

Name Class.....

Index Number:/.....

121/2

MATHEMATICS

Paper 2

March 2014

Kenya Certificate of Secondary Education.

Mini-Mock Examination 2014

Paper 2

2 ½ hours

Instructions to candidates

- Write your name, index number, admission number and class in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- The paper contains **TWO** sections: **Section I** and **Section II**.
- Answer **ALL** the questions in **Section I** and any **five** questions from **Section II**
- All answers and working must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
- Non – programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

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

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This paper consists of 18 printed pages

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

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Section I

Answer all questions in this section

1. Given that $\log_2 5 = j$ and $\log_3 2 = k$, write in terms of j and k in its simplest form $\log_{10} 8 - \log \sqrt{2}$.

{3 marks}

2. Find a and b given that $\frac{\sqrt{3}}{2\sqrt{3}+3} = a + b\sqrt{3}$

{3 marks}

3. Make s the subject of the formula
{3 marks}

$$p = \left(\frac{st}{r} + t \right)^{1/3}$$

4. Simplify the expression $\frac{4x-9x^3}{3x^2-4x-4}$
{3 marks}

5. Find the values of x which satisfy the equation $5^{2x} - 6 \times 5^x + 5 = 0$
{3 marks}

6. Use binomial expansion to evaluate $\left(3 + \frac{1}{\sqrt{3}}\right)^4 + \left(3 - \frac{1}{\sqrt{3}}\right)^4$
{3 marks}

7. Solve the equation $6 \cos x + 7 \sin x - 8 = 0$ for $0^\circ \leq x \leq 90^\circ$.
{4 marks}

8. Three quantities p , q and r are such that p varies directly as the square of q and inversely as r . If q is increased by 2.5% and r decreased by 20%, find the percentage change in p .
{3 marks}

9. Solve the equation

{3 marks}

$$2 \log x - \log(x - 2) = 2 \log 3$$

10. The following is a data of the numbers of chickens found in 12 homesteads.

12, 10, 13, 12, 10, 15, 17, 14, 15, 18, 17, 19

Find the quartile deviation of the data.

{3 marks}

11. AB is the diameter of a circle centre C. Given that A(3, -2) and B(5, 1) state the coordinates of the centre hence find the equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$ where a, b and c are constants.

{3 marks}

12. The Hire Purchase (H.P) price of a public address system was Ksh. 276,000. A deposit of Ksh. 60,000 was paid followed by 18 equal monthly installments. The cash price of the public address system was 10% less than the H.P price. Calculate

a) the monthly installment

{2 marks}

b) the cash price

{2 marks}

13. A point p moves inside a sector of a circle, centre O , and chord AB such that $2 \text{ cm} < OP \leq 3 \text{ cm}$ and angle $APB = 65^\circ$. Draw the locus of P .
{3 marks}

14. The table below shows Income tax rates in a certain year.

Monthly Income in Ksh.	Tax rate in each shilling
Upto 9,680	10%
From 9,681 to 18,800	15%
From 18,801 to 27,920	20%
From 27,921 to 37,040	25%
Over 37,040	30%

In that year, a monthly personal tax relief of Ksh. 1,056 was allowed. Calculate the monthly Income tax paid by an employee who earned a monthly salary of Ksh. 32,500.
{3 marks}

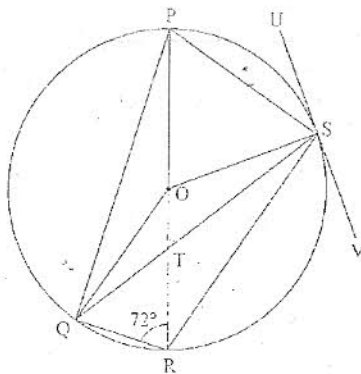
15. In what proportion should grade A sugar costing sh. 120 per kilogram and grade B costing sh. 200 per kilogram be mixed to produce a blend worth sh. 150 per kilogram?
{3 marks}

16. If a plane figure of area 50 cm^2 is transformed by a matrix $\begin{pmatrix} 1 & 3 \\ 3 & -7 \end{pmatrix}$ and then by matrix $\begin{pmatrix} 3 & -1 \\ 0 & 4 \end{pmatrix}$, find the area of the final image.
{3 marks}

Section II

Answer any five questions in this section

17. In the figure below, PR is a diameter of the circle centre O. Points P, Q, R and S are on the circumference of the circle. Angle $PRQ = 72^\circ$, $QS = QP$ and line USV is a tangent to the circle at S.



