

Name.....

Index No.

School

121/2

MATHEMATICS

PAPER 2

July / August 2007

2 ½ HOURS

BONDO DISTRICT SECONDARY SCHOOLS EVALUATION EXAMINATIONS – 2007

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

121/2

MATHEMATICS

PAPER 2

July / August 2007

2 ½ HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your name, school and Index Number in the spaces provided at the top of this page
2. The paper consists of two sections. Section I and Section II.
3. Answer ALL the questions in Section I and any FIVE from Section II.
4. All answers and working must be written on the question paper in the spaces provided below each question.
5. Marks may be given for correct working even if the answer is wrong.
6. Negligence and slovenly work will be penalized
7. Non programmable silent electronic calculator and KNEC Mathematical tables may be used except where stated otherwise.

Section I

FOR EXAMINER'S USE ONLY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
Marks																	

Section II

Question	17	18	19	20	21	22	23	24	TOTAL
Marks									

Grand Total

This paper consists of 16 printed pages.

*Candidates should check the question paper to ensure that all pages are printed as indicated
and no questions are missing*

SECTION 1 (50 MARKS)

Answer all the questions in the spaces provided after each.

1. Use logarithms table to evaluate.

(4mks)

$$\left(\frac{6.99 \times 0.3911}{\log 5} \right)^{-\frac{3}{4}}$$

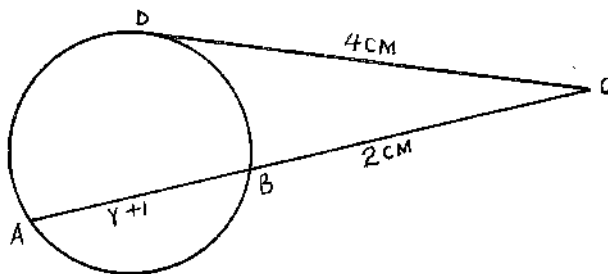
2. Make L the subject of the formula in

(3mks)

$$H = \sqrt[3]{\frac{3d(L-d)}{10L}}$$

3. Find the value of y in the figure below.

(2mks)



4. $(2x + 5y)$, $(x + y)$, $(x - y)$ are the first three terms of a Geometric Progression. Express x in terms of y . (3mks)

5. The probability that Chilla and Jotunda will pass an examination paper are $\frac{3}{5}$ and $\frac{7}{10}$ respectively. Find the probability that;
- (i) Both candidates will pass. (2mks)

- (ii) At least one will pass (2mks)

6. Two places A and B are 900km apart on the earth surface. If A is due North of B and given that the latitude of A is 5°N . Find the latitude of B. (Take radius of earth to be 6370km) (3mks)

7. If $\frac{\sqrt{14}}{\sqrt{7} - \sqrt{2}} - \frac{\sqrt{14}}{\sqrt{7} + \sqrt{2}} = a\sqrt{7} + b\sqrt{2}$

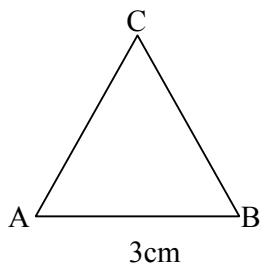
Find the values of a and b where a and b are rational numbers.

(4mks)

8.

Using the equilateral triangle below construct the locus of a point P such that $\angle APC = 30^\circ$

(3mks)



9. A customer deposited sh. 20,000 in a savings account. Find the accumulated amount after two years. If the interest was paid at 16% per annum compounded semi-annually. (3mks)

10. (a) Expand $[1 + \frac{1}{2}x]^7$ up to the term in x^3 . (2mks)

(b) Hence find the value of $(0.96)^7$ correct to 3 decimal places. (2mks)

11. A quantity T is partly constant and partly varies as the square root of S.

(a) Using constants a and b write down an equation connecting T and S. (1mk)

(b) If $S=16$ when $T=24$ and $S=36$ when $T=32$, Find the values of the constants a and b.

