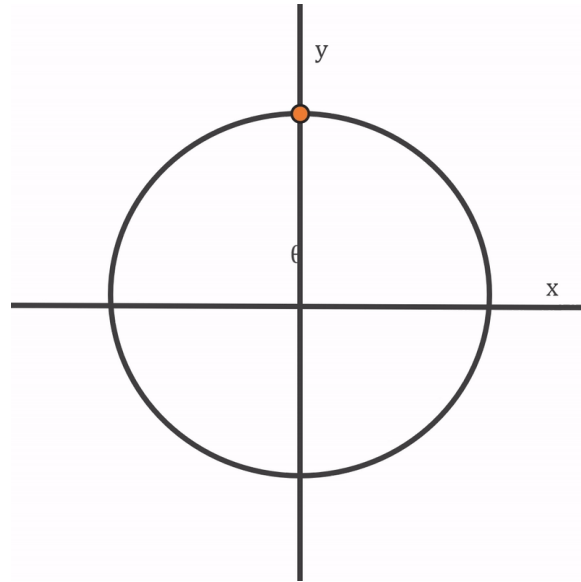


Ball in Circular Motion



Which of the following equations gives the correct relation for the velocity vector \vec{v} in cartesian coordinates for this ball following a circular motion with radius R ?

Define x and y to be:

$$x = R \cdot \sin \theta \quad (1)$$

$$y = R \cdot \cos \theta \quad (2)$$

Take the first and second derivatives of both to get relations for the velocity and acceleration:

$$\dot{x} = R \cdot \cos \theta \cdot \dot{\theta} \quad (3)$$

$$\dot{y} = -R \cdot \sin \theta \cdot \dot{\theta} \quad (4)$$

Combining both results in the velocity vector $\vec{a} = \dot{x} \cdot \mathbf{i} + \dot{y} \cdot \mathbf{j}$:

$$\mathbf{v} = (R\dot{\theta} \cos \theta, -R\dot{\theta} \sin \theta) \quad (5)$$