SCAN

Name:_____ Index No:_____/_____

1920/104
MATHEMATICS
November 2013
Time: 3 hours

Signature:_____

Date:_____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN INFORMATION TECHNOLOGY

MATHEMATICS

3 hours

INSTRUCTIONS TO CANDIDATES

*Write your **name** and **index number** in the spaces provided above.*
***Sign** and **write the date of examination** in the spaces provided above.*
*This paper consists of 15 **(FIFTEEN)** questions in **TWO** sections: **A** and **B***
*Answer **ALL** the questions in **Section A** in the spaces provided after each question.*
*Answer any **FOUR** questions in **Section B** in the spaces provided after each question.*
Candidates should answer the questions in English

For Examiner's Use Only

Section	Question	Maximum score	Candidates score
A	1-10	40	
B	11	15	
	12	15	
	13	15	
	14	15	
	15	15	
Total score			

This paper consists of 13 printed pages.

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

Turn over

SECTION A (40 MARKS)

*Answer **ALL** questions in this section in the spaces provided.*

1. Differentiate between *primary data* and *secondary data* as used in statistics. (4 marks)

2. (a) Convert the following hexadecimal number to its binary equivalent.
AC2 (2 marks)

(b) Evaluate the following expression involving permutation.
$Y = {}^{10}P_4 \times {}^{10}P_6$ (2 marks)

3. (a) List the stages involved in a statistical analysis process. (2 marks)

(b) Outline **three** characteristics of a *binomial distribution* as used in statistics. (3 marks)

4. Explain each of the following terms as used in statistics:

(a) arithmetic mean; (2 marks)

(b) harmonic mean. (2 marks)

5. Explain **two** properties of *standard deviation* as a measure of dispersion. (4 marks)

6. Describe each of the following computer coding systems:

(a) American Standard Code for Information Interchange; (2 marks)

(b) Binary Coded Decimal. (2 marks)

7. (a) State the binomial theorem as used in mathematics. (2 marks)

(b) Expand the following expression using the binomial theorem;

$(x+2y)^4$ (3 marks)

8. Figure 1 shows three different curves that describe the levels of Kurtosis. Use it to answer the question that follows.

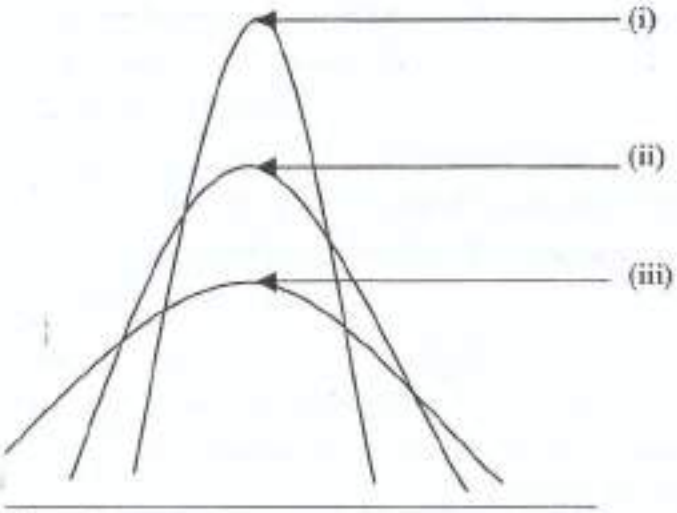


Figure1

Identify each of the curves labelled (i), (ii) and (iii). (3 marks)

