

Name.....

Index No

Candidate's Signature

Date:

121/1

MATHEMATICS

Paper 1

JULY/AUGUST -2014

Time: 2½ Hours

RACHUONYO SOUTH SUB-COUNTY JOINT EVALUATION EXAM
Kenya Certificate of Secondary Education (K.C.S.E)

MATHEMATICS

Paper 1

INSTRUCTIONS TO THE CANDIDATES

- Write your **name** 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 only **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.
- Calculations 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 11

| | | | | | | | | | |
|----------|----|----|----|----|----|----|----|----|-------|
| Question | 17 | 18 | 19 | 20 | 21 | 22 | 13 | 24 | Total |
| Marks | | | | | | | | | |

GRAND TOTAL

| |
|--|
| |
|--|

This paper consists of 16 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)

Answer all questions in this section in the spaces provided.

1. Without using a calculator, evaluate

$$\frac{\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7} \text{ of } 2\frac{1}{3}}{(1\frac{3}{7} - \frac{5}{8}) \times \frac{2}{3}}$$

Giving your answer as mixed fraction (3mks)

2. Two boys and a girl shared some money. The younger boy got $\frac{5}{18}$ of it; the elder boy got $\frac{7}{12}$ of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girl's share. (4mks)

3. Three numbers, 1400, 1960 and n have a G.C.D and L.C.M of 70 and $2^2 \times 5^2 \times 7^2 \times 11$ respectively. Find the least possible value of n (3mks)

4. A bus starts off from Kitale at 9. a.m and travels towards Kakamega at a speed of 60km/hr. At 9.50 a.m, a matatu leaves Kakamega and travels towards Kitale at a speed of 60Km/h. How far from Kitale will the two vehicles meet. (3mks)

5. Find the equation of a straight line which is equidistant from the points **A**(2,3) and **B** (6,1) (3mks)

6. Simplify the expression completely (3mks)

$$\frac{12x^2 - 16x}{20 - 11x - 3x^2}$$

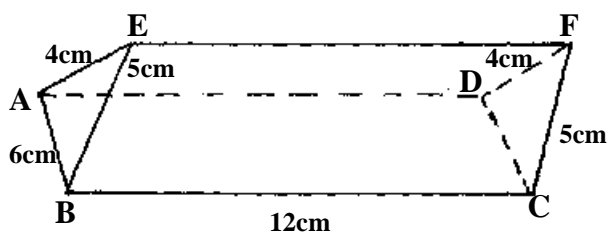
7. Given that $\sin = \frac{2}{3}$ and is an acute angle, find without using tables $\tan^2 + \cos^2$. Give your answer as a mixed fraction. (3mks)

8. Solve for y in the equation below. (4mks)

$$8(2^2)^y = 6(2^y) - 1$$

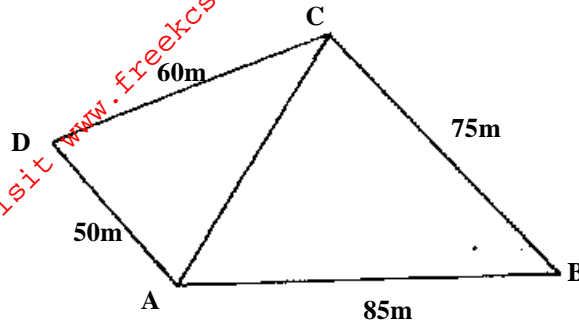
9. Using a ruler, a pair of compasses only and (proportional) a set square, construct on the upper side division of line **BC**, a line **BD** such that $\angle DBC = 37.5^\circ$. Use the line **BD** to divide **BC** into 4 equal portions. (3mks)

10. Sketch the net of the solid below. (2mks)



11. In a regular polygon, each interior angle is x° and each exterior angle is $\left(\frac{x-36}{3}\right)^\circ$
- (i) Find angle X° (1mk)
- (ii) Find the number of sides of the polygon (2mks)

12. The figure below represents a plot of land **ABCD** such that **AB**= 85m, **BC** 75m **CD**= 60m **DA** = 50m and angle **ACB** = 90° . (not drawn to scale)



Determine the area of the plot, in hectares correct to two decimal places.

(4mks)

13. An open rectangular box measures externally 32cm long , 27cm wide and 15cm deep. The box is made up of metal 1cm thick. If it has a mass of 1.5kg, what is the density of the box to 4 significant figures?

