

Name.....

Index No...../.....

School.....

Candidates Signature.....

Date

121/1
MATHEMATICS
Paper 1
July/August 2009
2 ½ Hours

BORABU INTER - SECONDARY SCHOOL
JOINT EVALUATION TEST - 2009
Kenya Certificate of Secondary Education (K.C.S.E)

121/1
MATHEMATICS
Paper 1
July/August 2009
2 ½ Hours

Instructions to candidates

1. Write your name and index number in the spaces provided above.
2. The paper contains two sections: **Section I** and **Section II**.
3. Answer **All** the questions in **section I** and **strictly any five** questions from **Section II**.
4. All answers and working must be written on the question paper in the spaces provided below each question.
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 answer is wrong.
7. Non-programmable silent electronic calculators and **KNEC** mathematical tables may be used, except unless stated otherwise.

For official 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 the pages are printed as indicated and no questions are missing*

1. Without using mathematical tables or a calculator, evaluate

$$\frac{0.7 \times 0.25 \times \sqrt{90.25}}{115 \times 0.0133} \quad (3\text{mks})$$

2. Simplify: $\frac{(6a + b)(a + b) - 7b(a + b)}{2a^2 - 2b^2}$ (3mks)

3. Mr. Okemwa, an aspiring politician distributed all his computers as follows:
A certain hospital received a quarter of the total number of computers, a nearby school received a half of the remainder and a self help group received a third of what the school received. What remained were six computers more than the self help group received. How many computers did Mr. Okemwa have? (4mks)

4. A Kenyan businessman bought a car from Zimbabwe for 12,000 Zimbabwean dollars. He sold it in Kenya at a profit of 15%. Given that 1 Zimbabwean dollar is equal to Ksh 9.8489, calculate his profit in Kenya shillings. (3mks)

5. Solve for x and y in the equation

$$36^x (24)^y = 192$$

(3mks)

6. Draw a line AB 12cm long. Using ruler and compasses only, construct the point x which divides the line AB internally in the ratio 5:3. Measure AX. (3mks)

7. The ratio of the cost of commodity X to that of commodity Y is 2:3 and the ratio of the cost of commodity Y to that of commodity Z is 6:1. If the total cost of the three commodities is sh 2200, express the cost of commodity Z as a percentage of commodity Y. (3mks)

8. A carton measuring 3.6m long, 2.4m wide and 1.5m high is a half full of water. All this water is run into an empty cylindrical tank of diameter 4.2m. find to the nearest cm the depth of water in the tank. (3mks)

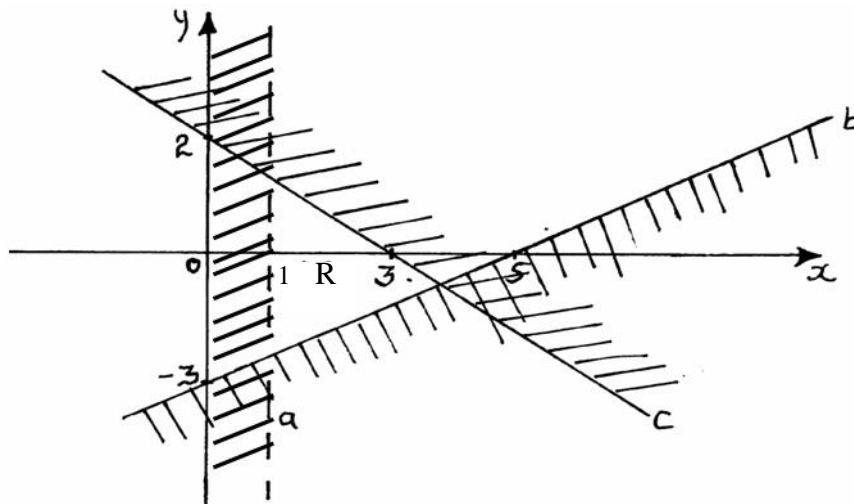
9. Using squares, square root and reciprocal tables only, evaluate

$$\frac{1}{0.2349} + 3\sqrt{0.2932} + (0.2717)^2 \quad (3\text{mks})$$

10. The angle of elevation to the top of a cliff from a point P on the horizontal ground is 35.5° . from another point B 8 metres nearer to the base of the cliff the angle of elevation of the top of the cliff is 40.3° . Calculate the height of the cliff. (3mks)

11. Simplify $\frac{2}{5}$ of $1\frac{2}{3} - \frac{1}{2} \sqrt{\frac{1\frac{2}{3} - 2\frac{1}{2}}{\frac{1}{3} - \frac{19}{27}}} + \frac{2}{3}$ (3mks)

