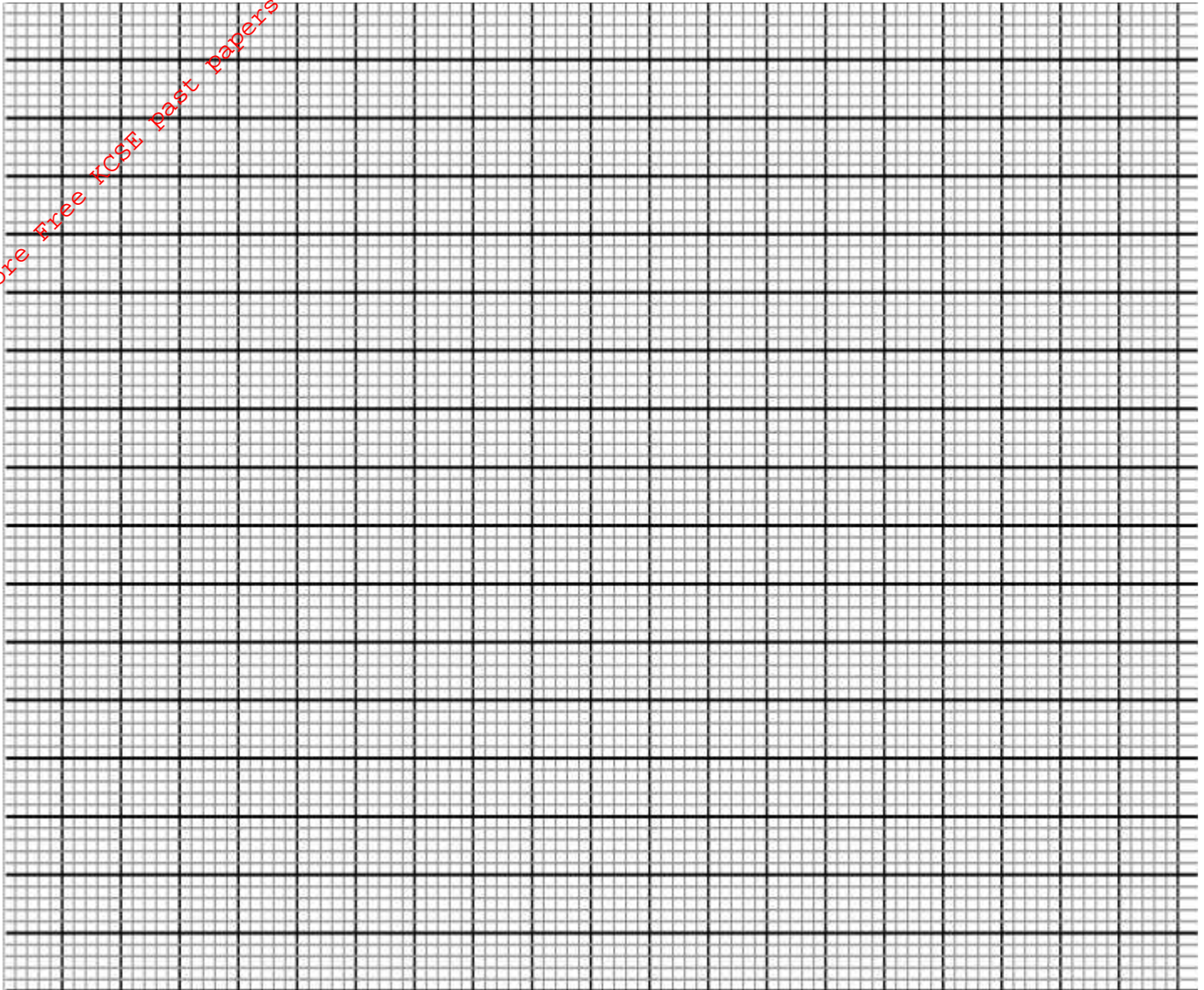
b) i)   State the group in which the median mark lies.   (1mark)

   ii)   A vertical line drawn through the median mark divides the total area of the histogram into two equal parts. Using this information or otherwise, estimate the median mark.   (3marks)

22. The figure below represents a rectangle PQRS inscribed in a circle centre O and radius 17cm. PQ =16cm.
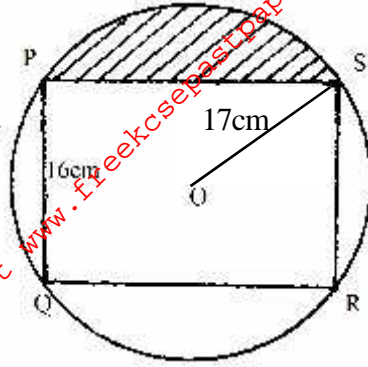
Calculate

(a)   The length PS of the rectangle   (2marks)

(b)   The angle POS   (4marks)

(c)   The area of the shaded region   (4marks)

23. A trader sold an article at sh.4800 after allowing his customer a 12% discount on the marked price of the article. In so doing he made a profit of 45%.
   a) Calculate
      (i) The marked price of the article. (3 marks)

      (ii) the price at which the trader had bought the article (2marks)

   b) If the trader had sold the same article without giving a discount, Calculate the percentage profit he would have made. (3 marks)

   c) To clear his stock, the trader decided to sell the remaining articles at a loss of 12.5%. Calculate the price at which he sold each article. (2marks)

24. In the figure below E is the mid point of BC. AD: DC 3:2 and F is the meeting point of BD and AE.
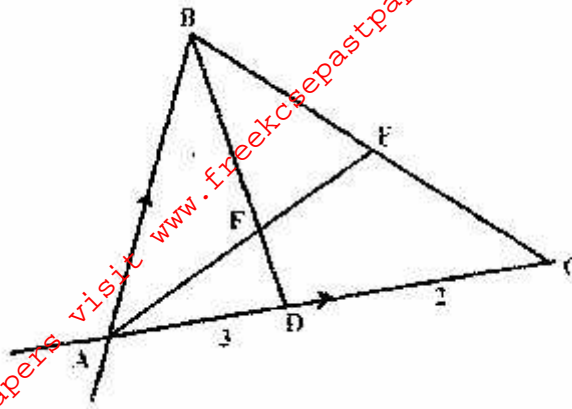
If ab = $\underset{\sim}{b}$ and AC = $\underset{\sim}{c}$, find in terms of $\underset{\sim}{b}$ and $\underset{\sim}{c}$ (2marks)

i) BD

ii) AE (2marks)

b) If BF = t BD and AF = n AE. find the value of t and n. (5marks)

c) State the ratio of BD to BF. (1mark)