Giving reasons, calculate the size of:

- a) $\angle QPR$
{2 marks}

- b) $\angle PQS$
{2 marks}

- c) $\angle OQS$
{2 marks}

- d) $\angle RTS$
{2 marks}

e) $\angle RSV$

{2 marks}

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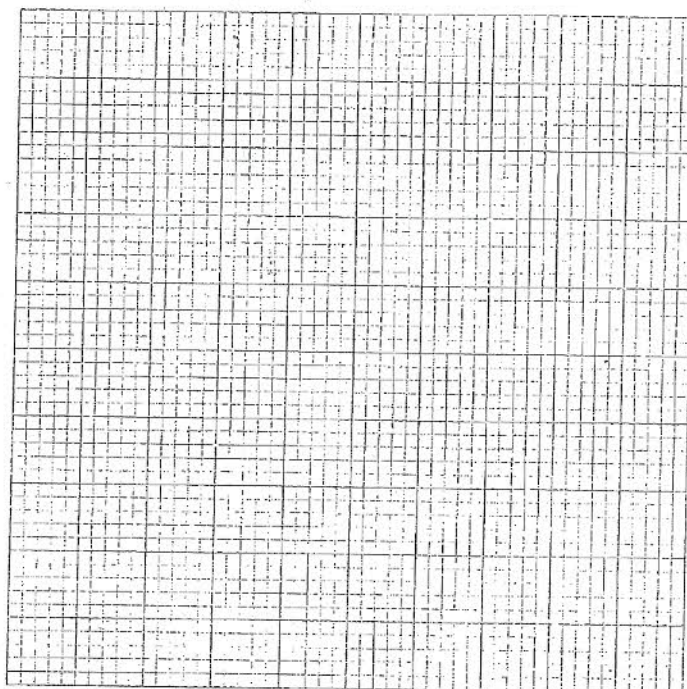
18(a) Complete the table below for $y = x^3 + 4x^2 - 5x - 5$.

{2 marks}

x	-5	-4	-3	-2	-1	0	1	2
$y = x^3 + 4x^2 - 5x - 5$			19			-5		

b) On the grid provided, draw the graph of $y = x^3 + 4x^2 - 5x - 5$ for $-5 \leq x \leq 2$

{3 marks}



c) i) Use the graph to solve the equation $x^3 + 4x^2 - 5x - 5 = 0$.

