

NAME..... INDEX NO.....

CANDIDATE'S SIGNATURE.....

DATE.....

121/1
MATHEMATICS
PAPER 1
JULY/AUGUST 2011
TIME: 2½ HRS.

**NANDI SOUTH, NANDI EAST AND TINDIRET
DISTRICTS JOINT EXAMINATION 2011**

*Kenya Certificate of Secondary Education
MATHEMATICS PAPER 1
TIME: 2½ HRS.*

INSTRUCTIONS TO CANDIDATES:

1. Write your **Name** and **Index Number** in the spaces provided at the top of this page.
2. Sign and Write the date of examination in the spaces provided above.
3. This paper consists of two Sections; Section I and Section II.
4. Answer all the questions in Section I and any **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 calculation, giving your answer at each stage in the spaces provided **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

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

SECTION I: (50 MARKS)

Answer all questions in this section.

1. Without using Mathematical tables or calculator, evaluate:

$$\sqrt{\frac{0.0273 \times 1.152}{1.3 \times 1.68}}$$

(3mks)

2. Solve the inequality $3 - 2x < x \leq \frac{2x + 5}{3}$ and show the solution on the number line.

(3mks)

3. A Kenyan bank buys and sells foreign currencies as shown below.

Buying (in Ksh)	Selling (Ksh)
1 Hong Kong dollar 9.47	9.53
1 South African rand 12.03	12.12

A tourist arrived in Kenya with 105,000 Hong Kong dollars and changed the whole amount to Kenya shillings. While in Kenya, she spent Ksh.403,879 and changed the balance to South African rands before leaving for South Africa. Calculate the balance in South African rands.

(3mks)

4. Simplify the expression: $\frac{12x^2 - 3y^2}{2x^2 - 7xy + 3y^2}$ (3mks)
5. Solve for x in the equation; $4^{1+x} + 3 \times 2^x = 1$ (3mks)
6. The points A(2, 3) and B(7, 5) are mapped onto A'(0,5) and B'(-5, 3). Determine by calculation the co-ordinates of the centre of rotation. (4mks)

7. Tanui is a real estate agent who is entitled to a commission on all properties bought through him. During a certain month, he sold 2 mansions at sh.2.54 million each, 4 flats at sh.582,000 each and 5 bungalows at sh.354000 each. If he was paid a total commission of sh.458,000. calculate the percentage rate of commission he was paid. (3mks)

8. Use reciprocals and squares tables only to evaluate:

$$\left(\frac{6}{0.002678} - \frac{17}{48.32} \right)^2 \quad (3\text{mks})$$

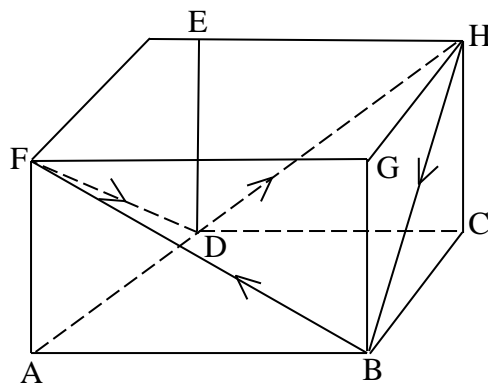
9. A boy walks directly from point A towards the foot of a vertical flag post 250m away. After covering a distance of 160m, he observes that the angle of elevation of the top of the flag post is 65° . Calculate the angle of elevation of the flag post from point A. (3mks)

10. Solve for χ in the equation $2 \sin (2\chi + 10^\circ) + 1 = 0$ for $0 \leq x \leq 360^\circ$. (3mks)

11. Given that $9\chi^2 - 12\chi + t$ is a perfect square, find the value of t . (3mks)
12. Given that $\sin \chi = \frac{1}{\sqrt{3}}$ and χ is an acute angle. Find $\cos(90^\circ - \chi) + \cos \chi$ in the form $\frac{\sqrt{a} + \sqrt{b}}{c}$, where a , b and c are constants. (3mks)
13. A particle starts from rest and accelerates uniformly reaching a velocity of 20m/s in 5 seconds. It then traveled with this velocity for 10 seconds after which it decelerated to rest in 3 seconds. Find the distance traveled by the particle. (3mks)
14. Two numbers are in the ratio 5:7. When 15 is added to each number, the ratio changes to 5:6. Find the two numbers. (3mks)

15. The proceeds of a certain harambee meeting was distributed among three primary schools A, B and C. A received $\frac{1}{3}$ of the total amount realized, B received $\frac{1}{3}$ of the remainder while C received $\frac{4}{5}$ of what B received. If the difference of what remained and B's share was sh.25,000, determine how much the harambee realized. (4mks)

16. On the surface of a cube ABCDEFGH below, a continuous path BFDHB is drawn as shown by the arrow.



- (a) Draw and label the net of the cube. (2mks)
- (b) On the net, show the path. (1mk)

SECTION II: (50 MARKS)