(3mks)

14. Find the integral values of x which satisfy the following inequalities;

$$2x + 3 > 5x - 3 > -8$$

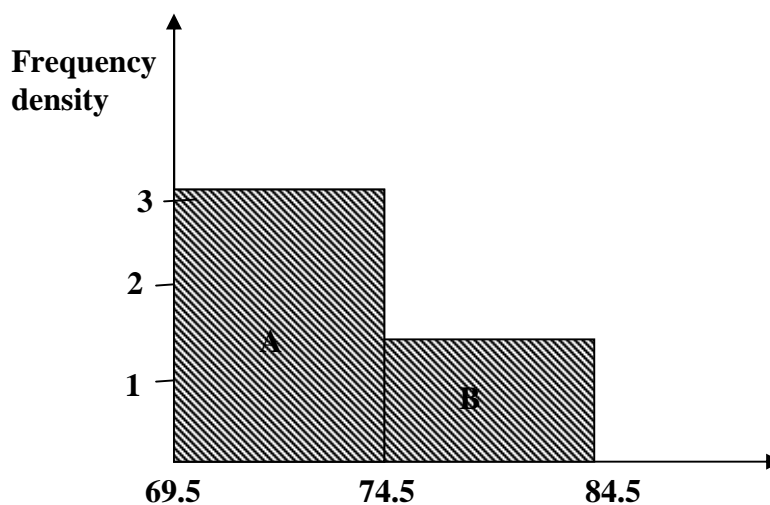
(3mks)

15. A Kenyan bank buys and sells foreign currency as shown below.

| | Buying Ksh | Selling Ksh |
|------------------|------------|-------------|
| 1 US dollar (\$) | 63.00 | 63.20 |
| 1 UK pound (£) | 125.00 | 125.95 |

A tourist arrived in Kenya with £ 9600 which he converted into Kshs at a commission of 5%. He later used $\frac{3}{4}$ of the money before changing the balance of dollars at no commission calculate ; to the nearest dollar, the amount he received. (3mks)

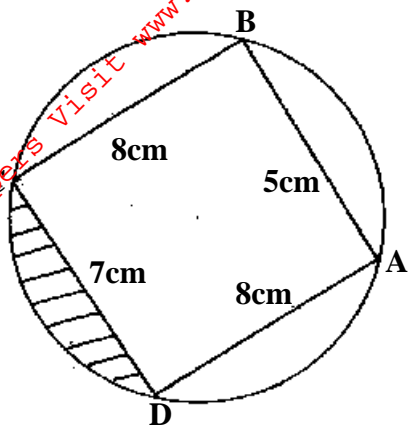
16. The histogram shown below represents the distribution of marks obtained in attest. The bar marked **A** has a height of 3.2 units while **B** has a height 1.2 units. If the frequency of the class represented by **B** is 6, find the frequency of the bar represented by **A**. (3mks)



SECTION II (50 MARKS)

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

17. The figure below (not drawn to scale) shows a quadrilateral **ABCD** inscribed in a circle. **AB** = 5cm, **BC** = 8cm, **CD** = 7cm and **AD** = 8cm. **AC** is one of the diagonals of length 10cm.



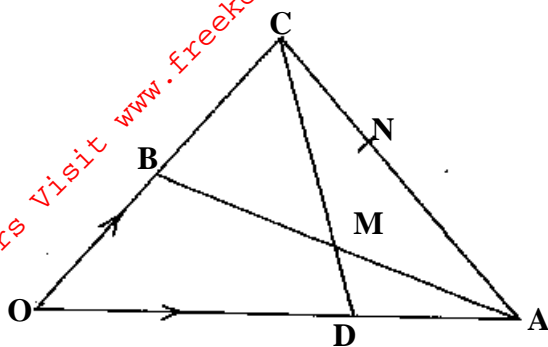
- (a) Find the size of angle **ABC**. (3mks)

- (b) Find the radius of the circle. (2mks)

- (c) Hence, calculate the area of the shaded region. (5mks)

18. In the figure below $\vec{OB} = \mathbf{b}$, $\vec{OC} = 3\vec{OB}$ and $\vec{OA} = \mathbf{a}$

- (a) Given that $\vec{OD} = \frac{1}{3} \vec{OA}$ and $\vec{AN} = \frac{1}{2} \vec{AC}$, \vec{CD} and \vec{AB} meet at M . Determine in terms of \mathbf{a} and \mathbf{b}



(i) \vec{AB}

(1mk)

(ii) \vec{CD}

(1mk)

- (b) Given that $\vec{CM} = k \vec{CD}$ and $\vec{AM} = h \vec{AB}$ determine the values of the scalars k and h (5mks)

- (c) Show that O , M and N are collinear.