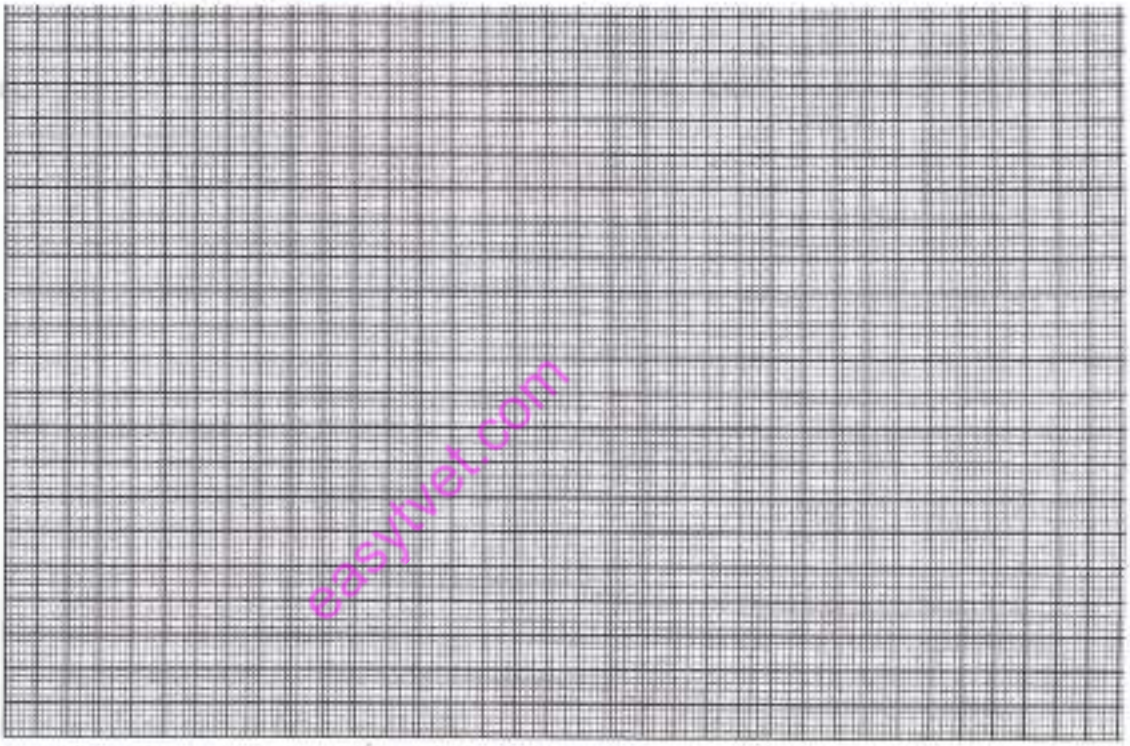
9. The probability that Angeline does her homework is ¾.The probability that her teacher checks the homework is 5/6. Use a probability tree to determine the probability that Angeline does not do her homework and the teacher does not check. (3 marks)

10. Table 1 shows the age distribution of employees in Arimi's Construction Company Ltd. Use it to answer the question that follows;

Age(in years)	No. of employees
15 - 25	80
25 - 35	200
35 - 45	120
45 - 55	60
55 - 65	20

Table 1

Draw a frequency polygon in the grid below to represent this information. (4 marks)



SECTION B (60 MARKS)

*Answer any **FOUR** questions in this section in the spaces provided.*

11. (a) (i) Define each of the following terms as used in matrices:

I. unity Matrix; (1 mark)

II. singular Matrix. (1 marks)

(ii) Using One's complement, evaluate the following:

$14_{10} - 6_{10}$ (2 marks)

(b) Using Cramer's rule, solve the following simultaneous equation;

$x + y + z = 2$

$x + 2y + z = 3$

$x + y + 2z = 1$ (5 marks)

(c) John is twice as old as his son Peter. 10 years ago, John was three times as old as Peter. Determine their present ages. (4 marks)

(d) A line passes through points (4,7) and (-2,1), determine the equation of the line. (2 marks)

12. (a) (i) Given $x = 3$, $y = -5$, $a = -4$ and $b = -7$:

Evaluate: $\sqrt{\frac{6a^2}{x} + \frac{2b^2}{y}}$ (2 marks)

(ii) Using matrices solve the following set of simultaneous equations:

$3x + y = 3$
$x + 2y = 7$ (4 marks)

(b) Let $A=\begin{bmatrix}1 & 2\\ 1 & 3\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 1 & 2\\ 2 & 0 & 2\end{bmatrix}$

