

NAME.....INDEX

NO.....DATE.....

SCHOOL:.....SIGNATURE.....

...

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST, 2010
2½ HOURS

LAICOMET

Kenya Certificate of Secondary Education 2010

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST 2010

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided at the top of this page.
2. This paper consists of two sections: Section I and Section II.
3. Answer all questions in section I and any five questions from Section II.
4. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
5. Marks may be given for correct working even if the answer is wrong.
6. Non- programmable silent electronic calculators and KNEC Mathematical tables may be used.

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

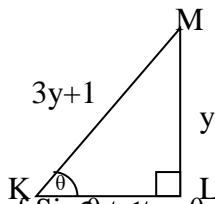
SECTION I (50 Marks):

Answer all questions in this section

1. Use logarithm tables to evaluate the following correct to 4 s .f (3mrks)

$$\frac{43.25 \times 0.9371}{\sqrt{2.641} \div 8.43}$$

2. KLM is a right – angled triangle



The ratio of $\sin 2\theta$ to $\tan \theta$ is $3:4$. Find the value of y .

(3mks)

3. If $\frac{\sqrt{5}-1}{2\sqrt{5}-4} = a + b\sqrt{5}$ State the values of the rational numbers a and b .

(3mks)

4. Wanjiku can plough a piece of land in 3 days while Chebet can plough the same piece in 5 days. Find how long they'd take working together.

(2mrks)

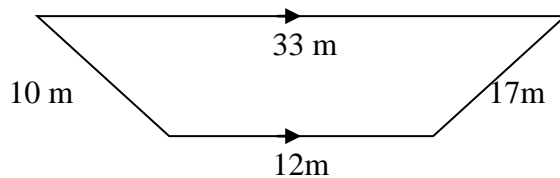
5. Find the number of terms that will give a sum of 800 in the series

$2 + 6 + 10 + \dots$

(2mks)

6. A flower garden is in the form of a trapezium shown below. Find the area of garden in m^2

(4mks)



7. In an examination taken by 50 candidates, the following results were obtained

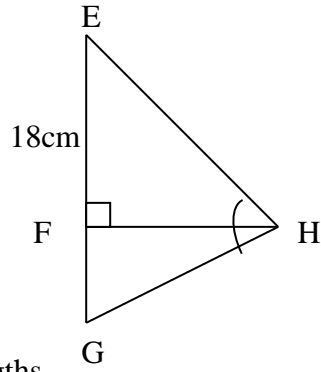
Marks	0 – 9	10 – 19	20 – 29	30 – 39	40 – 49
No. of candidates	5	10	17	14	4

Calculate

the mean mark

(3mks)

8. In this figure $\angle EHG = \angle EFH = 90^\circ$ and $HF = 7.5\text{cm}$ and $EF = 18\text{cm}$



Calculate the lengths

a) FG (2mks)

b) HG (2mks)

9. a) Expand $(1 - 2x)^4$ (2mks)

b) Use the first four terms of your expansion to find the value of 0.99^4 (2mks)

10. Given $\cos 2\theta = 1 - 2\sin^2\theta$, solve simultaneous equation

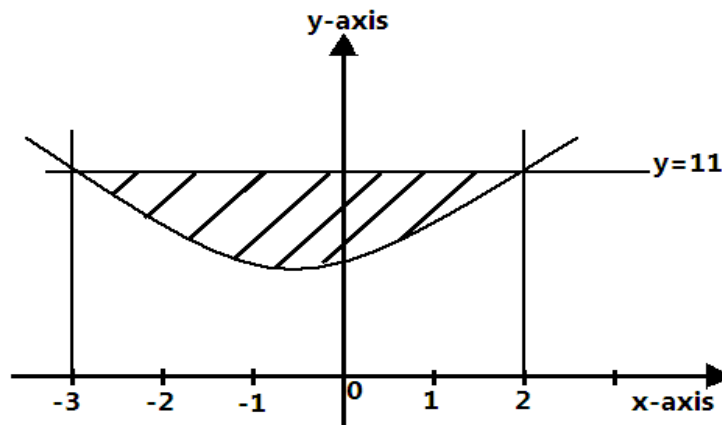
$$y = \cos 2\theta$$

$$y = \sin \theta$$

$$\text{for } 0^\circ \leq \theta \leq 360^\circ$$

(4mks)

