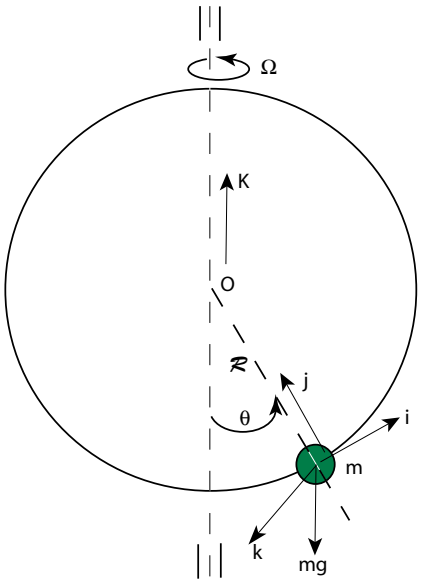
Hint for Problem 2.1:



The position vector of mass m can be expressed as (see the figure)

$$\mathbf{r} = -R\,\mathbf{j} \tag{1}$$

Hence, the velocity $\mathbf{v}$ can be expressed as

$$\mathbf{v} = -R\,\dot{\mathbf{j}} \tag{2}$$

Using the definition of the angular velocity given by

$$\dot{\mathbf{j}} = \boldsymbol{\omega} \times \mathbf{j} \tag{3}$$

and noting that

$$\boldsymbol{\omega} = \Omega\mathbf{K} + \dot{\theta}\mathbf{k},\ \ \mathbf{k} = \mathbf{i} \times \mathbf{j} \tag{4}$$

one obtains

$$\mathbf{v} = -R\,(\Omega\mathbf{K} + \dot{\theta}\mathbf{k}) \times \mathbf{j} \tag{5}$$

Of course, you can employ other kinematics. However, the result should be the same. I hope this will help!