(2mks)

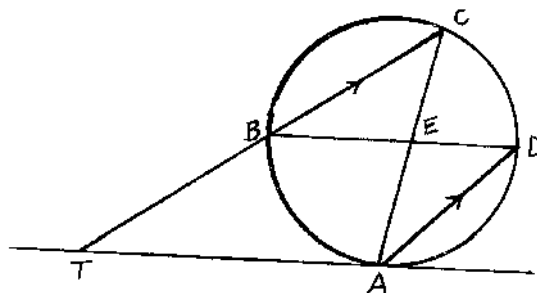
12. A rectangular plate has a perimeter of 28cm. Determine the dimensions of the plate that will give the maximum area. (3mks)

13. Solve for θ given that $2 \sin \theta + 1 = 0$ for $0 \leq \theta \leq 360^\circ$

(2mks)

14. In the figure below if angle $ACB = 40^\circ$ angle $ATB = 45^\circ$ and TC is parallel to AD . Calculate angle ABT and AEB .

(3mks)



15. The sum of two positive numbers is nine and the sum of their squares is one more than twice their product. Find the numbers.

(4mks)

16. Nelly, Odindo and Osalo contributed some money in the ratio 3:5:7 to start a business. They realized a profit of sh.50,000. How much did Osalo get as her share of the profit if it is shared in the ratio of their contribution to the business. (2mks)

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SECTION II (50 MARKS)

Answer five questions in this section

17. The table below shows tax rate in 2003.

Income(sh p.m)	Tax rates
0-8270	0%
8271-15790	10%
15791-23310	15%
23311-30830	20%
30831-38350	25%
38351-45870	35%
45871-53390	45%
Over 53390	50%

Mrs Odundo earns a monthly salary of shs. 23,520, a monthly House allowance of sh. 15,000, a medical allowance of sh.3,018, a commuter allowance of sh916.

Calculate:

- (a) Mrs Odundo's monthly income. (2mks)

- (b) The monthly income tax paid by Odundo in shillings. (6mks)

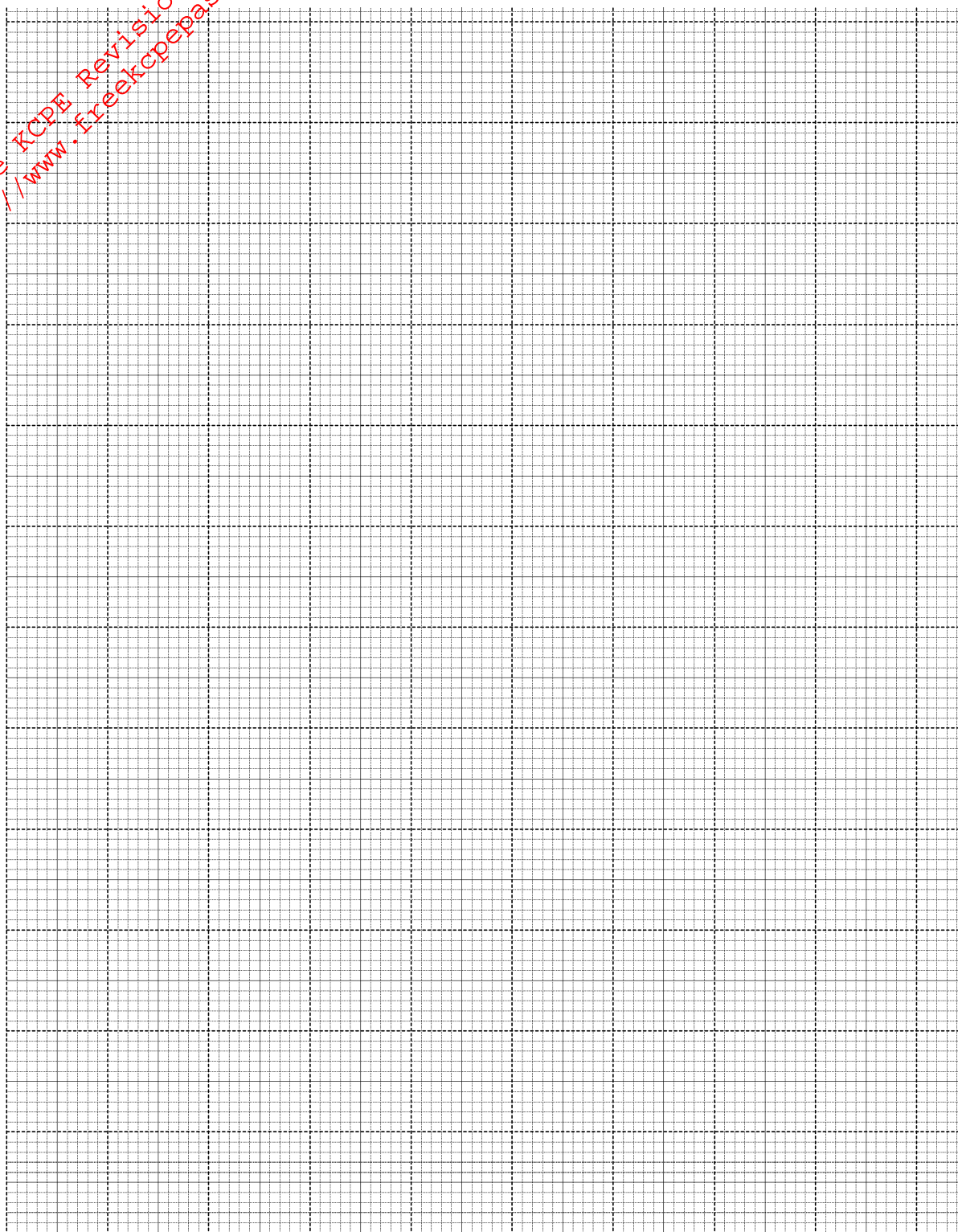
- (c) The net monthly salary Mrs. Odundo gets. (2mks)

