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Index No.....

School.....

Signature.....

Date.....

121/1  
MATHEMATICS  
PAPER 1  
July/August 2010  
2 ½ hrs

**BORABU / MASABA NORTH DISTRICTS JOINT EVALUATION TEST – 2010**  
**Kenya Certificate of Secondary Education (K.C.S.E)**

**MATHEMATICS**  
**PAPER 1**  
**July/August 2010**  
**2 ½ hrs**

**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.

**For examiner’s use only.**

**Section I**

|          |          |          |          |          |          |          |          |          |           |           |           |           |           |           |           |              |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|
| <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>13</b> | <b>14</b> | <b>15</b> | <b>16</b> | <b>Total</b> |
|          |          |          |          |          |          |          |          |          |           |           |           |           |           |           |           |              |

**Section II**

|           |           |           |           |           |           |           |           |              |              |  |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|--------------|--|
| <b>17</b> | <b>18</b> | <b>19</b> | <b>20</b> | <b>21</b> | <b>22</b> | <b>23</b> | <b>24</b> | <b>Total</b> | <b>GRAND</b> |  |
|           |           |           |           |           |           |           |           |              | <b>TOTAL</b> |  |

*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

*Answer all the questions in this section.*

1. HIV/AIDS awareness posters have been erected along both sides of a street in Nairobi. The posters are 60m apart along the left hand side of the street while they are 75M, a part a long the right hand side. At one end of the street the posters are directly opposite each other. At what distance measured from that end would you again find them directly opposite each other. (3mks)

2. Use tables of squares, square roots and reciprocals to evaluate. (4mks)

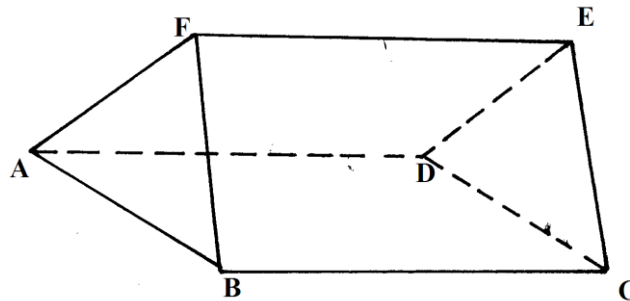
$$\sqrt{\frac{2500}{13.5^2} - 7.315}$$

3. Given that  $a = 3$ ,  $b = -1$  and  $c = 2$ , evaluate  $\frac{a^2 - b^2}{4 - 2b + c} - \frac{(a^2 - 2c^2)}{a + c - b}$  (2mks)

4. The image of point  $Q(1,2)$  after a translation is  $Q^1(-1,2)$ . What are the co-ordinates of a point  $R$  whose image  $R^1$  is  $(-3,-3)$  after this translation? (3mks)
5. Solve the inequality.  $\frac{x-3}{4} + \frac{x+5}{6} \leq \frac{4x+6}{8} - 1$  (3mks)
6. Under enlargement scale factor  $-2$ , the image of  $A(2,4)$  is  $A^1(-1,-2)$ . Find the coordinates of the centre of the enlargement. (3mks)
7. Two sides of a kite are  $12\text{cm}$  and  $8\text{cm}$  long respectively. If the shorter diagonal is  $10\text{cm}$  long, Calculate the area of the kite. (3mks)

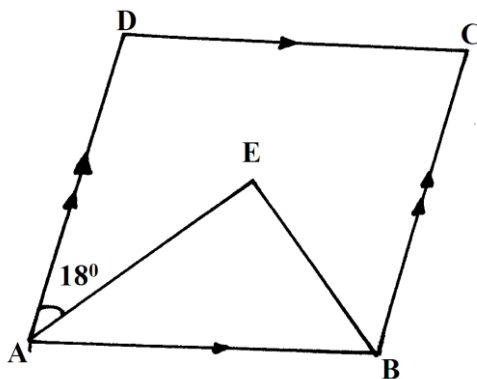
8. The distance from A to B is  $d$  km and that from B to C is  $x$  km. If a bus maintains an average speed of 50km/h between A and B and 60km/h between B and C, it takes 3 hours to travel from A to C. If it maintains 60km/h between A and B and 50km/h between B and C, the journey takes 8minutes less. What is the distance from A to C via B? (4mks)

