

1704/202
MATHEMATICS II
June/July 2017
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

**CRAFT CERTIFICATE IN BUILDING TECHNOLOGY
MODULE II**

MATHEMATICS II

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Scientific calculator.

Answer FIVE of the following EIGHT questions.

All questions carry equal marks.

Maximum marks for each part of a question are indicated.

Candidates should answer the questions in English.

This paper consists of 5 printed pages.

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

1. (a) A bag contains 6 green, 4 red and 5 blue balls. Three balls are picked, one at a time with replacement. Use tree diagram to determine the probability of picking:
- (i) one green, one red and one blue ball;
 - (ii) all green balls;
 - (iii) two red and one green in that order;
 - (iv) one blue and two red in that order.
- 6
8
18
(10 marks)
- (b) The probability that it will rain today is 0.26. Determine the probability that it will not rain today. (2 marks)
- (c) Two dice are tossed together. What is the probability that the sum of the numbers showing on their upper faces is:
- (i) 3;
 - (ii) 7;
 - (iii) odd;
 - (iv) even.
- 8
(8 marks)

2. Below are marks scored by 50 students in exam.

40-40-44	2	40	72	86	88	92	73	82	68	71	44
52-50-54	2	81	77	71	77	82	83	45	59	62	
86-85-80	2										
62-60-64	6	56	64	53	59	82	92	68	35	87	77
72-70-74	11	71	78	87	57	93	64	74	63	60	41
73											
82-80-84	9	83	64	72	88	70	57	60	80	81	83
66-65-69	5										
71											
44-42-44											
81											
77-75-79	3										
71											
67											
72											
81											
63											
45-46-49	1										
54-55-59	6										
62											
56											
61											
53-50-54											

2	79
2	63
3	60
6	71
6	83
10	6
9	74
2	88-85
	70
	57
	60
	80
	81
	83

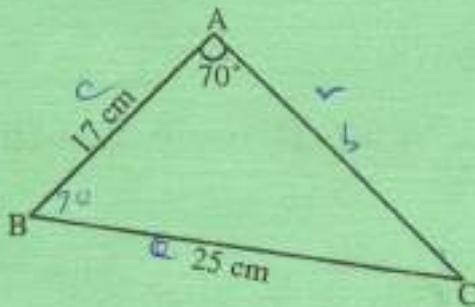
- (a) Construct a frequency distribution table starting with a class interval of 40-44. (5 marks)
- (b) Calculate the mean using 62 as assumed mean. (6 marks)
- (c) State the modal class. (1 mark)
- (d) (i) Draw a cumulative frequency curve. (8 marks)
- (ii) Estimate the median.

3. (a) Figure 1 shows a triangle ABC. Calculate:

- (i) the length of AC;
- (ii) the angles ABC and ACB;
- (iii) the area.

(10 marks)

$x+3=4$
 $4-3=x$
 $1=x$



$\frac{7}{14} \times 5 +$
 $b^2 = a^2 + c^2 - 2ac \cos$

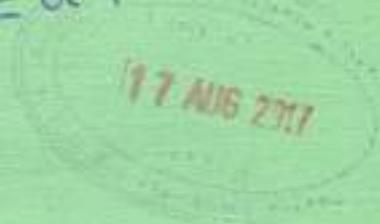


Fig. 1

(b) Solve $3 \sin x - 5 \cos x = 4$ for values of x , $0 \leq x \leq 360^\circ$

(10 marks)

4. (a) Solve for x and y .

$$\begin{pmatrix} x+3 \\ y-5 \end{pmatrix} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$$

3.2
 $1 \frac{1}{14} + 2 \frac{4}{14} = 3.2$ (4 marks)

(b) Use matrix method to solve the pairs of simultaneous equations

$$3x - 7y = 5$$

$$x + 4y = 6$$

$12 \quad 8$

$\frac{7}{14} \times 5 + \frac{7}{14} \times 6 +$

(8 marks)

(c) Define a singular matrix.

