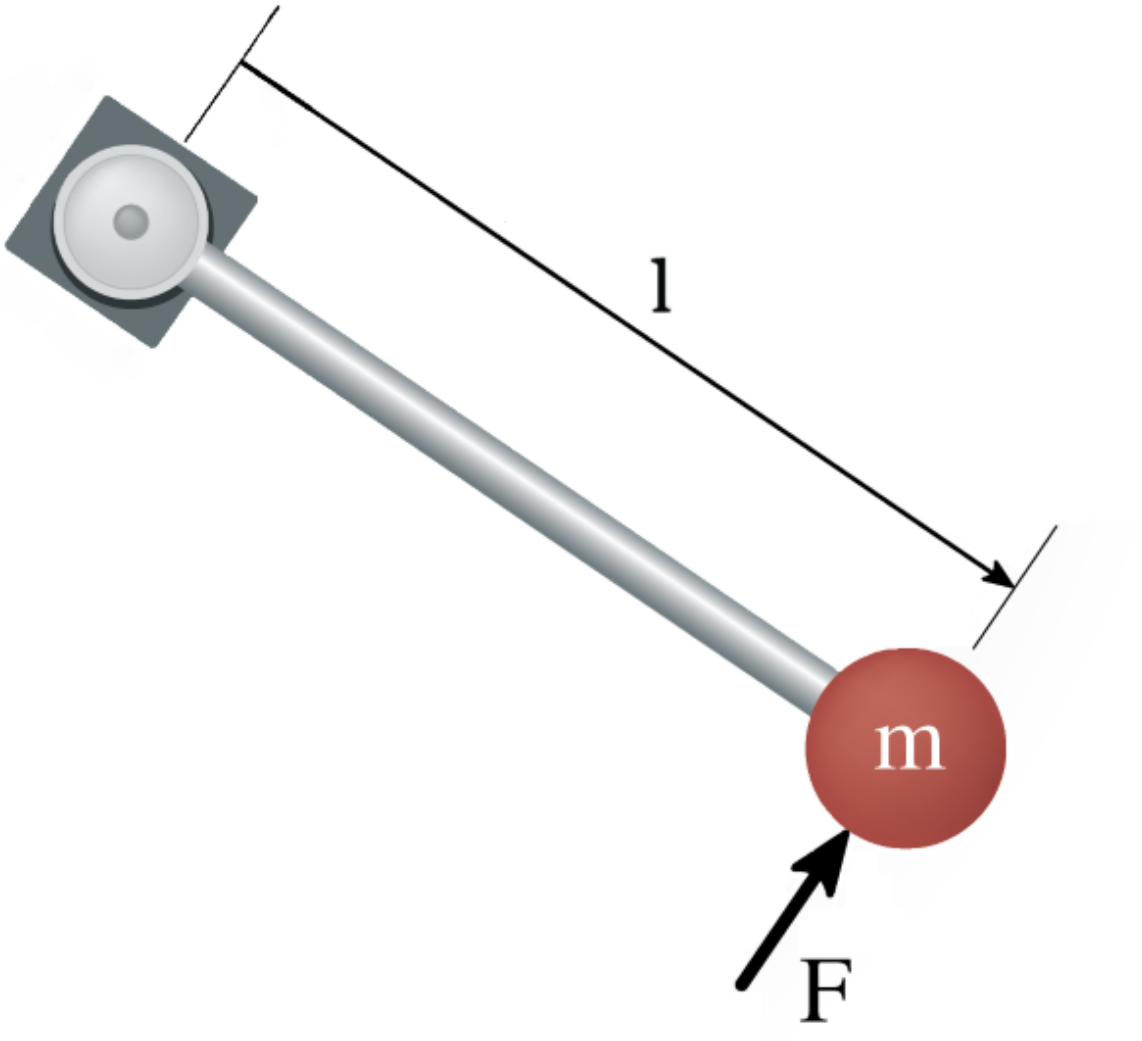
21-P-MOM-GD-010



A $\underline{M}$ kg sphere is attached to a rod of length $\underline{l}$ m which rotates around a fixed pin. A force of $F = \underline{A}t$ N is applied to the sphere (where t is in seconds). What is the sphere's velocity when $t = \underline{t}$ s, if the sphere starts at rest?

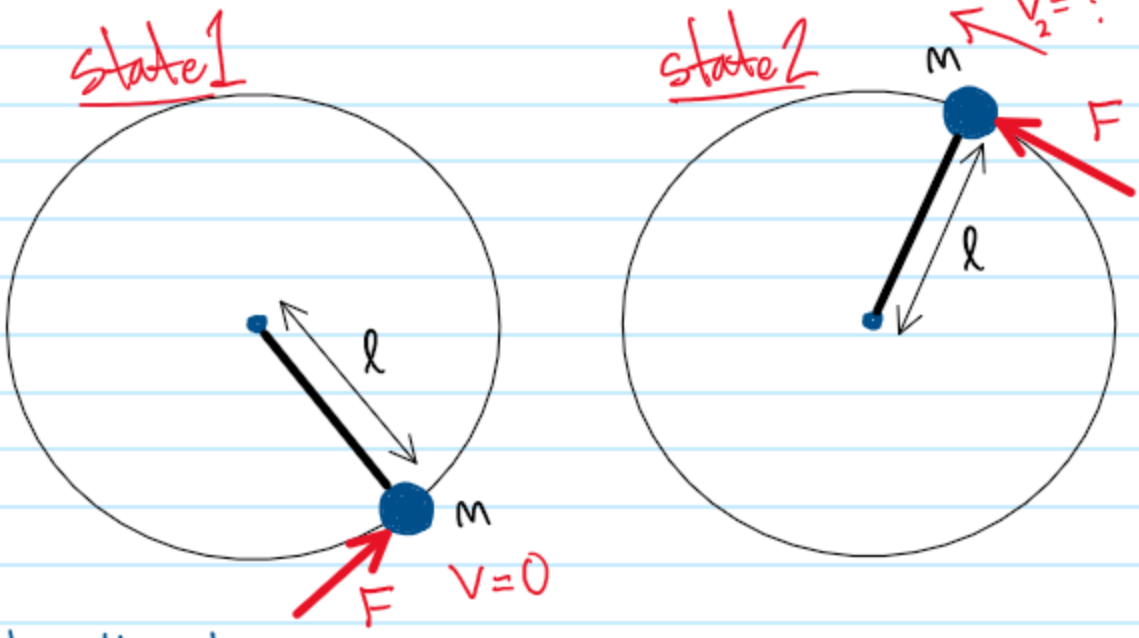
(Assume the motion is in the horizontal plane)

given

m, l, A, t

find

V_2



Conservation of Angular Momentum

$$H_1 + \Sigma \int M\,dt = H_2$$

$$ml\cancel{v_1} + \int_0^t At(l)\,dt = ml v_2$$

$$\tfrac{1}{2} A\cancel{l} t^2 = m\cancel{l} v_2$$

$$v_2 = \frac{At^2}{2m}$$