9. The figure shows a triangular prism of uniform cross-section,  $AF = 4\text{cm}$ ,  $AB = 6\text{cm}$ ,  $BC = 12\text{cm}$ . Given that angle  $BAF = 30^\circ$ , find the total surface area of prism. (4mks)



10. A train whose length is 86 metres is traveling at 28km/h in the same direction as a truck whose length is 10meters. If the speed of the truck is 60km/h and is moving parallel to the train, calculate the time it takes the truck to overtake the train completely. (3mks)

11. The figure below ABCD is a rhombus and triangle ABE is equilateral. Calculate angle CED, given that angle DAE =  $18^\circ$ . (3mks)



12. A girl walks directly from a point P towards the foot of a vertical flag post 210m away. After covering a distance of 150m, she observes that the angle of elevation of the top of the flag post is  $75^\circ$ . Calculate the angle of elevation of the flag post from the point P. (3mks)

13. Using logarithms, Evaluate  $\sqrt{\frac{3196^2 \times (0.024)^3}{204.6}}$ . (3mks)

14. Express as a fraction  $24.\dot{9}\dot{7}2\dot{3}$  (3mks)
15. An arc of a circle radius 3.5cm is 9.1cm long. Find the angle it subtends at the centre of the circle. (3mks)
16. Construct a triangle ABC such that angle  $ABC = 135^\circ$ ,  $AB = 4.6\text{cm}$  and  $BC = 6.1\text{cm}$ . measure AC and angle ACB (3mks)

## SECTION II

*Answer only five questions in this section in the spaces provided.*

17. Two business women jointly bought a minibus which could ferry 25 paying passengers when full. The fare between two towns A and B was shs. 80 per passenger for one way. The minibus made three rounds trips between the two towns daily. The cost of fuel was shs. 1,500 per day. The drivers and the conductors were paid allowance of shs. 200 and shs 150 respectively. A further of shs. 4,000 per day was set aside for maintenance, insurance and loan repayment.

(a) One day the minibus was full on every trip.

(i) How much money was collected from the passengers that day. (3mks)

(ii) How much was the net profit. (2mks)

(b) On another day, the minibus was 80% full on average for the round trips how much did each business woman get if the days profit was shared to the ratio 2:3? (5mks)

18. A post OT stands vertically on level ground. John moves from O, the foot of the flag post to point R, on the level ground. The three points T, O and R form a right angled isosceles triangle whose perimeter is 56 metres. S is another point on the level ground 35m from O. Calculate

(i) The angle of elevation of T and S. (4mks)

(ii) The distance ST (3mks)

(iii) Find angle RTS (3mks)



19. The internal radius of a pipe of uniform cross section is  $\sqrt{2.1} \text{cm}$ . Water flows through this pipe at a uniform speed of 10cm per second, into an empty rectangular tank of base area  $3\text{m}^2$
- (a) If water starts flowing through the pipe at 7.00am, what is the depth of the water in the tank at 9.30am? (5mks)

(b) Water leaves this tank through a tap at the rate of 11.6cm per second. If the height of the tank is 1.2M, determine the time it takes for the tank to be filled. (5mks)

20. Use ruler and compasses only for all constructions in this question.

(a) Construct triangle ACX such that  $AC = 6.7\text{cm}$ ,  $AX = 8.4\text{cm}$  and  $\angle CAX = 45^\circ$ . (3mks)

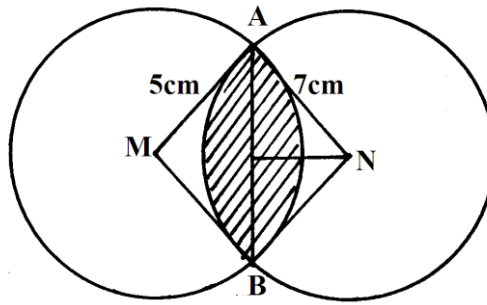
(b) (i) On the same diagram, construct a triangle ABC such that B lies on AX and angle  $AXC =$  angle XCB. (2mks)