{2 marks}

ii) By drawing a suitable straight line on the graph, solve the equation

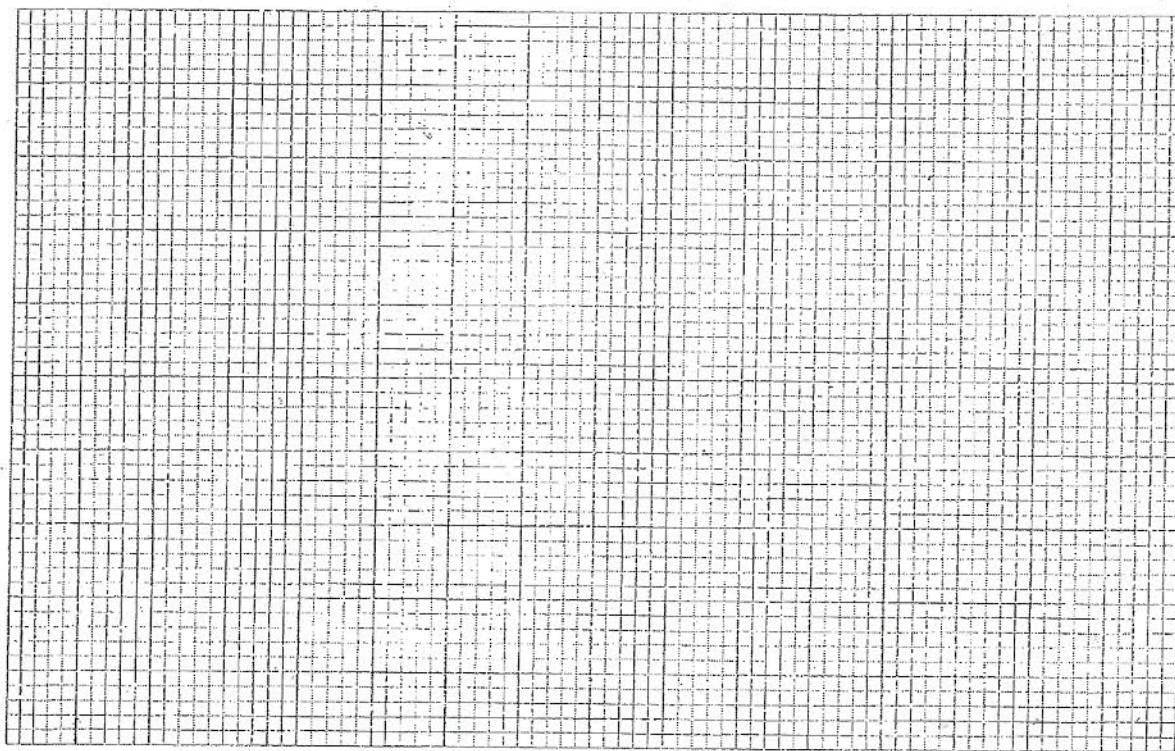
$$x^3 + 4x^2 - 5x - 5 = -4x - 1$$

{3 marks}

- 19(a) Complete the table below, giving the values correct to 1 decimal place.
{2 marks}

x°	0	40	80	120	160	200	240
$2 \sin (x + 20)^\circ$	0.7		2.0		0.0		-2.0
$\sqrt{3} \cos x$	1.7	1.3		-0.9		-1.6	

- b) On the grid provided, using the same scale and axes, draw the graphs of $y = 2 \sin (x + 20)^\circ$ and $y = \sqrt{3} \cos x$ for $0^\circ \leq x \leq 240^\circ$.
{6 marks}



- c) Use the graphs drawn in (b) above to determine:
i) the values of x for which $2 \sin (x + 20) = \sqrt{3} \cos x$
{2 marks}

20. A sequence is formed by adding corresponding terms of an AP and GP. The first, second and third terms of the sequence formed are 14, 34 and 78 respectively. Given that the common ratio of the GP is 3, find the first term of the AP and GP and the common difference of the AP. Find the 6th term of the sequence.

{6 marks}

- b) The second and third terms of a geometric progression are 24 and $12(x + 1)$ respectively. Find x if the sum of the first three terms of the progression is 76.

{4 marks}

21. A bag contains 3 orange beads and 3 blue beads of the same size and mass. Three beads are picked at random without replacement.

a) Draw a tree diagram to represent this information.

{2 marks}

b) Find the probability that all three beads picked are of the same colour.

{2 marks}

c) Find the probability of picking only one blue bead.

{2 marks}

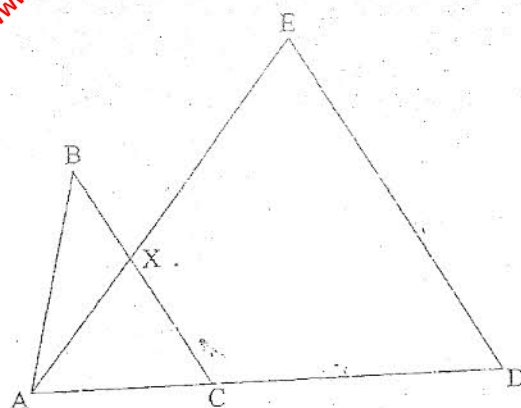
d) Find the probability of picking two blue beads.

{2 marks}

e) Find the probability of having the second bead picked being blue.

{2 marks}

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



- a) Express in terms of a and b only the following vectors

{2 marks}

i) BX

ii) ED

- b) Given that $BC = hBX$, express AD in terms of a , b and h .

{2 marks}

- c) Given that $AE = kAX$, write an expression for AD in terms of a , b and k .

