CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN BRIDGING IN MATHEMATICS

MATH 0010: GEOMETRY AND VECTORS

STREAMS: CERT IN BRIDGING **TIME: 2 HOURS**

DAY/DATE: THURSDAY 7/12/2017 **11.30 A.M - 1.30 P.M.**

INSTRUCTIONS:

- **Answer Question ONE (COMPULSORY) and any other THREE**

QUESTION ONE [30 MARKS]

(a) Find the equation of the line passing through points (4, 6) and is parallel to the line whose equation is $y = \frac{2}{3}x + 5$ [3 Marks]

(b) Draw on the same axis the graphs of $3x - y = 8$ and $2x - 3y = 10$ and find the values of x and y. [5 Marks]

(c) In the following figure, 0 is the centre of the circle. Calculate the size of the angles marked with letters. [4 Marks]

(d) Find the coordinates of the centre and the radius of the circle whose equation is $(x + 1)^2 + (y - 3)^2 = 4$ [3 Marks]

(e) Given that $\overrightarrow{PQ} = \begin{pmatrix}3\\5\end{pmatrix}$ and $\overrightarrow{QR} = \begin{pmatrix}-2\\6\end{pmatrix}$ work out

(i) $\overrightarrow{PQ} + \overrightarrow{QR}$

(ii) $^1/_2\ \overrightarrow{QR}$ [3 Marks]

(f) During patrol, a policeman moves from Point O and walks 7m eastwards then 12m northwards. How far and what is the bearing on his new position from the starting point? [4 Marks]

(g) The distance between points $A(-3+K,-6)$ and $B(2K,14)$ is 29 units. Find the possible values of k. [4 Marks]

(h) The points (x, y) divides the line segment directed from Q (4, 7) to Z(12, 19) in the ration 3:2. Find the possible values x and y. [4 Marks]

QUESTION TWO [10 MARKS]

(a) If $\tilde{q} = 2\tilde{\imath} - 3\tilde{\jmath} + 4\tilde{k}$ and $\tilde{b} = 3\tilde{\imath} - 6\tilde{\jmath} - 3\tilde{k}$ obtain

(i) $3\tilde{a} - \tilde{b}$

(ii) $\left|3\tilde{a} - \tilde{b}\right|$

(iii)$|\tilde{a}| + \left|\tilde{b}\right|$ [5 Marks]

(b) (i) Write equation $4y - 5 = 3x$ in the intercept only form. Hence state the x and y-intercept. [3 Marks]

(ii) Find the equation of a line that passes through the $P(1,4)$ and $S,(2,8)$ [2 Marks]

QUESTION THREE [10 MARKS]

(a) The figure below shows a cuboid. Find its;

(i) Surface area [3 Marks]

(ii) Volume

[1 Mark]

(b) Find the surface area and volume of a co cone whose height is 12cm and its diameter is 18cm as shown below [6 Marks]

QUESTION FOUR [10 MARKS]

Calculate all the angles in a triangle whose length are 5.5 cm, 4.2cm, and 3.8 cm.

(i) Calculate all the angles in the triangle. [6 Marks]
(ii) Find its perimeter. [2 Marks]
(iii) Calculate the area of the triangle using Heroes Formula. [2 Marks]

QUESTION FIVE [10 MARKS]

(a) The coordinates of the end points of the diameter of a circle are $A(-3, 8)$ and $B(1, 5)$, find

(i) Coordinate of the centre [2 Marks]
(ii) Radius of circle [3 Marks]
(iii) Equation of the circle [3 Marks]

(b) Differentiate between minor and major arc [2 Marks]

QUESTION SIX [10 MARKS]

If $\overrightarrow{A} = 2\tilde{\imath} - 3\tilde{\jmath} - 3\tilde{k}$, $\overrightarrow{B} = 3\tilde{\imath} - 6\tilde{\jmath} + 4\tilde{k}$ and $\overrightarrow{C} = -\tilde{\imath} + 3\tilde{\jmath} + 2\tilde{k}$. Find [10 Marks]

(i) $\overrightarrow{A}.\left(\overrightarrow{B} - \overrightarrow{C}\right)$

(ii) $\overrightarrow{A}\ x\ \overrightarrow{B}$

(iii) $\overrightarrow{C}.\left(\overrightarrow{A} x\ \overrightarrow{B}\right)$

(iv) A unit vector that is perpendicular to both $\overrightarrow{A}\ and\ \overrightarrow{B}$

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