(ii) Measure AB: (1mk)

(c) On the same side of CX as B, construct the locus of a point P such that angle  $CPX = 45^\circ$ . (2mks)

(d) Calculate the area of triangle ABC (2mks)

21. Two circles centres M and N have radii 5cm and 7cm respectively. If the two circles share a common chord AB of length 6cm. (10mks)



Calculate the area of the shaded region to 4 significant figures.

22. The table below gives a field book showing the results of a survey of a section of a piece of land between X and H on the stream. All measurement are in metres.

|     | H  |     |
|-----|----|-----|
| C33 | 95 | D36 |
|     | 90 |     |
| B21 | 70 |     |
| A42 | 30 | E25 |
|     | 25 | F40 |
|     | X  |     |

(a) Draw a sketch of the land.

(2mks)

(b) Calculate the area of this piece of land

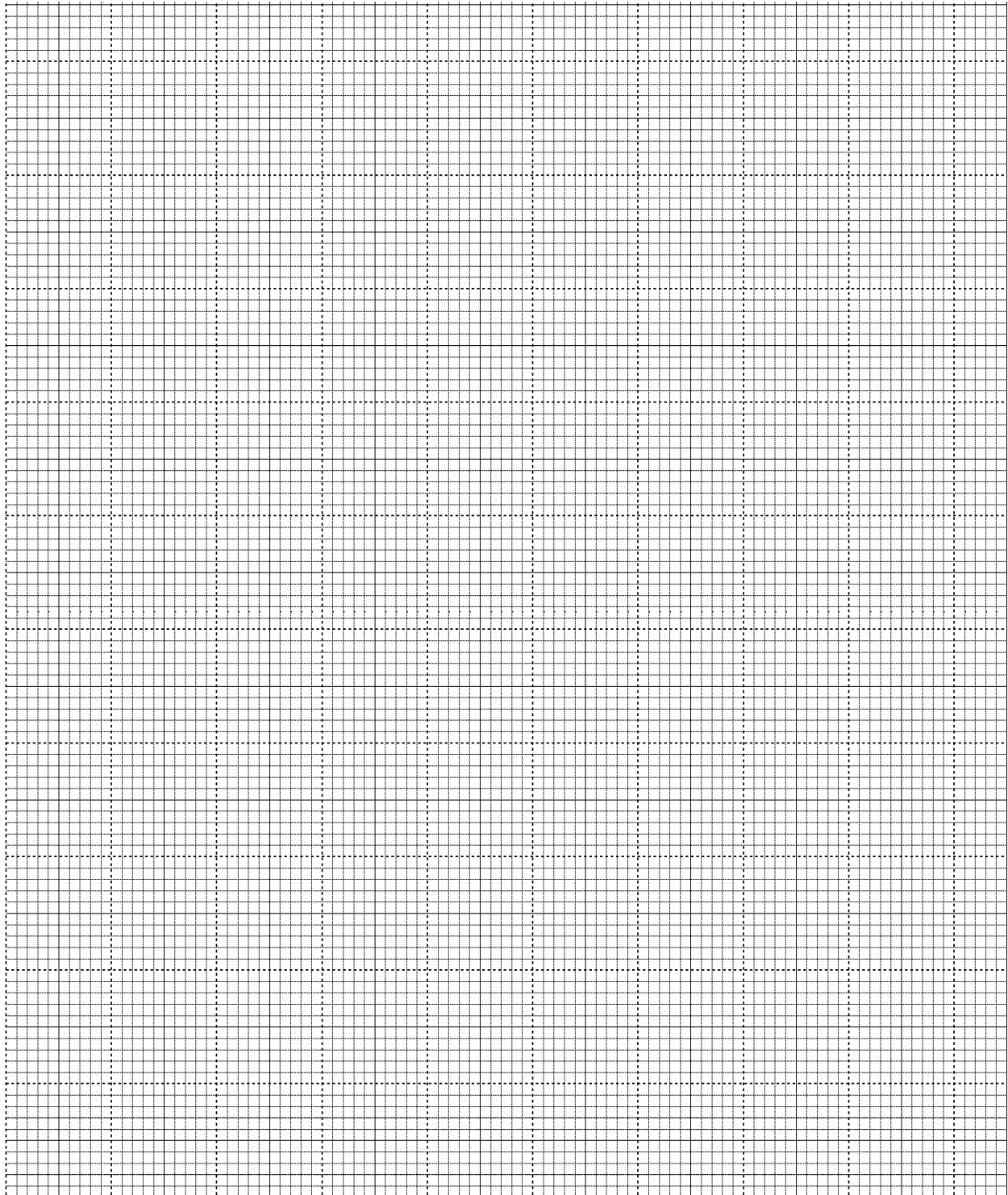
(8mks)