(3mks)

19. The table below shows the analysis of examination marks scored by 160 candidates.

| Marks % | 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91-100 |
|-------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| No. of candidates | 2 | 6 | 15 | 22 | 36 | 34 | 20 | 15 | 6 | 4 |

(a) Using an assumed mean of 45.5, calculate

(i) The mean

(3mks)

(ii) The standard deviation

(4mks)

(b) Calculate the minimum mark for grade A if 40 students got grade A-

(3mks)

20. **ABCD** is a quadrilateral with vertices as follows: **A**(3,1), **B** (2,4) **C** (4,3) and **D** (5,1)

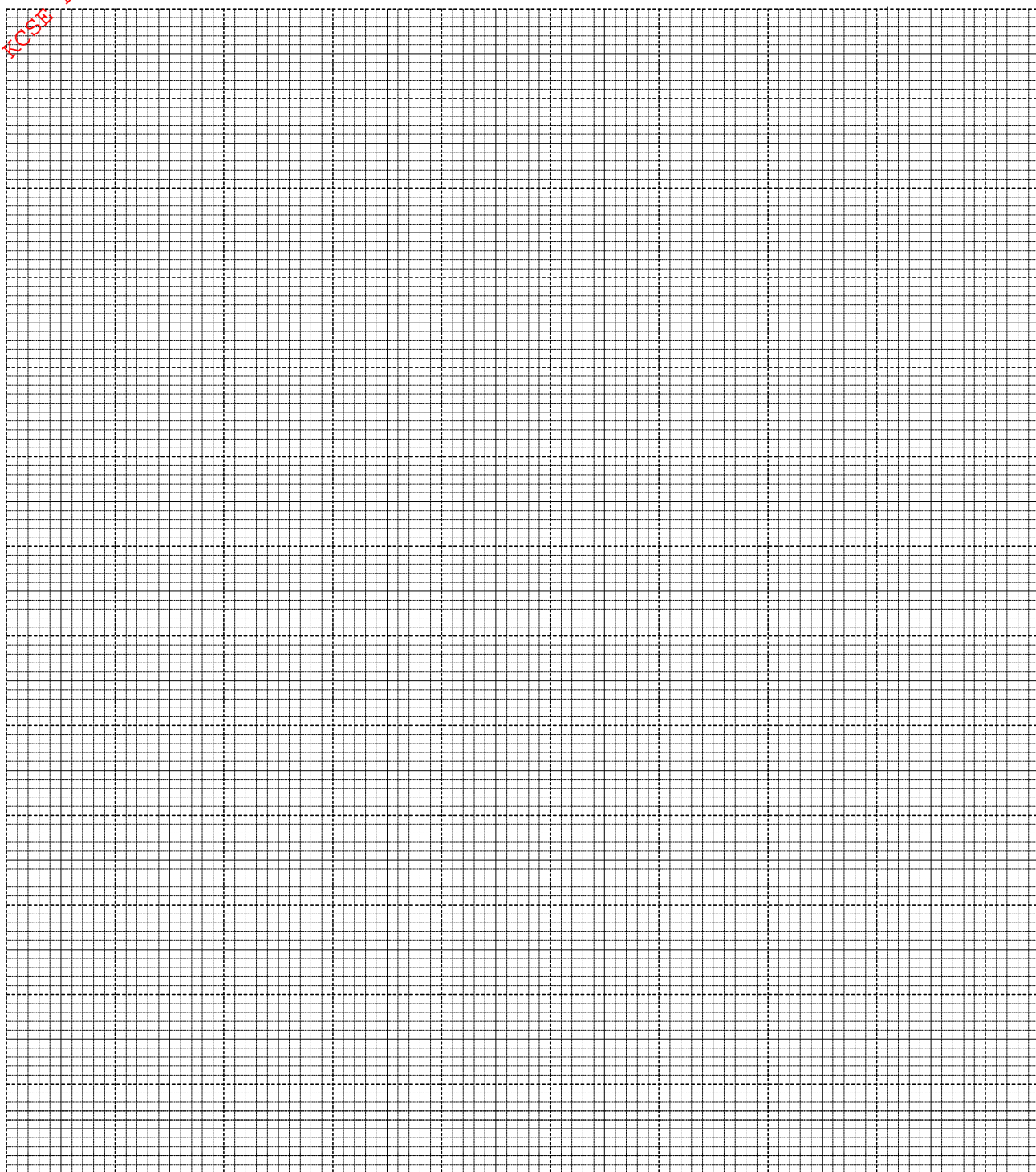
- (a) (i) On the grid provided draw the quadrilateral **ABCD** and the image **A'B'C'D'** under a transformation

with matrix $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$. Find the co-ordinates of **A'B'C'D'** (3mks)

