KABARAK UNIVERSITY

(ELAND COLLEGE)

UNIVERSITY EXAMINATIONS

BRIDGING CERTIFICATE COURSE IN MATHEMATICS

AUGUST 2008 EXAMINATIONS

COURSE CODE: BMATH 001

COURSE TITLE: VECTORS AND GEOMETRY

STREAM: BRIDGING

DAY: WEDNESDAY

DATE: 27TH AUGUST 2008

TIME: 2.00 PM TO 4.00 PM

INSTRUCTIONS TO CANDIDATES

1. Attempt question ONE and any other TWO questions.

2. Show your working clearly.

QUESTION ONE (30MKS)
(a)   Given that a~= 2i-j and   b= 3i = 5j
       Find
       (i) a +b   (ii)3a+2b   (iii)[a+b]

       (ivl 3A[+] 2b l   (5marks)
(b)   Find the equation of the straight line that passes A (1,6) and B (5,9)
       (3marks)
(c)   Find the center and radius of the circle whose equation is
       $x^2+y^2 +8x-2y-8=0$ (3marks)
(d)   Given that Sin A=$\frac{4}{5}$, Cos B =$\frac{5}{13}$ and A and B are acute angles. Calculate the value of the
       following without using tables
                (i)   Sin A Cos B + Cos A Sin B

                (ii) Sin^2A +Cos^2A (4marks)

(e)   In triangle PQR, P =14.3cm r=17.5 cm and Q =25^0. Calculate the length of side PR
       (5marks)

(f)   In the figure below, 0 is the center of the circle, if C=47^0, find d, p and q   (3marks)
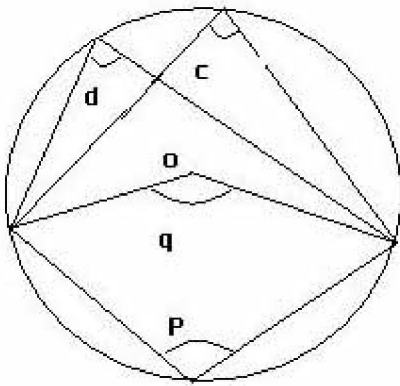
(g)   An arc of length 4.4cm subtends an angle of 72^0 at the center of a circle, calculate the
                (i)   Radius of the circle
                (ii)   Area of the segment bounded by the arc and the corresponding chord.
                         (4marks)
(h) i)   Find the angle between the vectors a= $2i$ +3j and b= $5i$+ j   (3marks)
    ii) Find the numbers m and n such that m$\binom{3}{5}$+n$\binom{2}{1}$=$\binom{4}{9}$ (2marks)

QUESTION TWO (20MARKS)
   (a) the equation of the straight line through (5,4) , parallel to 3x- 4y+7=0

          (3marks)
   (b) Show that the equation of a circle with center at (-3,3) and radius 5 units is given by

$x^2 + y^2 + 6x-6y=7$ (3marks)

(c) Express in terms of the ratios of a cute angles   (i)Cos 205^0 (ii)Tan 153^0 (4marks)

(d) Find the length of the arc subtending an angle of 215^0 at the centre of the circle of

radius 14cm. (take $\pi=\frac{22}{7}$)   (3marks)

(e) A ladder reaches the top of the wall of height 6m when the end on the ground is 2.5m

from the wall. What is the length of the ladder?   (3marks)

(f) In $\triangle$ KLM, K= 15cm, L= 25^0, M= $120^{0.}$ Find m.(4marks)

QUESTION THREE (20 MARKS)

(a) Find the gradient of the line joining A(p,q) and B(r,s)   (2marks)

(b) Find if AB is parallel or perpendicular to PQ in the following cases:

A(1,4), B(6,6) P(2,-1),Q(12,3)   (3marks)

(c) Given that the circle whose equation $x^2+y^2- 7x + 2y + c = 0$ passes through (7,1),find the

value of C, State the co-ordinates of the center of the circle. If (7,1) is one end of the

diameter of the circle, find the other end point   (5marks)

(d) Find the angle subtended at the center of a circle by an arc of length 20cm if the

circumference of the circle is 60cm.   (3marks)

(e) In a triangle, two sides are 2.8cm and 12cm long and the angle between them is 60^0.

Find the length of the third side.   (3marks)

(f) Draw a line segment CD and show the position of x where CX: XD IS

   (i) 2:5
   (ii) 3:1
   (iii)–2:5
   (iv)6:-1   (4marks)

QUESTION FOUR (20MARKS)
(a) Simplify the following without using tables

   (i) $\sin 45^0 \cos 30^0$
   (ii) $\tan 45^0 \cos 60^0$
   (iii) $\dfrac{\sin 60^0 \tan 30^0}{\cos 60^0}$ (4marks)

(b) Find the values of θ from 180^0 to 360^0 inclusive which satisfy Cos (θ +60^0)=0.5.

   (3marks)

(c) If $\sin\theta= \frac{3}{5}$, find, without using tables or calculators, the values of

   (i)   Cos θ
   (ii)   Tan θ
(d) If S = sin θ, simplify

   (i) $\sqrt{(1-s^2)}$

   (ii) $\dfrac{s}{\sqrt{(1-s^2)}}$

   (iii) $\dfrac{1-s^2}{s}$ (6marks)

(e) In triangle ABC, a=5cm, b=7cm, c=9cm, calculate angle B and the area of the triangle.

   (4marks)

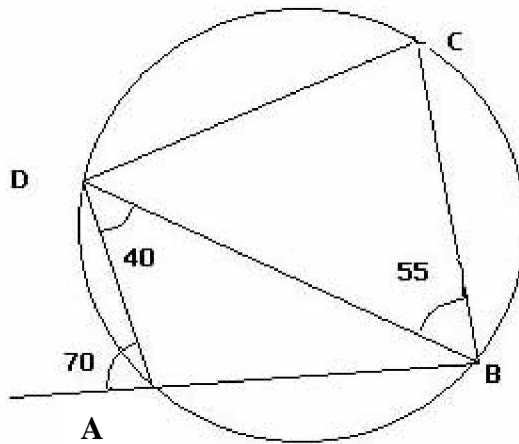QUESTION FIVE (20MKS)
   (a) In the figure below find:
      i)   Angle BCD.   Ii)   Angle CDA   (4marks)

(b) If $p = \binom{3}{2}$ and $q = \binom{5}{1}$, find   (i) $|\,p\,|$ and $|\,q\,|$ (ii) $|\,p+q\,|$ (iii) $|\,q-p\,|$
correct to 2 decimal places.   (5marks)

(c) Given that A is the point [2,5] and that B is the point [10,-1], find the position vector of a point P on AB such that, AP:PB=2:3.   (3marks)

(d) Find the equation of the straight line joining the origin to the mid- point of the line
joining A(3,2) and B(5,-1).   (4marks)

(e) Find the center and radius of a circle given by
$$3x^2+3y^2+6x+12y+9=0$$ (4marks)