23. (a) Complete the table below giving your values to 2 decimal places. (2mks)

| $\theta^{\circ}$     | $\theta^{\circ}$ | $15^{\circ}$ | $30^{\circ}$ | $45^{\circ}$ | $60^{\circ}$ | $75^{\circ}$ | $90^{\circ}$ | $105^{\circ}$ | $120^{\circ}$ | $135^{\circ}$ | $150^{\circ}$ | $165^{\circ}$ | $180^{\circ}$ |
|----------------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Tan $\theta^{\circ}$ | 0                | 0.27         | 0.58         | 1            | 1.73         |              | $\alpha$     | -3.73         | -1.73         | -1            |               | -0.27         | 0             |
| Sin $\theta^{\circ}$ | 0                | 0.5          |              | 1            | 0.87         | 0.5          | 0            | -0.5          |               | -1            | -0.87         | -0.5          | 0             |

(b) Using the grid provided and the table in part (a) draw the graphs of  $y = \tan \theta$  and  $y = \sin 2\theta$ .

(4mks)



(c) Using your graphs, determine the range of values for which  $\tan \theta > \sin 2\theta$  for  $90 \leq \theta \leq 180$ .

(1mk)

(d) Use your graph to solve

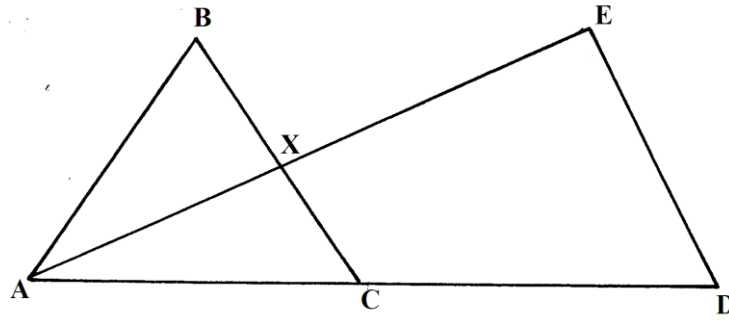
(i)  $\tan \theta = -2$

(1mk)

(ii)  $2 \sin 2\theta = 0.8$

(2mks)

24. In the figure below,  $AB = \frac{3}{4}\vec{a}$ ,  $AX = \frac{2}{3}\vec{b}$ . BC is parallel to ED such that  $BX = \frac{1}{3}ED$ .  $AC:CD = 3:7$



- (a) Express the vectors  $BX$  and  $ED$  in terms of  $\vec{a}$  and  $\vec{b}$  only (2mks)

- (b) Given that  $BC = h\vec{b}$ , express  $AD$  in terms of  $\vec{a}$ ,  $\vec{b}$  and  $h$  (3mks)

- (c) Given that  $AE = k\vec{a}$ , write an expression for  $AD$  in terms of  $\vec{a}$ ,  $\vec{b}$  and  $k$ . (2mks)

- (d) Solve for the values of  $h$  and  $k$  above. (3mks)