{2 marks}

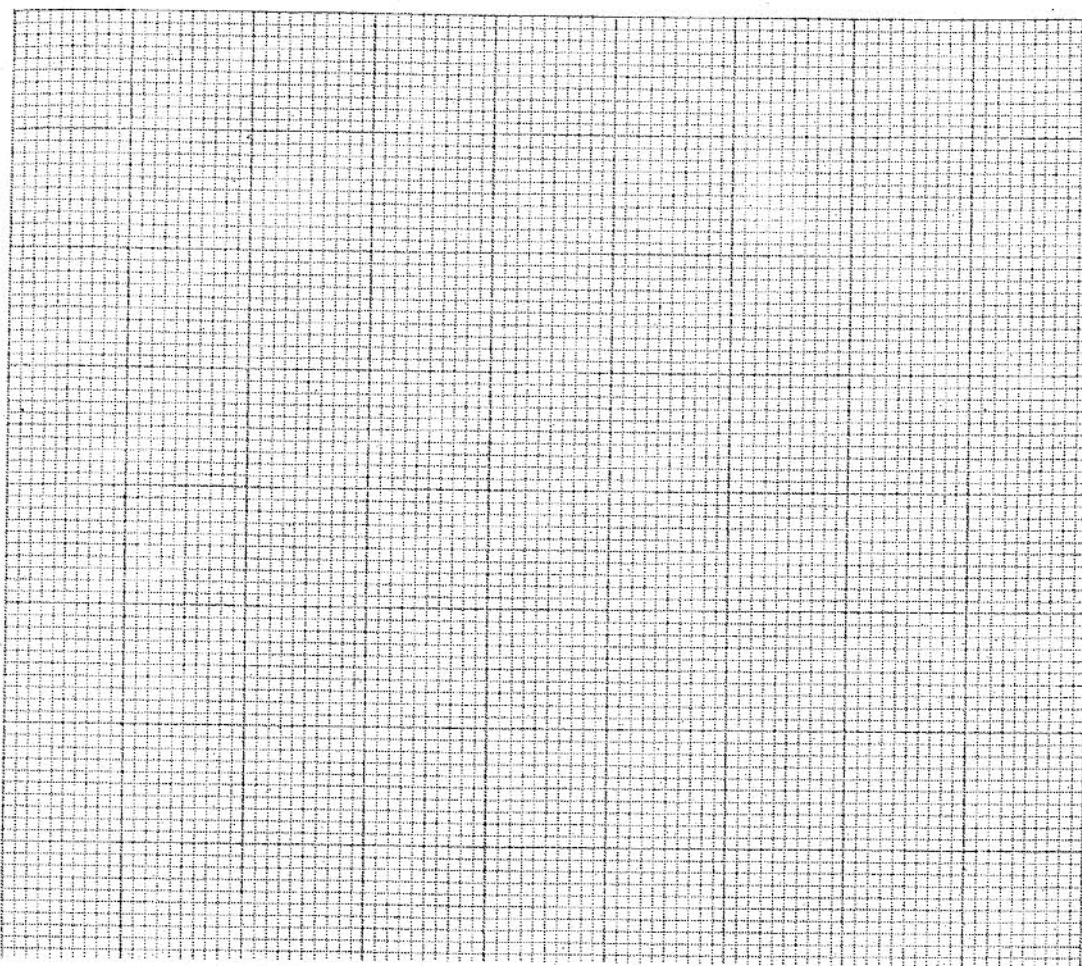
- d) Solve the values of h and x .
{4 marks}

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23. OABC is a parallelogram with vertices $O(0, 0)$, $A(2, 0)$, $B(3, 2)$ and $C(1, 2)$. $O'A'B'C'$ is the image of OABC under transformation matrix

- a) i) Find the coordinates of $O'A'B'C'$.
{2 marks}

- ii) On the grid provided draw OABC and $O'A'B'C'$.
{2 marks}



- b) i) Find $O''A''B''C''$, the image of $O'A'B'C'$ under the transformation matrix $\begin{pmatrix} 1 & 0 \\ 0 & -2 \end{pmatrix}$.

{2 marks}

- ii) On the grid draw $O''A''B''C''$.

{1 mark}

- c) Find the single matrix that maps $O''A''B''C''$ onto $OABC$.

{3 marks}

24. The table below shows the frequency distribution of diameters for 40 tins in millimeters.

By

completing the table and using 164.5 as the working mean, calculate

- The actual mean for the grouped lengths.
- The standard deviation of the distribution.
- The semi-interquartile range of the lengths.

{10

marks}

Diameter (mm)	No. of tins (f)					
130-139	1					
140-149	3					
150-159	7					
160-169	13					
170-179	10					
180-189	6					