11. In the figure below, the area bounded by the curve, the lines $x = -3$, $x = 2$ and the x -axis is 35 square units.



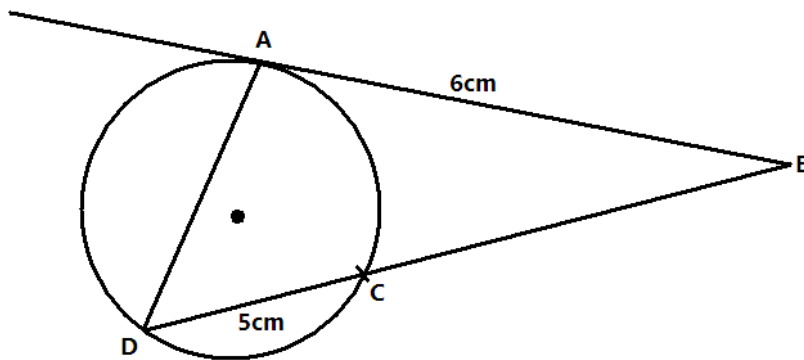
Find the area of shaded region

(2mks)

12. In the figure below, AB is a tangent to the circle BCD is a straight line. Angle $ABC = 30^\circ$,

$AB = 6\text{cm}$ and $CD = 5\text{cm}$. Calculate BC , hence the area of the triangle ABD .

(4mks)



13. Find the area of a regular hexagon of side 5cm . (4mks)

14. Find the radius and the co-ordinates of the centre of a circle whose equation is given as

$$6y^2 - 9x + 6x^2 + 6y + \frac{3}{2} = 0 \quad (3\text{mks})$$

15. 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)

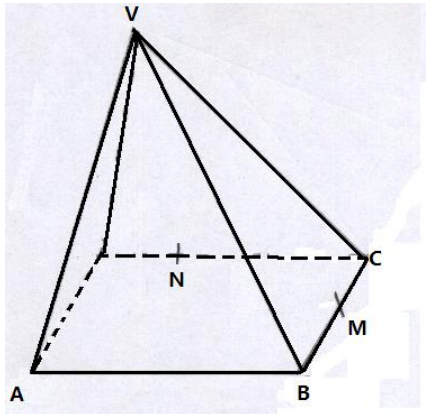
16. A particle moves in a straight line such that the distance S metres, travelled after time, t seconds is given by $S = 8 + 6t^2 - t^3$;

Find the acceleration of the particle at $t = 1$ (3mks)

SECTION II (50 Marks)

Answer only FIVE questions from this section

17. VABCD below is a square based right pyramid whose edges are all equal to 10 cm . M and N are the mid points of BC and CD respectively



c) Calculate

i) Volume of the pyramid

(4mks)

ii) Angle NAM

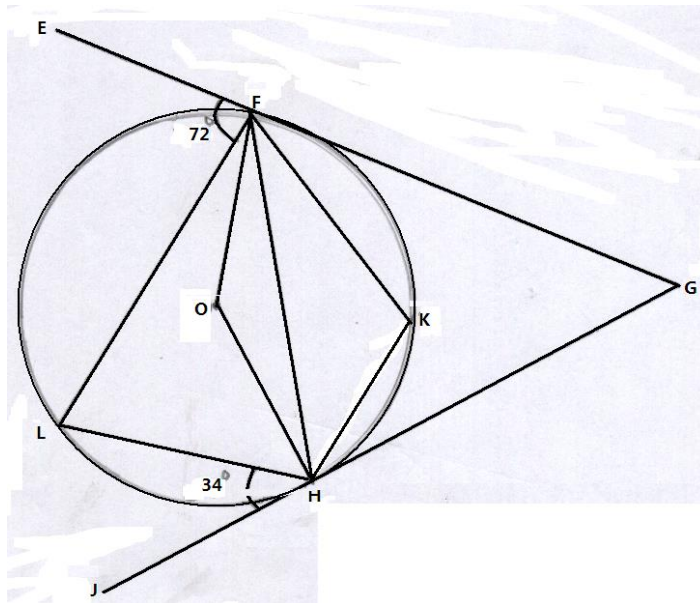
(4mks)

d) Sketch the net of the pyramid

(2mks)

18. In the figure below, EFG and GHI are tangents to the circle whose centre is O .

Given that $\angle EFL = 72^\circ$ and $\angle LHI = 34^\circ$



Find, giving reasons the sizes of the angles

- a) $\angle FHL$ (2mks)
- b) $\angle FLH$ (2mks)
- c) $\angle FKH$ (2mks)
- d) $\angle HGF$ (2mks)
- e) $\angle OHF$ (2mks)

19. a) The probability that a student is left – handed is 0.35. Calculate the probability that

i) a student chosen at random is right –handed. (1mk)

ii) Two students chosen at random are both left handed. (2mks)

b) A family of three children could get a girl first, followed by a boy then another boy. this could be denoted by *GBB* . Given that getting a boy or a girl at any stage is equally likely;

(i) Use the letters B and G to show the possibility space for all families with three children (1mk)

