KABARAK   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE CERTIFICATE OF PRE- UNIVERSITY

MATHEMATICS

COURSE CODE: **PMATH 021**

COURSE TITLE: **VECTORS**

STREAM: **SEMESTER TWO**

DAY: **THURSDAY**

TIME: **9.00 – 11.00 A.M.**

DATE: **06/08/2009**

INSTRUCTIONS:

Answer All questions in section A and any Two in section B

PLEASE TURN OVER

SECTION A (30 marks)

1. Distinguish between
   a) Gradient and y intercept of a line. [2 marks]
   b) Sector and segment [2 marks]

2. Determine whether the following lines are parallel or perpendicular
   $$3x + 3 = 2x ; \quad 2y - 3x + 8 = 0$$ [3 marks]

3. A sheep is tethered at the corner of a fenced square grazing plot each of side 20 cm. long, if the length of the rope is 14 cm, what is the of the of the plot not grazed by the sheep ? [3 marks]

4. Find the angle subtended at the centre of a circle by an arc length 20 cm if the circumference of the circle is 60 cm [3 marks]

5. In a triangle ABC, $A = 130^0$ $b = 4cm$ $c = 5cm$. Find the length a and the measure of the angle C [5 marks]

6. Given that $90^0 < \theta < 270^0$, find θ when
   a) $\tan\theta = \sqrt{3}$ [3 marks]
   b) $\cos\theta = -\dfrac{\sqrt{3}}{2}$ [3 marks]

7. Given a triangle ABC, $c = 4.85$ cm, $B = 32^0$ and $A = 76^0$. Find the length b [3 marks]

8. In triangle PQR, $p = 5$ cm, $q = 7$ cm and $r = 9$ cm. Find the area of the triangle. [3 marks]

SECTION B 40 Marks

9.
   a) Define the terms scalar and vector and hence state which of the following are scalars and vectors; momentum, magnetic field intensity, calorie and specific heat. [5 marks]

   b) If $\ddot{a} = 2\hat{i} - 3\hat{j}; \quad \ddot{b} = 4\hat{i} - 2\hat{j}$; Find $\left| 2\ddot{a} - 3\ddot{b} \right|$ [5 marks]

   c) Find all the angles between 0^0 and 360^0 which satisfy the equation
   $$1 + 2\sin 2\theta = 0$$ [5 marks]

d) The windscreen wiper of a car sweeps through an angle of 120^0. The shaded region in the figure below represents the area swept clean by the wiper. If OA = 7 cm and OB = 21 cm, find the area of the glass swept clean. [5 marks]

10.

a) The vertices of a triangle are A(-3, 0), B(-3, 3) and C(3, 4). Find the area of the triangle. [5 marks]

b) The vertices of a parallelogram are P(-3, 1), Q(3, 0), R(2, 4) and S(x, y). Find x and y. [5 marks]

c) Two points G(1, 3) and H(2, 8) lie on a straight line. Obtain m, c and equation of this line. [4 marks]

d) Simplify the following without using tables..
   i. $\sin 30^0 \cos 30^0$
   ii. $\tan 45^0 + \cos 45^0 \sin 45^0$ [6 Marks]

11.

a) Two parallel chords of a circle are each 8 cm long. If the radius of the circle is 5 cm long, what is the perpendicular distance between the chords? [5 Marks]

b) Find the value of x in the figure below and show that triangle ABC is isosceles. [5 marks]

c) Two boats leave the habour at 9.00 A.M. Boat A sails north at 20km/h. Boat B sails east at 15Km/h. How far apart are the two boats at noon? [5 marks]

d) The radius of a circle centre O is 5cm. Find the perpendicular distance from O to a chord whose length is 6 cm. [5 marks]