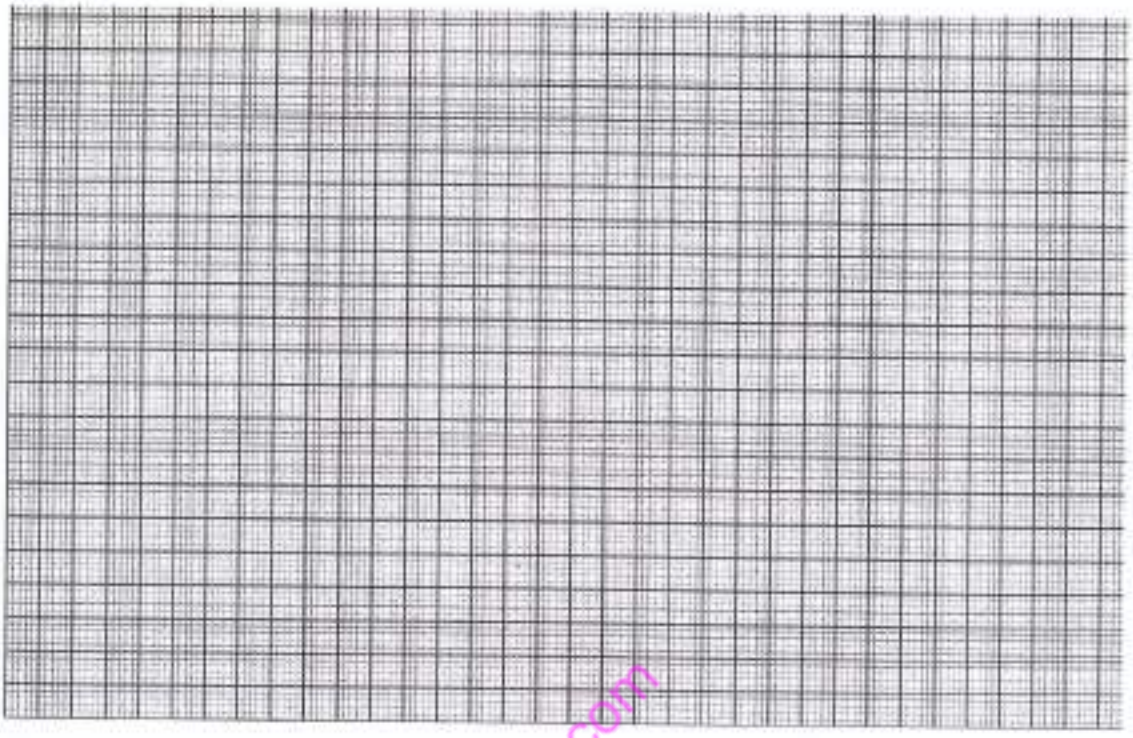
Show that $AB \neq BA$ (3 marks)

(c) A bag contains 12 marbles of which four are white and eight are black. Three marbles are drawn at random from the bag without replacement. Determine the probability that all the three balls drawn from the bag are black.

(3 marks)

(d) Using the graph of $y=x^2+5x+4$ for $-7 \leq x \leq 3$, solve the following equation:

$x^2+5x+4=0$ (3 marks)



13. (a) Outline **four** emerging trends in mathematical research. (4 marks)

(b) A research was conducted and the findings showed that everyone in the doctor's room was suffering from either a cold or Pneumonia. Assuming that13 people had a cold, 8 had pneumonia and 5 had both:

(i) Use a Venn diagram to represent this information;

(ii) Determine the total number of people in the doctor's s room. (6 marks)

(c) Convert 376_8 to its Hexadecimal equivalent. (3 marks)

(d) Differentiate between *finite* and *infinite* sets as used in set theory. (2 marks)

14. (a) Let $S=\begin{bmatrix}1 & 2\\ 3 & -4\end{bmatrix}$ and $T=\begin{bmatrix}5 & 0\\ -6 & 7\end{bmatrix}$

Given that $X = 5S - 2T$

Determine the value of X. (3 marks)

(b) A random sample of 12 girls is taken and is found to have a mean weight of 50 kilograms and a standard deviation of 9 kilograms. Determine the 95% confidence interval for the population mean weight of the girls. (3 marks)

(c) (i) Solve for x in the following linear inequality;

$5x + 7 < 3(x + 1)$. (2 marks)

(ii) Determine the values of a, b, c, and d given that;

$$3\begin{bmatrix} a & b \\ c & d \end{bmatrix} + 4\begin{bmatrix} 1 & -1 \\ -3 & -2 \end{bmatrix} = 2\begin{bmatrix} 1 & 0 \\ 5 & 3 \end{bmatrix}$$ (3 marks)

(d) Table 2 shows a record of four teams A,B,C and D after a hockey season. Use it to answer the question that follows.

	Win	Tie	Loss
A	5	5	2
B	3	5	4
C	6	3	3
D	2	3	7

Table 2

Two point systems, X and Y are suggested as ways of ranking the teams.

	System X	System Y
Win	4	2
Tie	1	1
Loss	0	0

Use matrices to determine the points' scored by each team using of the systems, X and Y. (4 marks)

15. (a) Let;

$U = \{1,2,3,4,5,6,7,8,9,10,11,12\}$

$A = \{1,3,5,7,9,11\}$

$B = \{2,3,5,7,11\}$

$C = \{2,3,6,12\}$

Determine; $(A \cup B) \cap \overline{C}$ (3 marks)

(b) (i) The probability that Collins hits a target if he shoots is $\frac{1}{5}$.

Determine the expected number of times he will hit the target if he shoots a 100 times. (2 marks)

(ii) Determine the binomial expansion of the following expression up to the 4th term; $(1-y)^5$ (2 marks)

(c) Using the Gaussian elimination method, solve the following simultaneous equations. (5 marks)

$z - 3x - 2y = 6$

$2z - 4x + 2y = 18$

$-3z + 8x + 9y = -9$

(d) A box contains one white ball and five black balls. Four draws are made at random with replacement from the box. Determine the probability that the white ball is picked exactly 3 times. (3 marks)