Describe the transformation that maps **ABCD** onto **A'B'C'D'** fully (1mk)

- (b) A transformation represented by the matrix $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ maps **A'B'C'D'** onto **A''B''C''D''** find the co-ordinates of **A''B''C''D''**. Plot **A''B''C''D''** on the same grid. (3mks)

- (c) Determine a single transformation that maps **A''B''C''D''** onto **ABCD**. Describe this transformation fully. (3mks)



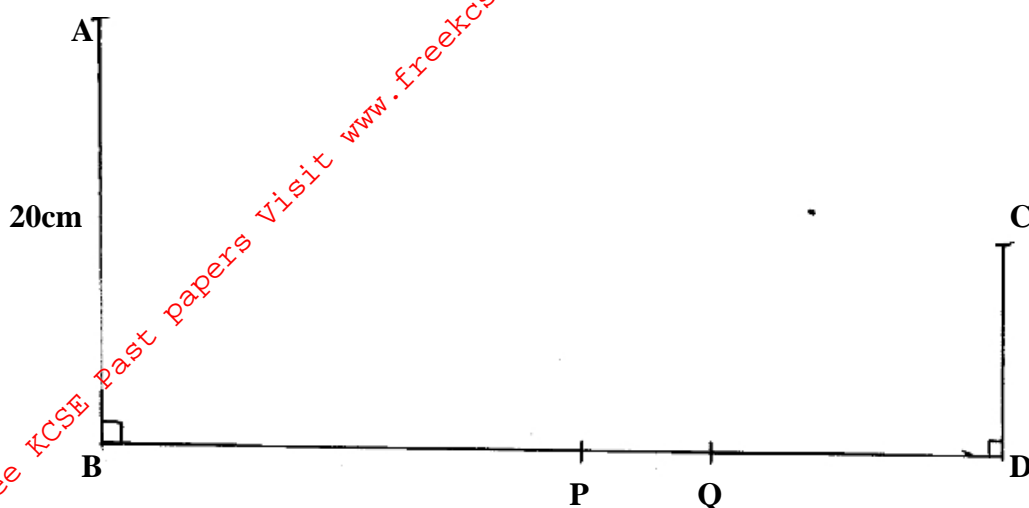
21. Four towns **P, Q, R** and **S** are such that **Q** is 1500 km due east of town **P**. Town **R** is 1080 km due North of town **Q**. Town **S** is on a bearing of 330° from **P** and on a bearing of 300° from **R**.
- (a) Use a ruler and a pair of compasses and show the positions of town **P, Q, R** and **S**. (take a scale of $1\text{cm} = 3000\text{km}$) (5mks)

(b) (i) Determine the distance of **PS** in Km (2mks)

(ii) Determine the distance **RS** in km. (2mks)

(iii) Determine the bearing of town **S** from **Q** (1mk)

22. The diagram below represents two vertical watch – towers **AB** and **CD** on a level ground. **P** and **Q** are two points on a straight road **BD**. The height of the tower **AB** is 20m and road **BD** is 200m



- (a) A car moves from **B** towards **D**. At point **P**, the angle of depression of the car from points **A** is 11.3° . Calculate the distance **BP** to 4 significant figures. (2mks)
- (b) If the car takes 5 second to move from **P** to **Q** at an average speed of 36km/hr, calculate the angle of depression of **Q** from **A** to 2 decimal places. (3mks)
- (c) Given that **QC** = 50.9 cm, calculate (2mks)
- (i) The height of **CD** in meters to 2 decimal places;
- (ii) The angle of elevation of **A** from **C** to the nearest degree. (3mks)

23. The parents of a certain mixed secondary school decided to buy a school van worth Ksh. 900,000. Each student was to contribute the same amount of money. 50 students were transferred from the school; as a result each of the remaining students had to pay Ksh. 600 more.
- (a) Find the original number of the students in the school. (5mks)

- (b) Find the percentage change in contributions per student. (3mks)

- (c) If the ratio of boys to girls in the school was 11: 7 find the amount of money contributed by boys alone. (2mks)

24. The distance S metres from a fixed point, covered by a particle after t seconds is given by the equation;

$$S = t^3 - 6t^2 + 9t + 5$$

(a) Calculate the gradient of the curve at $t = 0.5$ seconds.

(3mks)

(b) Determine the values of S at the maximum turning points of the curve.

(4mks)

(c) On the space provided, sketch the curve of $S = t^3 - 6t^2 + 9t + 5$

(3mks)