CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF
CERTIFICATE IN ANIMAL HEALTH AND PRODUCTION

MATH 00100/00121: INTRODUCTORY MATHEMATICS

STREAMS: CERT (ANHE)   **TIME: 2 HOURS**

DAY/DATE: MONDAY 10/12/2018   **2.30 PM – 4.30 PM**

INSTRUCTIONS:

Answer Question One and any other Two Questions

QUESTION ONE (30 MARKS)

(a)   Explain the following properties of real numbers   [3 marks]

      (i)   distributive property
      (ii)   Commutative property
      (iii)   Multiplicative identity property

(b)   Write the equation of the line that is parallel to the line whose equation is y=3x+6 and
      passes through point (4,7)   [3 marks]

(c)   Are the lines L_1 and L_2 passing through the given pairs of points parallel or
      perpendicular?

      L_1(0, 3) (3, 1) and L_2 (-1, 4) (-7, -5)   [3 marks]

(d)   Solve the system of equations below by substitution method.

$$4x - 7y = -2$$
$$x - 4y = -3$$

                                                                         [4 marks]

(e)   Given that A= $\begin{bmatrix} 1 & 2 \\ -4 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 11 & 5 \\ 0 & -2 \end{bmatrix}$, find the following

(i) $A+B$ [4 marks]

(ii) $A-B$

(f)   If $f(x) = ¿$

$$\begin{cases} x+3 \,; x \le 2 \\ \\ 5 \,; 2 < x < 6 \\ x^2 + 1 \,; x \ge 6 \end{cases}$$

[3 marks]

Find   (i) $f(1)$

         (ii) $f(10)$

         (iii) $f(5)$

(g)   Find the 17th term of the arithmetic progression with first term 5 and common difference 2.   [3 marks]

(h)   A radio station tower was built in two sections. From a point 87 feet from the base of the tower, the angle of elevation of the top of the first section is 25 °, and the angle of elevation   of the top of the second section is 40 °. What is the height of the top section of tower (x)? [4 marks]

87 feet
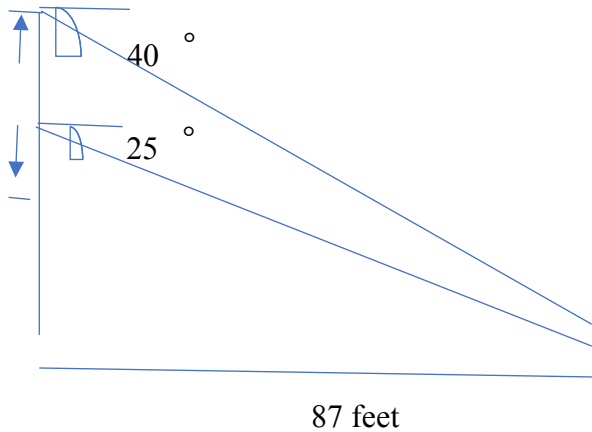
(i)   solve the equation below using factorization method $3x^2 = 2x + 8$ [3 marks]

QUESTION TWO (20 MARKS)

(a)   Determine if each of the following is a polynomial giving your rationale. If it is, find the degree of the polynomial.   [4 marks]

(i) $6x^3+3x^2$

(ii) y^2-4y+3

(iii) $y^2+\dfrac{5}{y}-4y+3$

(iv)   10

(b)   Use the factor theory to determine whether:

(i) $2x^3+x^2-8x-4$ has a factor of x-2

(ii)   By dividing confirm the answer obtained in (i) above and hence express
$2x^3+x^2-8x-4$ as a product of three linear factors.   [6 marks]

(c)   A ladder 10m long, leaning against a vertical wall makes an angle of 65 $^\circ$ with the ground.
[6 marks]
(i)   How high on the wall does the ladder reach
(ii)   How far is the foot of the ladder from the wall?
(iii)   What angle does the ladder make with the wall?

(d)   solve the system of equations by the method of elimination.   [4 marks]

$2x+3y=4$

$x-2y=-5$

QUESTION THREE (20 MARKS)

(a)   If $f(x)=-4x+9 \wedge g(x)=2x-7,$ find;

(i) $fog(x)$ and hence $fog(2)$ [4 marks]

(ii) $gof(x)$ and hence $gof(5)$ [4 marks]

(b)   Solve the simultaneous equations using matrix method.

$5x+y=7$

$3x - 4y = 18$

(c)   Given matrix $A = \begin{bmatrix} 0 & 6 & 2 \\ 3 & -2 & -3 \\ 4 & 7 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 8 & 6 & -4 \\ 9 & 2 & 10 \\ 3 & 4 & -1 \end{bmatrix}$

        Find AB   [3 marks]

(d)   Find the inverse of the matrix   [4 marks]

$$A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$$

QUESTIN FOUR (20 MARKS)

(a)   An arithmetic progression has 3 as its first term. Also, the sum of the first 8 terms is twice the sum of the first 5 terms. Find the common difference.   [5 marks]

(b)   If a number is added to 2, 16 and 58, it results in the first 3 geometric members. Find out the number and enumerate the first 3 members of the progression.   [6 marks]

(c)   Show that $x^2 + 2x = (x+1)^2 - 1$. Hence use, competing square to solve

        $x^2 + 2x - 3 = 0$ [5 marks]

(d)   Solve the equation $2\sin^2 x = \sin x$ for the values of $x, 0 \leq x \leq 360°$ [4 marks]