Name: _____ Index No: _____/_____

1301/311, 1305/311,
1304/311, 1309/311
MATHEMATICS
June/July 2013
Time: 3 hours

Candidate's Signature: _____

Date: _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN CARPENTRY AND JOINERY
CRAFT CERTIFICATE IN MASONRY
CRAFT CERTIFICATE IN PLUMBING
CRAFT CERTIFICATE IN ROAD CONSTRUCTION

MATHEMATICS

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided above.
You should have the following for this examination:
Mathematical tables/calculator;
Drawing instruments.
*Answer any **FIVE** of the following **EIGHT** questions.*
All questions carry equal marks.
*Show **ALL** necessary working.*
*Answer **ALL** the questions in the spaces provided on this question paper.*
Candidates should answer the questions in English.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total
Marks									

This paper consists of 16 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

1. (a) Given that $P = \begin{bmatrix} 5 & 3 \\ 4 & 2 \end{bmatrix}$ determine $P^2 - 2P + 4P^{-1}$.

(9 marks)

(b) A sub-contractor bought 30 bags of cement and 15 wheelbarrows from a hardware shop at a total cost of Ksh.72,000. A clerk of works bought 36 bags of cement and 20 wheelbarrows from the same shop at a total cost of Ksh.92,000. Assuming that there was no price change in the cost of the goods bought, use inverse matrix method to determine the:-

(i) cost of cement per bag.
(ii) cost of one wheelbarrow.
(iii) total cost of 50 bags of cement and 40 wheelbarrows.

(11 marks)

2. (a) The 9th and 23rd terms of an arithmetic progression are 400 and 750 respectively. Calculate the:-

(i) 40th term

(ii) sum of the first 40 terms.

(12 marks)

(b) A geometric progression (G.P) has the following three consecutive terms, (3 -x), (6) and (7 - 5x). Find two possible values of x. (8 marks)

3. (a) Show that for all values for θ,

$$\frac{1+\sin\theta}{\cos\theta}+\frac{\cos\theta}{1+\sin\theta}=2\sec\theta$$

(6 marks)

(b) Eliminate θ in the following equations $x = a \sec \theta$, $y = b \tan \theta$. (5 marks)

(c) Find the values of x between 0° and 360° that satisfy the equation $\sin^2 x = \frac{1}{2} \sin 2x$. (9 marks)

4. (a) Make x the subject of the formula, given

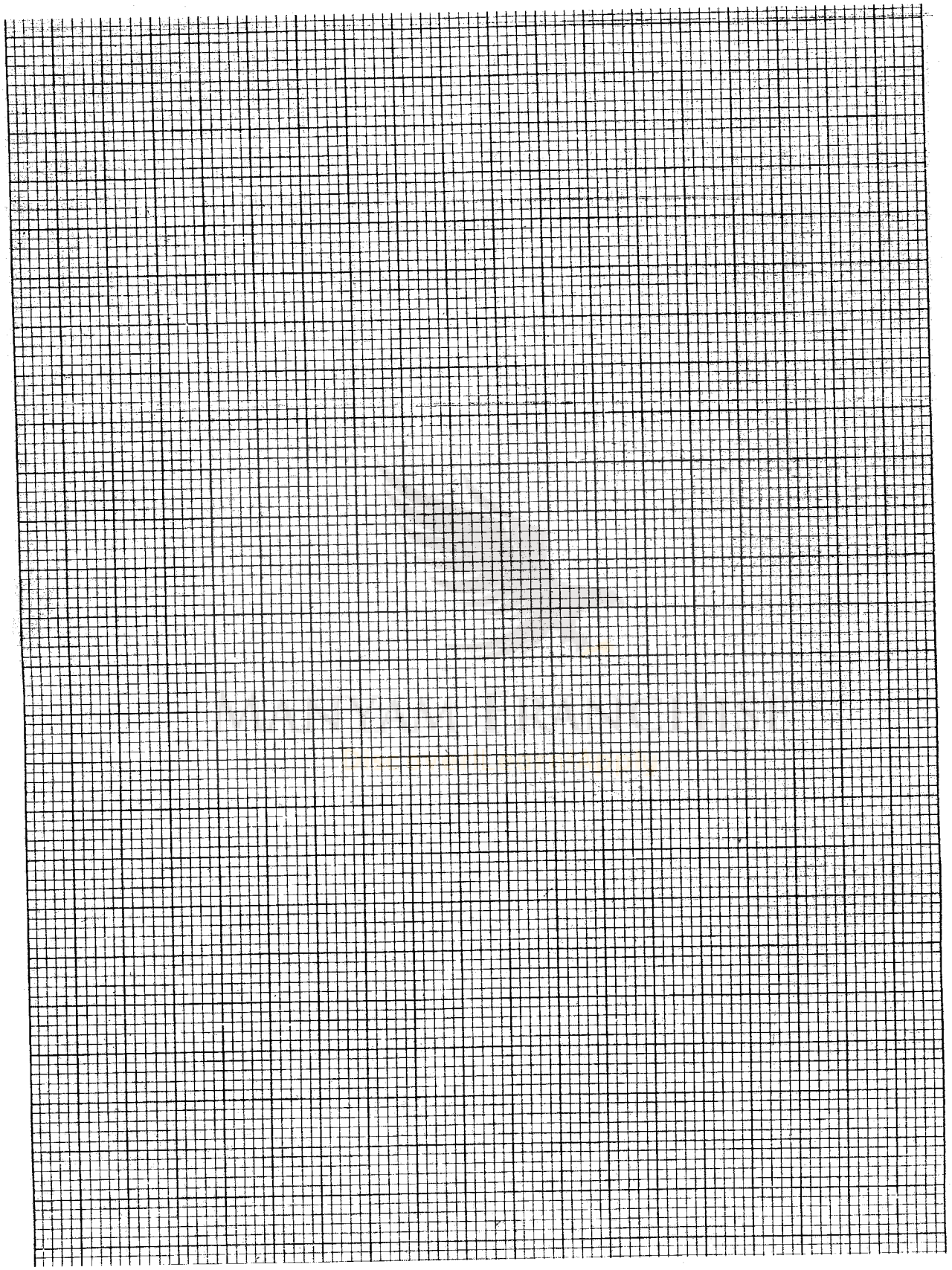
$$P = ah\left[\sqrt{x^2 + h^2} - S\right]$$

