

KABARAK



UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

BRIDGING CERTIFICATE COURSE IN MATHEMATICS

COURSE CODE: BMATH001

COURSE TITLE: VECTOR AND GEOMETRY

STREAM: BRIDGING

DAY: MONDAY

TIME: 2.00 – 4.00 P.M.

DATE: 27/04/2009

INSTRUCTIONS:

1. Answer Questions ONE and ANY OTHER TWO questions.
2. Show your working clearly.

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

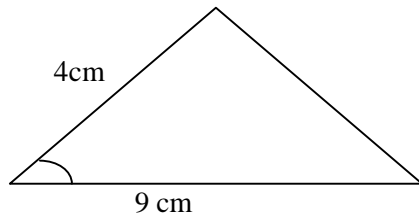
- (a) Determine the equation of a line that passes through the points A (4, 2) and B (7,-1) in the form $y = mx + c$

(3 marks)

- (b) Given that θ is an acute angle and $\text{Cos}\theta=0.4$, determine the value of $\text{Tan}\theta$ and $\sin \theta$ without using tables or calculators.

(3 marks)

- (c) Find the area of the triangle below



(3 marks)

- (d) In triangle ABC, $A=130^\circ$, $b=4\text{cm}$, $c=5\text{cm}$. Find the length a and the measure of angle C.

(4 marks)

- (e) Simplify the following

(i) $\sqrt{9 - x}$ where $x=3\text{sine}$

(2 marks)

(ii) $\sqrt{\frac{x}{2}}$ where $x = 2\text{sec}\theta$

(3 marks)

- (f) Find the centre and radius of the circle whose equation is

$$2x^2 + 2y^2 + 4x + 8y + 6 = 0$$

(4 marks)

- (g) A chord AB subtends an angle 120° at the centre of a circle. If the radius of the circle is 10cm,

Calculate;

- (i) The length of the major Arc AB.

- (ii) The area of the minor segment cut off by AB (take $\pi = 3.14$).

(4 marks)

(h) Given that $\vec{u} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and $\vec{v} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$

Find (i) $2\vec{u} + \vec{v}$ (2 marks)

(ii) $\vec{u} + \vec{v}$ (2 marks)

QUESTION TWO (20 MARKS)

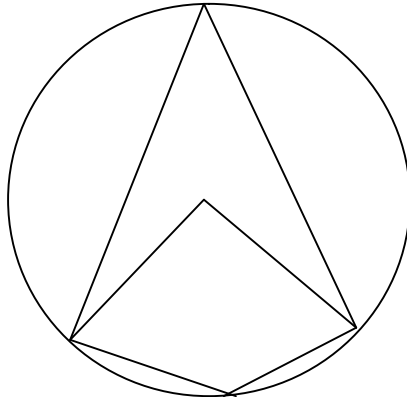
(a) The equation of a line L1 is $2x - 3y - 4 = 0$.

Determine the equation of a line

(i) L2 which is perpendicular to L1 and passes through $(-2, 4)$ (4 marks)

(ii) L3 which is parallel to L1 and passes through $(3, -1)$ (4 marks)

(b) The figure below shows a circle centre O. Find the value of angles a, b, c and d. Using the angles provided. (4 marks)



(c) Express the following obtuse angles in terms of acute angles and hence find their values

(i) $\sin 190$ (ii) $\cos 260$ (iii) $\tan 320$

(iv) $\tan 450$

(8 marks)

QUESTION THREE (20 MARKS)

(a) Given that $\vec{u} = 3\mathbf{i} + 5\mathbf{j}$ and $\vec{v} = 4\mathbf{i} + 2\mathbf{j}$

Find the value of

(i) $\vec{u} \cdot \vec{v}$

(2Marks)

(ii) $|\vec{u}|$

(1 mark)

(iii) $|\vec{v}|$

(1 mark)

(b) Use dot product of vectors to find the angle between \vec{u} and \vec{v}

(2 marks)

(c) Two parallel chords of a circle are each 8cm long. If they are 3cm from the centre O of the circle,

Calculate the radius of the circle

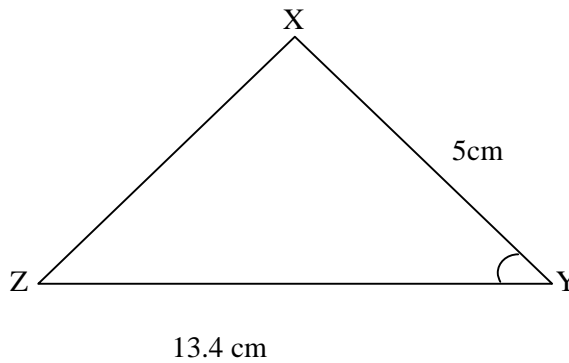
(4 marks)

(d) In the figure below $ZY = 13.4$ and $XY = 5\text{cm}$, and angle $xyz = 57.7^\circ$.

Determine;

(i) The length XZ

(ii) Angle YXZ



(4marks)

(e) The wiper of a Volvo car is 20cm long. It sweeps through an angle of 100° on a flat windscreen. Calculate the distance moved by the tip y of the wiper in one sweep.

(3marks)

(f) Prove that $\sec^2 \theta - \csc^2 \theta - \cot^2 \theta \equiv \tan^2 \theta$

(3marks)

QUESTION FOUR (20 MARKS)

(a) Find the co-ordinate of the centre of a circle and its radius if its equation is given by:

$$4x^2 + 4y^2 + 8x + 16y + 12 = 0$$

(4marks)

(b) Determine the equation of a circle which circumscribes the triangle with vertices

A (1, 0), B (2, 1), C (0, 2)

(4marks)

- (c) P divides line AB externally in the ratio 4:2. Taking any point o as the origin, find the position vector p of P in terms of a and b the position vector of A and B respectively. (5 marks)
- (d) In a triangle ABC, B=60 and AC=6cm. Determine the length of BC. (3 marks)
- (e) Show that $\sec^2 \theta + \csc^2 \theta - \cot^2 \theta = \sec^2 \theta$ (4 marks)

QUESTION FIVE (20 MARKS)

- (a) Verify that $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{a}$. (3 marks)
- (b) Determine the angle between the following two vectors

$$\vec{a} = 2\mathbf{i} + 3\mathbf{j}$$

$$\vec{b} = 5\mathbf{i} + \mathbf{j} \quad (5 \text{ marks})$$

- (c) In triangle ABC, a=2.5 cm, b=3.6 cm and c=5.0 cm. Calculate the angle A and C. (4 marks)
- (d) Write down AB: BC in the following cases: (2 marks)
- (e) Without drawing the lines, determine which of the following pairs of lines are perpendicular.

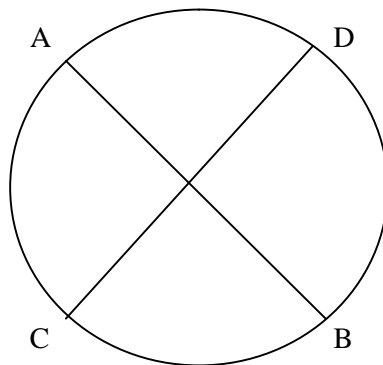
(i) $Y=3x+7, y=-1/3x +3$

(ii) $Y=7x +2, y=-7x.$

(iii) $3/2x +2, y=-2/3x -1/2.$

(iv) $Y=5/2x +3, y=2/5x +4$ (4 marks)

- (f) Find the value of the length marked by letter a in the figure below:



(2 marks)