12. Write down the linear inequalities represented by the figure below defining region R (3mks)

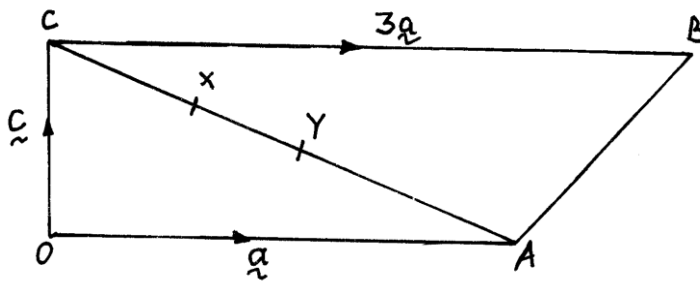


13. The length of an arc of a circle is $\frac{1}{10}$ of the circumference of the circle. If the area of the circle is 13.86cm^2 ; find:
- (a) The angle subtended by the arc at the centre of the circle (2mks)
- (b) The area of the sector enclosed by the arc. (2mks)
14. Given that $p = 3$, $q = -2$ and $r = -1$, evaluate
- $$\frac{2(p+r)^2 - (p-q)(q-r) - 2r}{3(p+q) - 2(q-r)} \quad (3\text{mks})$$
15. The image of $(0, 2)$ under an enlargement scale factor 3 is $(4, 6)$. What are the coordinates of the centre of enlargement? (3mks)
16. Two pipes P and Q can fill an empty tank in 2hours and 4hours respectively. Pipe R can empty the full tank in 3hours. If the three pipes P, Q and R are opened at the same time, find how long it will take for the tank to be full. (3mks)

SECTION II (50MARKS)

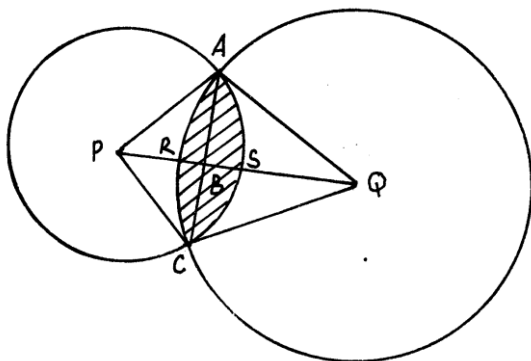
Answer any five questions from this section

17. The diagram below shows a trapezium OABC $\vec{OA} = \vec{a}$, $\vec{OC} = \vec{c}$ and $\vec{CB} = 3\vec{a}$. X and Y are points on AC such that AX:XC = 1:2 and AY:YC = 1:3.



- (a) Express the following vectors in terms of \vec{a} and \vec{c}
- (i) \vec{AC} (1mk)
 - (ii) \vec{AY} (1mk)
 - (iii) \vec{OY} (1mk)
 - (iv) \vec{OX} (1mk)
 - (v) \vec{AB} (1mk)
- (b) Show that points O, Y and B are collinear. (2mks)
- (c) OX produced meets CB at Z. Find the ratio OX:XZ. (3mks)

18. Two intersecting circles have centers P and Q as shown below. The circle centre P has radius 8cm and that of centre Q has radius 9cm.



The distance between the centers $PQ = 14\text{cm}$ and $PB : BQ = 3:4$.
Calculate:

- (i) Angle APC (2mks)
- (ii) Angle AQC (2mks)
- (iii) The area of the shaded region (6mks)

19. Four points A, B, C and D lie on the same plane. Point A is 42km due south west of point C. Point B is 50km on a bearing of $S60^{\circ}E$ from point C. Point D is equidistant from A, C and B

(a) Using the scale 1cm represents 10km, construct a diagram showing the positions of A, B, C and D. (6mks)

(b) Determine:

(i) The distance between A and B (2mks)

(ii) The bearing of D from A. (2mks)