18. The table below shows the ages of patients in the Hospital at any particular time throughout the year.

Age (years)	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45
No. of patients	3	4	6	9	8	8	5	4	3

- (a) Plot and draw an ogive curve for the distribution on the grid provided.

(4mks)



(b) Use the ogive curve to find

(i) The median

(2mks)

(ii) The semi-interquartile range.

(2mks)

(iii) If any patient above the age of 30 years can share bed with another, determine the number of patients who can share beds in the hospital.

(2mks)

19. Form four class at Agege Secondary School has 15 girls and 25 boys. The probability of a girl completing the Secondary School course is $\frac{3}{5}$ and that of a boy is $\frac{4}{5}$.

(a) A student is picked at random from the class. Find the probability that:-

(i) The student picked is a girl and will complete the course. (2mks)

(ii) The student will not complete the course. (2mks)

(b) If two students are picked at random from the class. Find the probability that:-

(i) Both are girls. (3mks)

(ii) Both are of same gender and will complete the course. (3mks)

20. Two towns A(60°N , 25°W) and B(60°N , 155°E) are both on the same parallel of latitude and also on the same great circle. A pilot can fly from A and B along the parallel of latitude or along the great circle over the north pole.
- (a) Giving your answers to the nearest kilometer, determine which route is shorter and by how much (Take earth's radius = 6370km) (6mks)

