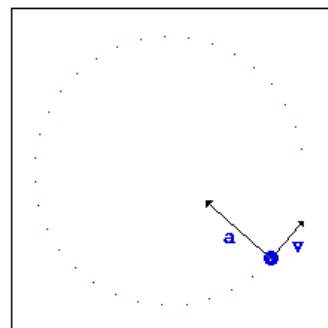


UNIFORM CIRCULAR MOTION

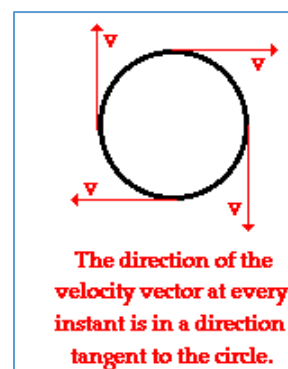
Uniform circular motion can be described as the motion of an object in a circle at a constant speed. As an object moves in a circle, it is constantly changing its direction. At all instances, the object is moving tangent to the circle. Since the direction of the velocity vector is the same as the direction of the object's motion, the velocity vector is directed tangent to the circle as well. The image at the right depicts this by means of a vector arrow.



An object moving in a circle is accelerating. Accelerating objects are objects which are changing their velocity - either the speed (i.e., magnitude of the velocity vector) or the direction. An object undergoing uniform circular motion is moving with a constant speed. Nonetheless, it is accelerating due to its change in direction. The direction of the acceleration is inwards. The image at the right depicts this by means of a vector arrow.

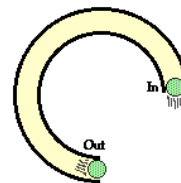
The final motion characteristic for an object undergoing uniform circular motion is the net force. The net force acting upon such an object is directed towards the center of the circle. The net force is said to be an inward or **centripetal force**. Without such an inward force, an object would continue in a straight line, never deviating from its direction. Yet, with the inward net force directed perpendicular to the velocity vector, the object is always changing its direction and undergoing an inward acceleration.

The best word that can be used to describe the direction of the velocity vector is the word **tangential**. The direction of the velocity vector at any instant is in the direction of a tangent line drawn to the circle at the object's location. (A tangent line is a line that touches a circle at one point but does not intersect it.) The diagram at the right shows the direction of the velocity vector at four different points for an object moving in a clockwise direction around a circle. While the actual direction of the object (and thus, of the velocity vector) is changing, its direction is always tangent to the circle.



To summarize, an object moving in uniform circular motion is moving around the perimeter of the circle with a constant speed. While the speed of the object is constant, its velocity is changing. Velocity, being a vector, has a constant magnitude but a changing direction. The direction is always directed tangent to the circle and as the object turns the circle, the tangent line is always pointing in a new direction.

1. A tube is been placed upon the table and shaped into a three-quarters circle. A golf ball is pushed into the tube at one end at high speed. The ball rolls through the tube and exits at the opposite end. Describe the path of the golf ball as it exits the tube.



2. Why an object moving in a circle at constant speed can be said to experience an acceleration.