(ii) Using the possibility space calculate the probability that a family of three children has at least one girl. (2mks)

(iii) The family has two girl. (2mks)

(iv) The oldest and the youngest are of the same sex. (2mks)

20. (a) Complete the table below for $y = x^2 - 5x + 2$ (2mks)

x	-2	-1	0	1	2	3	4	5	6	7
x^2	4		0			9			36	
$-5x$		5					-20			-35

y			2			-4				16
---	--	--	---	--	--	----	--	--	--	----

(b) On the grid provided draw the graph of $y = x^2 - 5x + 2$ and $y = 2x - 4$ on the same axes for values of x in the domain $-2 \leq x \leq 7$, Using the scale 1 cm for 1 unit on x axis and 1cm for 2 units on y – axis. (4mks)

Grid

(i) State the equation of the line of symmetry of the curve $y = x^2 - 5x + 2$ (1mk)

(ii) Use your graph to solve the equation $x^2 - 7x + 6 = 0$ (2mks)

(iii) State the range of values of x for which $x^2 - 5x + 2 \leq 2x - 4$ (1mk)

21. A businessman wants to buy machines that make plastic chairs. There are two types of machines that can make these chairs, type A and type B. Type A makes 120 chairs a day, occupies 20cm^2 of space and is operated by 5 men. Type B makes 80 chairs a day, occupies 24cm^2 of space and is operated by 3men. The businessman has 200m^2 of space and 40 men.

a) List all inequalities representing the above information given that the business man buys x machines of type A and y machines of type B. (3mks)

b) Represent the inequalities above a graph.

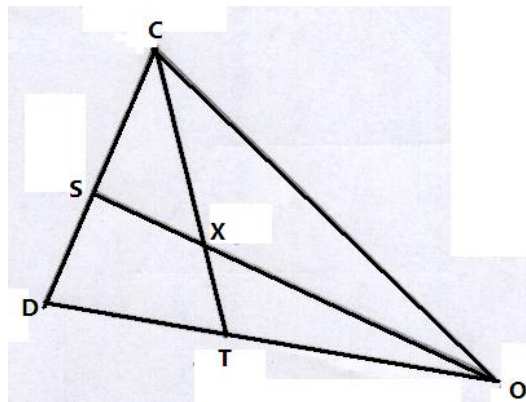
(3mks)

Grid

c) Using your graph find the number of machines of type A and those of type B that the business man should buy to maximize the daily chair production. (2mks)

d) Given that the price of a chair is *ksh.250*, determine the maximum daily sales the businessman can make. (2mks)

22. In the figure below S is the mid-point of line CD . T is a point on the line OD such that $OT:TD = 3:2$ and X is the point of intersection of the lines CT and OS



a) Given that $OC = \mathbf{c}$ and $OD = \mathbf{d}$, express in terms of \mathbf{c} and \mathbf{d} the vectors;

(i) \mathbf{OS}

(1mk)

(ii) \mathbf{CT} (1mk)

b) Given further that $\mathbf{CX} = t\mathbf{CT}$ and $\mathbf{OX} = w\mathbf{OS}$,

i. Express \mathbf{OX} in terms of w, c and \mathbf{d} (2mks)

ii. Express \mathbf{OX} in terms of t, c and \mathbf{d} (2mks)

c) Hence find the values of t and w (4mks)

23. A trader deals in maize, beans and peas and mixes them for selling at different prices. The cost of maize per kg is sh.42 that of beans and peas is sh. 60 and sh. 80 per kg respectively.

a) In making a certain brand of githeri regular he mixed maize and beans in the ratio 2:1 Calculate his selling price if he has to make a profit of 25 % on a kilogram of 'Githeri Regular' (3mks)

b) In making 'Githeri super' he mixed maize and beans in the ratio $x:y$. If the total cost per kg was 49.20 find the ratio $x:y$ (3mks)

- c) Another special brand, 'Githeri Royal', has the ratio of maize, beans and peas as 2:2:1. Find his percentage profit if he sells this brand at sh. 71 per kilogram. (4mks)

24. The velocity V metre per second of a vehicle is related to the time t seconds by $v = t^2 - 2t + 3$

t	1	2	3	4	5	6	7	8	9	10	11	12	13
v	2		6		18	27		51		83		123	

- a) Complete the table below
- b) Use the trapezium rule to determine the total distance traveled by the vehicle from $t = 1$ to $t = 13$ seconds, using 6 strips. (3mks)

- c) Use calculus to determine;
- (i) The exact distance traveled by the vehicle from $t = 1$ to $t = 13$ seconds. (3mks)

(ii) Find the percentage error in determining the distance by trapezium rule. (2mks)