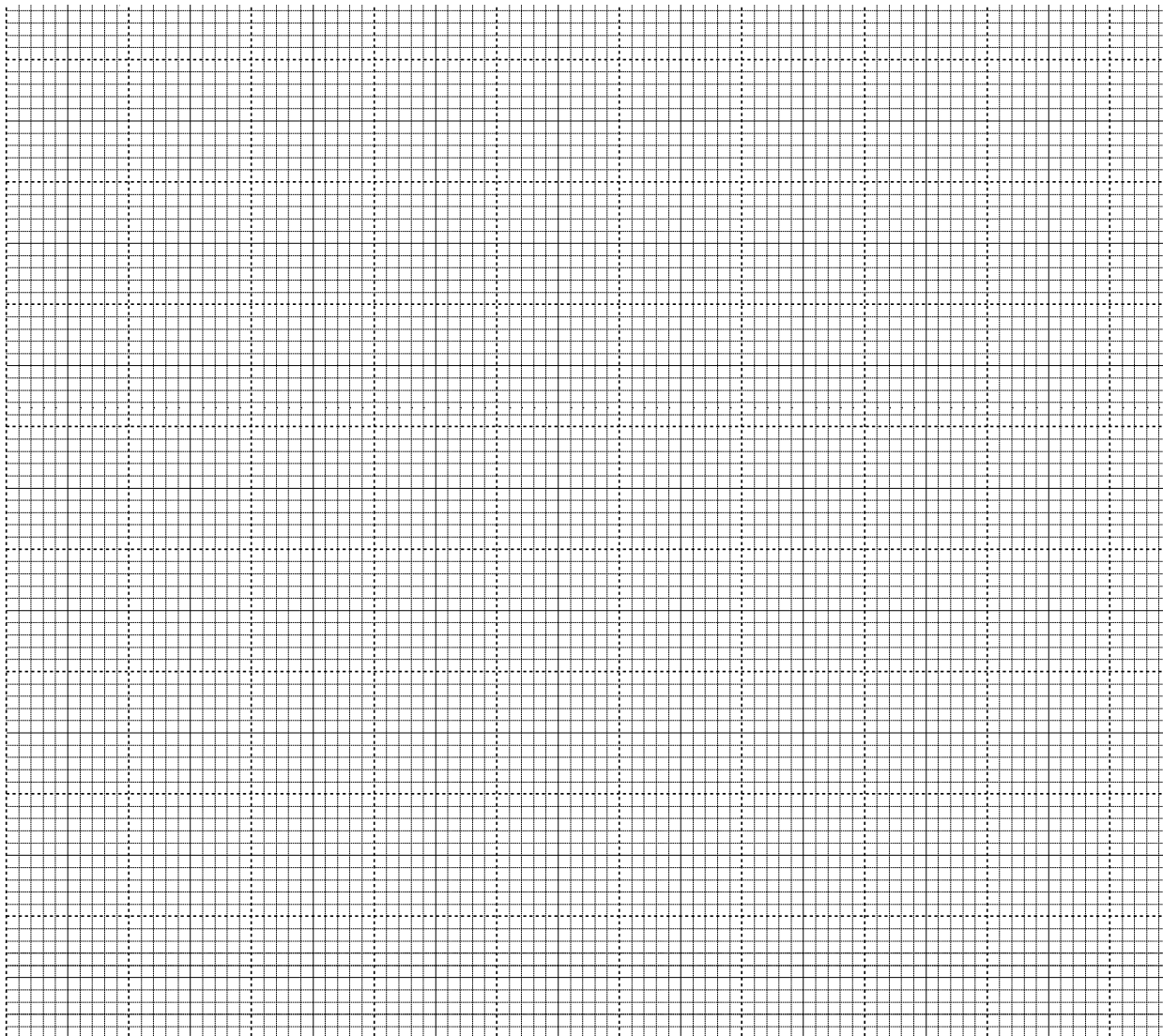
20. A line l is drawn through the point $(2, 3)$ making an angle of 45° with the positive direction of the x-axis and it meets the line $x = 6$ at point P.
- (a) Find the gradient of line l . (1mk)
- (b) Find the equation of line l . (2mks)
- (c) Find the coordinates of a point Q where line l intersect with the x-axis. (2mks)
- (d) Find the distance of P from the origin O (2mks)
- (e) Find the equation of the line through P perpendicular to OP (3mks)

21. A bucket that is in the shape of frustum of a pyramid has a rectangular base of sides 80cm and 60cm and a rectangular top of sides 40cm and 30cm. its vertical height is 50cm.
- (a) If the bucket is filled with milk, find its capacity in cm^3 (5mks)
- (b) The milk is to be packed into spherical packets of radius 7cm and full packets are to be sold. Find the number of full packets that will be realized. (3mks)
- (c) If each packet of milk was to sell at Sh. 70, find the total amount realised from the sale. (2mks)

22. (a) Complete the table below for the function $y = x^2 - 5x + 4$. (3mks)

x	-1	0	1	2	3	4	5	6
y								

- (b) On the grid provided, draw the graph of the function $y = x^2 - 5x + 4$ for $-1 \leq x \leq 6$ and use it to estimate the roots of the equation $x^2 - 5x + 4 = 0$ (4mks)



- (c) Using the same graph in (b) above, determine the roots of the equation $x^2 - 6x + 2 = 0$ (3mks)

23. The distance between two towns A and B is 360km. A minibus left A at 8.15a.m and travelled towards B at an average speed of 90km/h. A matatu left B at 10.35a.m on the same day and travelled towards A at an average speed of 110km/h.
- (a) How far from A did they meet? (4mks)
- (b) At what time did the two vehicles meet? (2mks)
- (c) A motorist started from his home at 10.30a.m on the same day and travelled at an average speed of 100km/h. He arrived at B at the same time as the minibus. Calculate the distance from B to his home. (4mks)

24. A marble is projected up and after t seconds its distance from the starting point is S cm where $s = 24t - 3t^2$.
- (i) What is its initial velocity? (2mks)
- (ii) After how many seconds does it reach its farthest point? (2mks)
- (iii) What is the velocity after 8 seconds? (2mks)
- (iv) Find the value of S when $t = 8$ seconds (2mks)
- (v) What is its acceleration? (2mks)

