KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

BRIDGING CERTIFICATE COURSE IN MATHEMATICS

COURSE CODE: **BMATH 001**

COURSE TITLE: **VECTOR AND GEOMETRY**

STREAM: **BRIDGING**

DAY: **TUESDAY**

TIME: **11.00 - 1.00 P.M.**

DATE: **12/01/2010**

INSTRUCTIONS:

Attempt question **ONE** and any other **TWO** questions

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

(a) A line passes through the points A (5, 7) and B (4, 9). Determine its equation in the form $y = mx + c$ **(3 mks)**

(b) Given that vector $\vec{A} = \binom{2}{3}, \vec{B} = \binom{4}{-1}$ and $\vec{C} = \binom{3}{5}$, find

(i) $\vec{A} + \vec{B}$

(ii) $\vec{B} + \vec{C}$

(iii) $\vec{A} + (\vec{B} + \vec{C})$ **(6 mks)**

(c) In a triangle ABC, ∠A = 60°, BC = 10 cm and AC = 4 cm. Find ∠B **(2 mks)**

(d) Given that; $4x^2 + 4y^2 + 8x + 16y + 12 = 0$ is an equation of a circle, determine its centre and radius.

(4 mks)

(e) If $\overrightarrow{OP} = 4i + 3j$, express OP as a column vector and hence determine the modules of OP. **(3 mks)**

(f) Find the angle subtended at centre of a circle of radius 14 cm by an arc of length 12.1 cm. **(3 mks)**

(g) A chord AB subtends an angle of 60° at the centre O. If the radius of the circle is 10cm, calculate:

(i) The length of the major arc AB **(2 mks)**

(ii) The area of the minor segment cut off by AB take ($\pi = 3.14$) **(3 mks)**

(h) Simplify $\frac{\sqrt{x^2 - 25}}{x}$ given that $x = 5sec\theta$. **(4 mks)**

QUESTION TWO (20 MARKS)

(a) A line L_1 is $9x - 6y - 18 = 0$. Determine the equation of a line

(i) L_2 which is perpendicular to L_1 and passes through (6, -3). **(4 mks)**

(ii) L3 which is parallel to L1 and passes through (9, -3). **(4 mks)**

(b) The wiper of a Datsun car is 14 cm long. It sweeps through an angle of 100° on a flat Windscreen. Calculate the distance moved by tip y of the wiper in one sweep. **(3 mks)**

(c) Express the following ratios in terms of ratios of acute angles and hence find their Values:

(i) Sin 390°

(ii) Cos 160°

(iii)Tan 320° **(6 mks)**

(d) Show that (i) $\tan 45^0 = 1$

(ii) $\cos 45° = 1/\sqrt{2}$ using a suitable triangle.

(3 mks)

QUESTION THREE (20 MARKS)

(a) Express the following in terms of tan 80°

(i) **$\mathbf{Tan 620^0}$** **(2 mks)**

(ii) **$\mathbf{Tan 460^0}$** **(2 mks)**

(iii) **$\mathbf{Tan {-80}^0}$** **(1 mk)**

(b) Simplify

(i) $\frac{1}{\sqrt{16-16\,sin^2\theta}}$ **(2 mks)**

(ii) $\frac{tan\theta}{1+\,tan^2\theta}$ **(3 mks)**

(c) Verify that $\vec{A}\cdot\vec{B} = \vec{B}.\vec{A}$ **(4 mks)**

(d) Given that $\vec{A} = 2i + 3j$ and $\vec{B} = 5i + j,$ Find

(i) $\vec{B}\cdot\vec{A}$ **(2 mks)**

(ii$|\vec{A}|$ **(1 mk)**

(iii) $|\vec{B}|$ **(1 mk)**

(iv)The angle between $\vec{A}$ and $\vec{B}$ **(2 mks)**

QUESTION FOUR (20 MARKS)

(a) State the gradient and y – intercept of the following lines;

(i) $8y + 24x = 8$ **(2 mks)**

(ii) $6y - 30x + 6 = 0$ **(2 mks)**

(b) Without drawing the lines, determine which of the following pairs of lines are perpendicular;

(i) $y = 8x + 7, \quad y = \frac{1}{8}x + 3$

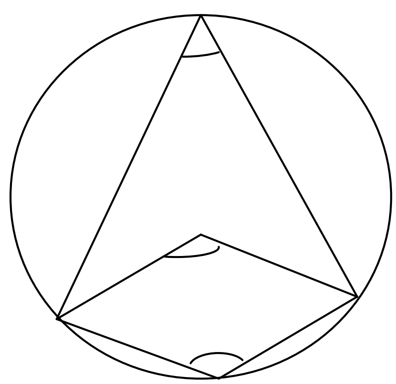
(ii) $y = 3x + 7, \quad y = -\frac{1}{3}x$

(iii) $y = \frac{2}{7}x - 1, \quad y = \frac{-2}{7}x - {}^{1}/_{2}$

(iv) $y = {}^{3}/_{2}x - 1, \ y = \frac{-2}{3}x - 4$ **(4 mks)**

(c) Determine the equation of a circle that circumscribe the triangle vertices (1, 0) (2, 1) and (0, 2) **(4 mks)**

(d) In the figure below, 0 is the centre of the circle. Using the angles provided, find a, b, c and d



(4 mks)

(e) Show that sec $\theta + co$ secθ cotθ = sec θ cosec^{2}θ **(4 mks)**

QUESTION FIVE (20 MARKS)

(a) A point P divides AB internally in the ratio 2:5, taking any point as the origin, find the position vector of P in terms of a and b the position vectors of A and B respectively.

(5 mks)

(b) Draw a line segment AB and show the position of X on AB such that AX:XB is

(i) 4:7 (ii) -2:5 (iii) 3:-1 **(3 mks)**

(c) A chord is 4 cm away from the centre of a circle of radius 5 cm. Determine the length Of the chord. **(3 mks)**

(d) Show that $\frac{\sin\theta + \cos\theta}{\sin\theta \cos\theta} = 2 + \sec\theta \cos sec\theta$

(e) State and prove the ratio theorem **(4 mks)**

. **(5 mks)**