Answer any five questions in this section:

17. (a) Complete the table below for the function $y = 3\chi^2 - 2\chi - 1$ for $-3 \leq x \leq 4$. (2mks)

χ	-3	-2	-1	0	1	2	3	4
$3\chi^2$			3				27	
-2χ	6							-8
-1								
y		15				7		

- (b) Draw the graph $y = 3\chi^2 - 2\chi - 1$. (3mks)
- (c) Draw the line $y = 3\chi + 1$ on the same axis hence find the values of χ for which $y = 3\chi + 1$ and $y = 3\chi^2 - 2\chi - 1$ are equal. (3mks)
- (d) Write down the simplified quadratic equation whose roots are the solution of the simultaneous equation in (c) above. (2mks)

GRAPH

18. The table below gives marks scored by 50 candidates in a Mathematics test.

Marks	26-30	31-35	36-45	46-50	51-65
No. of candidates	5	8	16	14	7

- (a) State the modal frequency. (1mk)
- (b) Calculate the mean score. (4mks)
- (c) Draw a histogram and a frequency polygon on the same grid to represent the information. (5mks)

19. (a) Given the matrix $P = \begin{pmatrix} 15 & 20 \\ 14 & 24 \end{pmatrix}$

Find P^{-1} , the inverse of P .

(2mks)

(b) Two traders Ole Maina and Ole Kanda bought goats and sheep at sh.g per goat and sh.S per sheep. Ole Maina paid a total of sh.64,000 for 14 goats and 24 sheep. Ole Kanda paid a total of sh.60,000 for 20 sheep and 15 goats.

(i) Form a matrix equation to represent this information.

(2mks)

(ii) Hence find the cost of one sheep and one goat.

(3mks)

(c) Ole Maina sold all his animals at a profit of 20% per goat and 25% per sheep. Ole Kanda sold all his animals at a profit of 25% per goat and 22% per sheep. Calculate the profit Ole Kanda made.

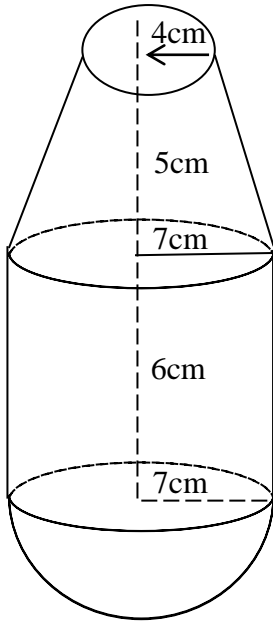
(3mks)

20. Use a ruler and pair of compasses only.
- (a) Construct triangle ABC such that $BC = 5\text{cm}$, $AC = 12\text{cm}$ and $\text{angle } ABC = 30^\circ$. (3mks)
 - (b) Construct a perpendicular from A to meet BC produced at D. Measure AD. (2mks)
 - (c) Construct triangle A^1BC such that the area of triangle A^1BC is three quarters the area of triangle ABC and both triangles share the side BC. (3mks)
 - (d) Describe the locus of A^1 . (2mks)

21. The position of three ships A, B and C in the sea are such that B is 400km on a bearing of 030° from ship A. Ship C is 750km from ship A on a bearing of 120° . An enemy ship P is sighted 1000km due South of B.
- (a) Taking a scale of 1cm :1000km, construct a scale drawing using a ruler and pair of compasses only to show the relative positions of ships A, B, C and P. (5mks)

- (b) Use the scale drawing to determine:
- (i) the distance of P from A. (2mks)
- (ii) the bearing of P from C. (2mks)
- (iii) the direction in which ship A would sail in order to intercept ship P, assuming that the latter remain stationary. (1mk)

22. A right conical frustum of base radius 7cm, top radius 4cm and height 5cm is stuck onto a cylinder of base radius 7cm and height 6cm and further attached to the hemisphere to form a closed solid as shown below. (Take $\pi = \frac{22}{7}$).



- (a) Find the volume of the solid. (8mks)

- (b) Given that the mass of the solid is 2430g, find its density. (2mks)

23. (a) On the grid provided below draw the graph of the function $y = 3x^2 + 5$ for $0 \leq x \leq 4$. (4mks)

- (b) Use the trapezoidal rule of 7 ordinates, estimate the area bounded by the curve $y = 3x^2 + 5$, the line $x = 1$, $x = 4$ and X-axis. (2mks)
- (c) Assuming that the area determined by integration to be actual area. Use integration to estimate the area and hence calculate the percentage error in using the trapezoidal rule. (4mks)

24. A bus and a Nissan left Nairobi for Eldoret 340km away at 7.00am traveling at 100km/hr and 120km/hr respectively. After 30 minutes the Nissan had a puncture which took 30 minutes to mend.

(a) How far from Nairobi did the Nissan catch up with the bus. (6mks)

(b) At what time did the Nissan catch up with the bus. (1mk)

(c) At what time did the bus reach Eldoret. (3mks)