Hence calculate the value of x when P = 54, S = 7, a = 3 and h = 6. (7 marks)

(b) Plot the graph $y = -x^2 + 2x + 6$ for $-3 \leq x \leq 4$ and hence solve the following equations.:

(i) $-x^2 + 2x + 6 = 0$

(ii) $-x^2 - 2x + 4 = 0$ (13 marks)



5. (a) An article manufactured by a company consists of two parts A and B. In the process of manufacture of part A, 9 out of 100 are likely to be defective similarly, 5 out of 100 are likely to be defective in manufacture of part B. Calculate the probability that the assembled article will not be defective (assuming that the events of finding part A non defective and that of B are non-indepedent). (6 marks)

(b) The masses of 50 women attending an ante-natal clinic were recorded in kilogrammes as shown in Table 1.

Table 1

40	61	41	61	42	62	43	62	44	63
45	63	46	63	47	64	48	64	49	64
50	64	51	65	52	68	53	69	54	70
54	71	55	72	57	73	57	74	58	75
58	76	59	79	59	80	60	81	60	84

(i) Draw a frequency distribution table for the above information starting with 40 - 44 , 45 - 49, 50 - 54, ...
(ii) State modal frequency and class.
(iii) Calculate the mean and standard deviation.

(14 marks)

6. The parallel faces of frustum of a pyramid are squares of sides 3cm and 4cm respectively. If the volume of the frustum is $30cm^3$, determine the:

(a) height of the frustum (6 marks)
(b) height of the pyramid. (7 marks)
(c) total surface area of the frustum (7 marks)

7. (a) Given that $\underset{\sim}{u} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$, $\underset{\sim}{v} = \begin{bmatrix} 5 \\ 7 \end{bmatrix}$, $\underset{\sim}{w} = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$ determine the values of α and β such that $\alpha\underset{\sim}{u} + \beta\underset{\sim}{v} = \underset{\sim}{w}$.

(5 marks)

(b) Two forces of 30N and 70N act at a point in a plane. If the angle between the force vectors is 40° and taking 70N force as a reference vector, determine the magnitude and direction of the resultant force. (10 marks)

(c) A plot of land has the shape as shown in Fig. 1. Find the area of the plot.

(5 marks)

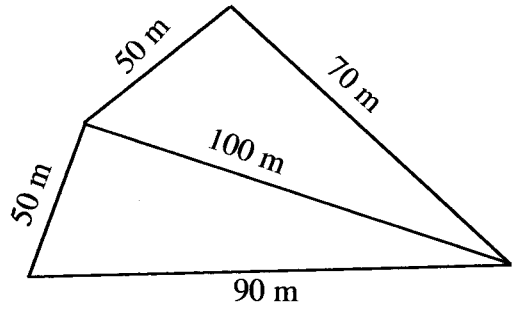


Fig.1

8. (a) A dealer imported a car worth US$15,000 from united Arab Emirates. He paid US$1,000 as transport, and 86% custom duty, 4.8% miscellaneous expenses both based on the buying price of the car. He later sold the car at 16% profit of the total expanses incurred. Assuming that 1 US$ = Ksh.80, calculate:

(i) profit in Kenya shillings.
(ii) selling price of the car.

(8 marks)

(b) A man has a total income of K£15,000 p.a. He pays a widow children pension of Kshs.1000 and insurance policy of Kshs.900 on monthly basis. He receives a monthly relief of Kshs.550. Using table 2, calculate the net monthly salary in shillings.

(8 marks)

Table 2

Total Monthly Income (K£)	Tax in Kshs. per K£
1 - 300	2
301 - 600	3
601 - 900	5
901 - 1200	7
1201 - 1500	9
1501 and over	11

(c) 14 workers can do a piece of work in 30 days. If the job is to be done in 12 days, determine the number of extra workers to be employed. (4 marks)