(2 marks)

(d) For the matrix shown below

$$\begin{pmatrix} 2 & -5 \\ 6 & 4 \end{pmatrix}$$

determine:

- (i) the determinant;
- (ii) the transpose;
- (iii) the inverse.

$12 \quad 1 \frac{16}{14}$
 $1 \frac{1}{14}$
 $R \times C$
 $= \frac{4}{14} \times 5 + \frac{7}{14} \times 6$
 $-\frac{1}{14} \times 5 + \frac{3}{14} \times \frac{33}{14}$ (6 marks)

5. (a) Differentiate the following:

(i) $y = 2x^2 - 5x$; (1 mark)

(ii) $y = (x - 2)(5x^2 + 1)$; (3 marks)

(iii) $y = x \sin x$; (4 marks)

(iv) $y = \frac{3x^2}{\cos 2x}$. (4 marks)

(b) An object is thrown upwards so that its height above the ground after t seconds is $\{2t(5 - t) + 9\}$ metres. Find the:

- (i) velocity;
 (ii) acceleration;
 (iii) maximum height reached.

(8 marks)

6. (a) Integrate the following:

(i) $\int 2x dx$ (1 mark)

(ii) $\int \frac{x^2 + 5x + 6}{x + 3} dx$ (5 marks)

(b) Evaluate $\int_0^2 (4 - 2x^2) dx$ (4 marks)

(c) Calculate the area between the curve $y = x^2 - 3x + 2$, x -axis, line $x = 1$ and $x = 3$. (10 marks)

$$\frac{PRT}{100}$$

$$\frac{400000 \times 15 \times 4}{100}$$

7. (a) If $\underline{a} = \begin{pmatrix} 2 \\ -4 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$, find $\frac{1}{2}\underline{a} + 3\underline{b}$ (4 marks)
- (b) Determine the length of the vector $\begin{pmatrix} 3 \\ 2 \\ 4 \end{pmatrix}$ (2 marks)
- (c) **Figure 2** shows triangle OAB. $\underline{OA} = \underline{a}$, $\underline{OB} = \underline{b}$ and P lies on AB such that AP:PB = 3:2. Express the vector \underline{QP} in terms of \underline{a} and \underline{b} . (4 marks)

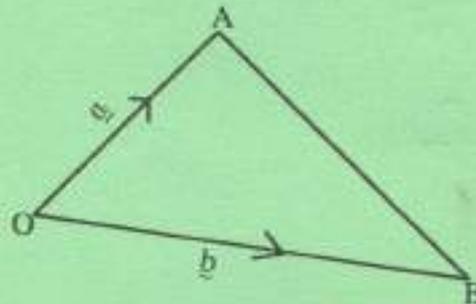


Fig. 2



- (d) Given $\underline{r} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$. Find its magnitude and direction. (5 marks)
- (e) Resolve the vector $\underline{r} = (7, 150^\circ)$ into the horizontal and vertical components. (5 marks)

8. (a) A tourist from America had 2,000 US dollars to use in Kenya. He exchanges the dollars into Kenya Shillings. He spent a total of Ksh. 72,000, then converted the balance back to US dollars. Calculate how much US dollars he remained with, given that 1 US dollar is equivalent to Ksh. 88. (6 marks)
- (b) John bought land at Ksh. 800,000. He then subdivided the land in three portions and sold them at Ksh. 300,000, Ksh. 500,000 and Ksh. 200,000 respectively. Calculate his percentage profit. (4 marks)
- (c) Mary took a bank loan of Ksh. 400,000 to be paid back after 4 years at a compound interest of 15% per annum. Determine the total amount she paid back. (4 marks)
- (d) Paul is a businessman who buys cars in Japan and sells them in Germany. During one month he bought and transported 25 Nissan cars at a cost of 300,000 Japanese Yen each. At what price must he sell each car in Germany if he wishes to make a profit of 25%?
25.523 German Deutschmark = 208.166 Japanese Yen. (6 marks)

$A = A$

$$\frac{200000}{800000} \times 100$$

$$\frac{25}{100} \times 100000$$

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