KABARAK   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

CERTIFICATE IN BRIDGING MATHEMATICS

COURSE CODE: BMATH 001

COURSE TITLE: VECTOR & GEOMETRY

STREAM: BRIDGING

DAY: TUESDAY

TIME: 9.00- 11.00 AM

DATE: 01/09/2009

INSTRUCTIONS:
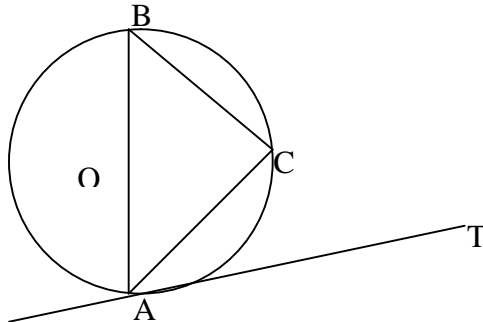Attempt **Question ONE** and **Any other TWO**

PLEASE TURN OVER
INSTRUCTIONS: Answer Question ONE and any other TWO Questions

QUESTION ONE (COMPULSORY 30 MARKS)

a) In the figure below, TA is a tangent to the circle O and angle $CAT=70^0$. Find the value of :

   i. Angle $< CBA$ (2 marks)

   ii. Angle$< BTA$ (2 marks)

b) b. Find the value of (tan A-cosA) if sin A =12/13 when A is obtuse.   (3 marks)

c) define the following terms:-

   i. Arc.   (1 mark)

   ii. Chord   (1 mark)

   iii. Segment   (1 mark)

   iv. Sector   (1 mark)

d) Given that cos $\Theta=2/3$,where Θ is an acute angle, obtain cos (90-Θ), tan Θ, and $\sec^2$ Θ. Without using tables or a calculator leaving your answer in simplified surd form.

                                                                                 (5 marks)

e) in the following questions solve for Θ for $0^0 \le \Theta \le 360^0$

   i. 4 sin $(\Theta+20)^0=3$ (2 marks)

   ii. 2 $\sin^2$+sin $\Theta=0$ (2 marks)

   iii. $4\sin^2 \Theta+4$ cos $\Theta=5$ (2 marks)

f) f. Show that the points A(1,2,3), B(3,8,1), C(7,20,-3) are collinear   (2 marks)

g) find numbers M and N such that

M $\begin{bmatrix} 3 \\ 5 \end{bmatrix}$ $+ N \begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 4 \\ 9 \end{bmatrix}$ (2 marks)

h) Find the radius and the coordinates of the centre of the circle $2x^2+2y^2-8x+5y+10=0$

                                                                            (4 marks)

QUESTION TWO (20 marks)
a) Prove that P=2i+3j+4k is a perpendicular to q =5i+2j-4k $\qquad$ (2 marks)
b) Given that $\quad$ a=4i+3j+12k
      i. B =8i-6j,
   Find a^2, b^2 and a-b
   Hence find the angle between the vectors a and b $\qquad$ (6 marks)
c) Find the centroid of the triangle whose vertices are A(1,2), B(3,7) and C(2,3)
$\qquad$ (3 marks)
d) Find the magnitude and directions of the vectors:-
      i. 3i +4j $\qquad$ (1mark)
     ii. -5i +12j $\qquad$ (1mark)
    iii. i-j $\qquad$ (1mark)
    iv. -10j $\qquad$ (1mark)
e) prove that if $P=\hat{h}a + \underset{\sim}{k}b$ represents the point P on the line AB, then $\hat{h}+\underset{\sim}{k}=$ 1
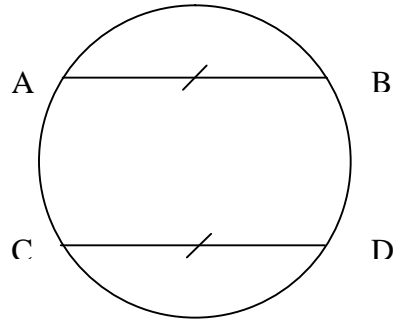$\qquad$ (5 marks)

QUESTION THREE(20 MARKS)
a) Find the value of Θ for $0^0 < \Theta < 90^0$ given that
      i. $\sin(\Theta+30^0)= \cos 2\Theta$ $\qquad$ (2 marks)
     ii. $\sin \Theta = \cos (2\Theta-30^0)$ $\qquad$ (2 marks)
b) A parallelogram has diagonals of lengths 12 cm and 15 cm that intersect. How long are the sides of the parallelogram? $\qquad$ (3 marks)
c) In triangle PQR, QR = 5 cm and $<QPR =60^0$
  Calculate the radius of the circumcircle of the triangle. $\qquad$ (5 marks)
d) The perimeter of a triangle fields is 120m.Two of the sides are 21m and 40 m. Calculate the largest angle of the fields $\qquad$ (5 marks)
e) Without using mathematical tables or electron calculators and leaving your answer in the surd form where necessary, obtain:
      i. $\cos (-180^0)$ $\qquad$ (1 mark)
   ii. $\sin (540^0)$ $\qquad$ (1 mark)
    iii. $\tan (135^0)$ $\qquad$ (1 mark)

QUESTION FOUR (20 MARKS)
a) A chord 12cm long is on a circle of radius 10cm. Find the distance of the chord from the centre of the circle. $\qquad$ (4 marks)
b) Find the perimeter of a semi-circle protractor whose radius is 14 cm. $\quad$ (3 marks)
c) The wiper of a bus is 40 cm long. It sweeps out through an angle of 120^0 non a flat windscreen. Calculate the distance moved by the tip of the wiper in one sweep.
$\qquad$ (5 marks)
d) The figure below shows a circle ABCD in which chord AB and CD are equal. Show that:-
      i. AD = BC

ii. AC is parallel to BD (4 marks)

e) In the figure below find x and y (4 marks)
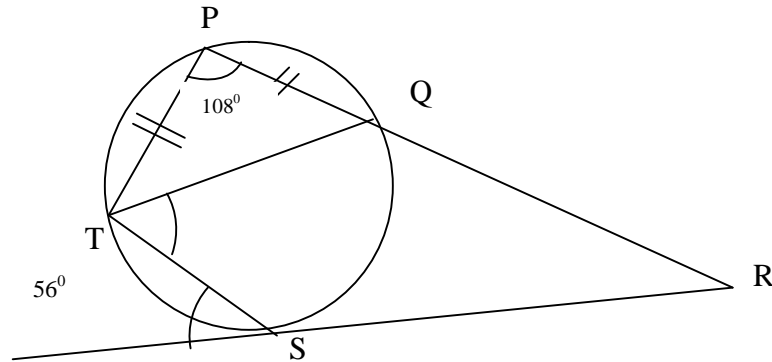
QUESTION FIVE (20 MARKS)

a) Find the equation of the circle whose centre is at the point (2,1) and which passes through the point (4,-3) (4 marks)

b) Find the equation of the straight line which passes through the point (2,-1) and parallel to the line $3x+5y =1$ (3 marks)

c) Solve the following pair of simultaneous equations graphically.

$4x-3y =12$

$X = 2y =2$ (4 marks)

d) Find the gradient of the line joining R (4,8) and S (5, -2) (2 marks)

e) Find the equation of the straight line joining the points (-5,2), and (3,-4) (2 marks)

f) Prove that the four points (4,0),(7,-3),(-2,-2),(-5,1) are the vertices of a parallelogram and find the equation of the diagonals (5 marks)