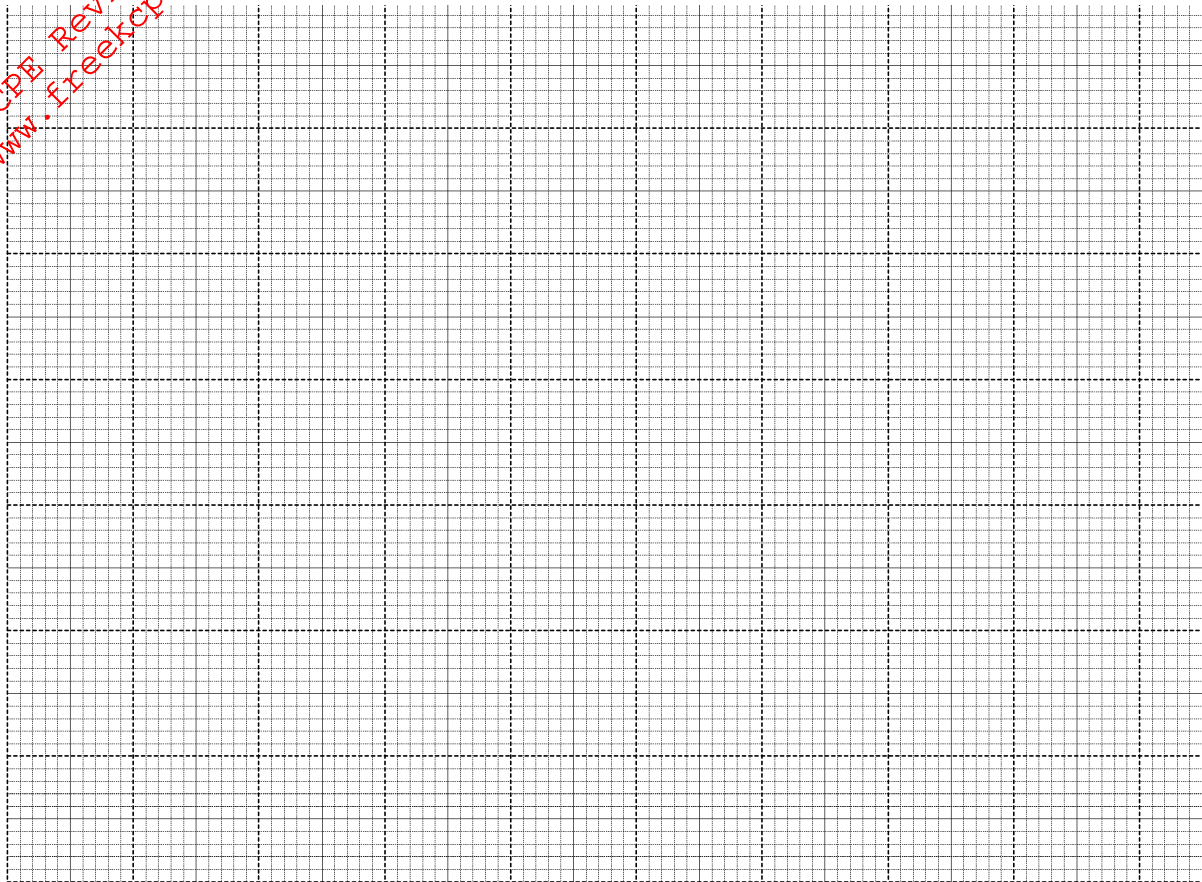
- b) The average speed of the aircraft is 600km/hr. Calculate to the nearest minute the time taken by the pilot using either route. (4mks)

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

x	0°	15°	30°	45°	60°	75°	90°	105°	120°
$3 \cos x^\circ$	3.00		2.60		1.50	0.78	0	-0.75	
$4 \sin (2x-10^\circ)$	-0.69	1.37		3.94	3.76		0.69		-3.06

- (b) Taking 1cm to represent 15° on the x-axis and 2cm to represent 1 unit on the y-axis. Draw the graphs of $y=3\cos x^\circ$ and $y=4\sin(2x-10^\circ)$ on the same set of axes on the grid provided.

(4mks)



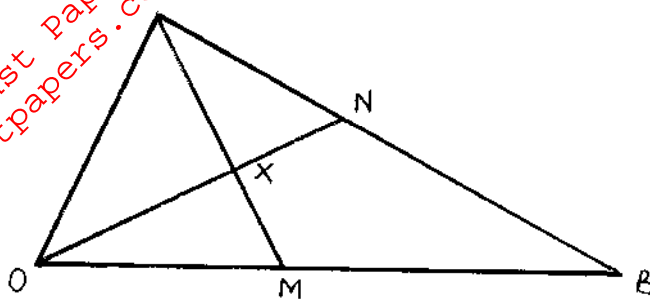
- c) Use your graph to find the values of x for which $3 \cos x - 4 \sin (2x - 10^\circ) = 0$. (2mks)

- d) State

- (i) The amplitude of the graph $y = 3 \cos x$ (1mk)

- (ii) The period of the graph $y = 4 \sin (2x - 10^\circ)$ (1 mk)

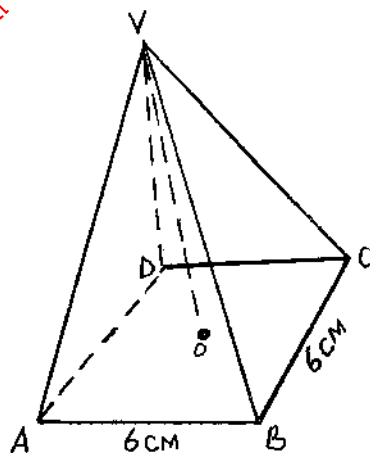
22. In the figure below M and N are points on OB and BA respectively such that $OM:MB=2:3$ and $BN:NA=2:1$. ON and AM intersect at x.



- a) Given that $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$ express \vec{ON} , \vec{AM} and \vec{AB} in terms of \mathbf{a} and \mathbf{b} . (4mks)

- b) By taking $\vec{OX} = h\vec{ON}$ and $\vec{AX} = k\vec{AM}$, where h and k are scalars. Find two expressions for \vec{OX} in terms of \mathbf{a} and \mathbf{b} . Hence determine the constants h and k and ratio in which x divides AM . (6mks)

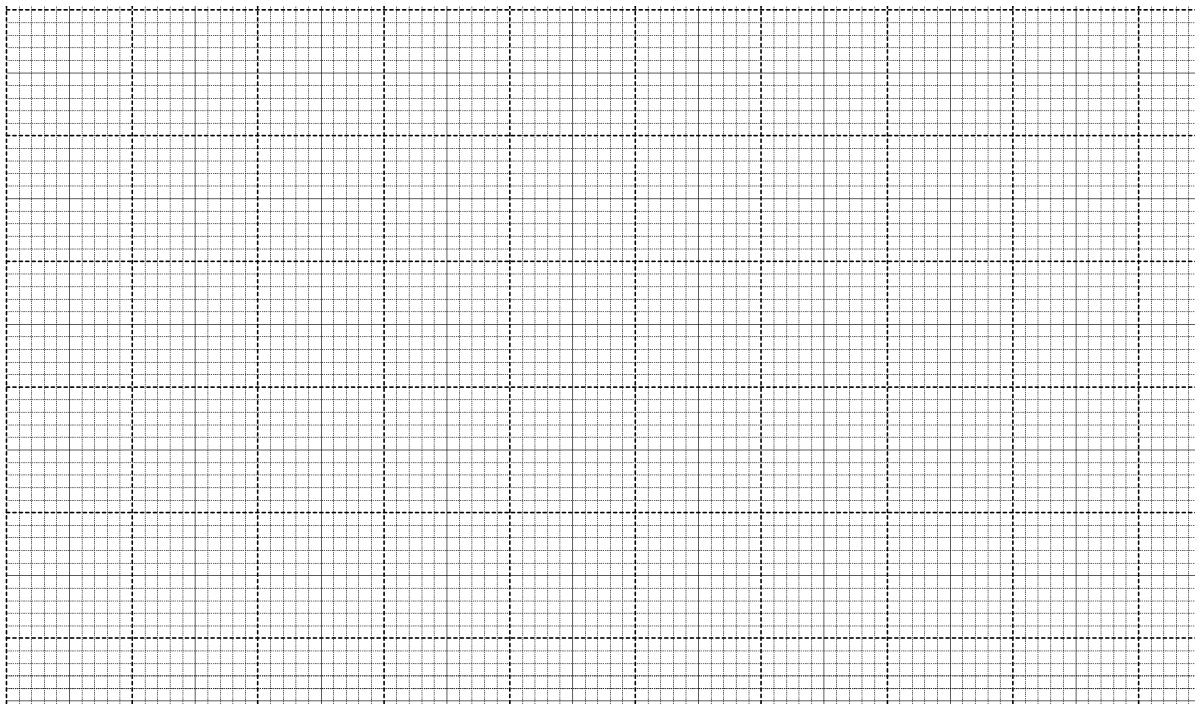
23. The figure below is a square based pyramid ABCDV with $AD=DC = 6\text{cm}$ and height $VO = 10\text{cm}$.



- a) State the projection of VA on the base ABCD. (1mk)
- b) Find
- (i) The length of VA. (3mks)
- (ii) The angle between VA and the plane ABCD. (2mks)
- (iii) The angle between planes VDC and ABCD. (2mks)
- (iv) Volume of the pyramid. (2mks)

24. A school has to take 384 people for a tour. There are two types of buses available. Type X and type Y. Type X can carry 64 passengers and type Y can carry 48 passengers. They have to use at least 7 buses.
- a) Form all linear inequalities which will represent the above information. (3mks)

- b) On the grid provided, draw the inequalities and shade the un-wanted region. (4mks)



- c) The charges for hiring the buses are

Type X: sh. 25,000

Type Y: sh 20,000

Use your graph to determine the number of buses of each type that should be hired to minimize the cost. (3mks)