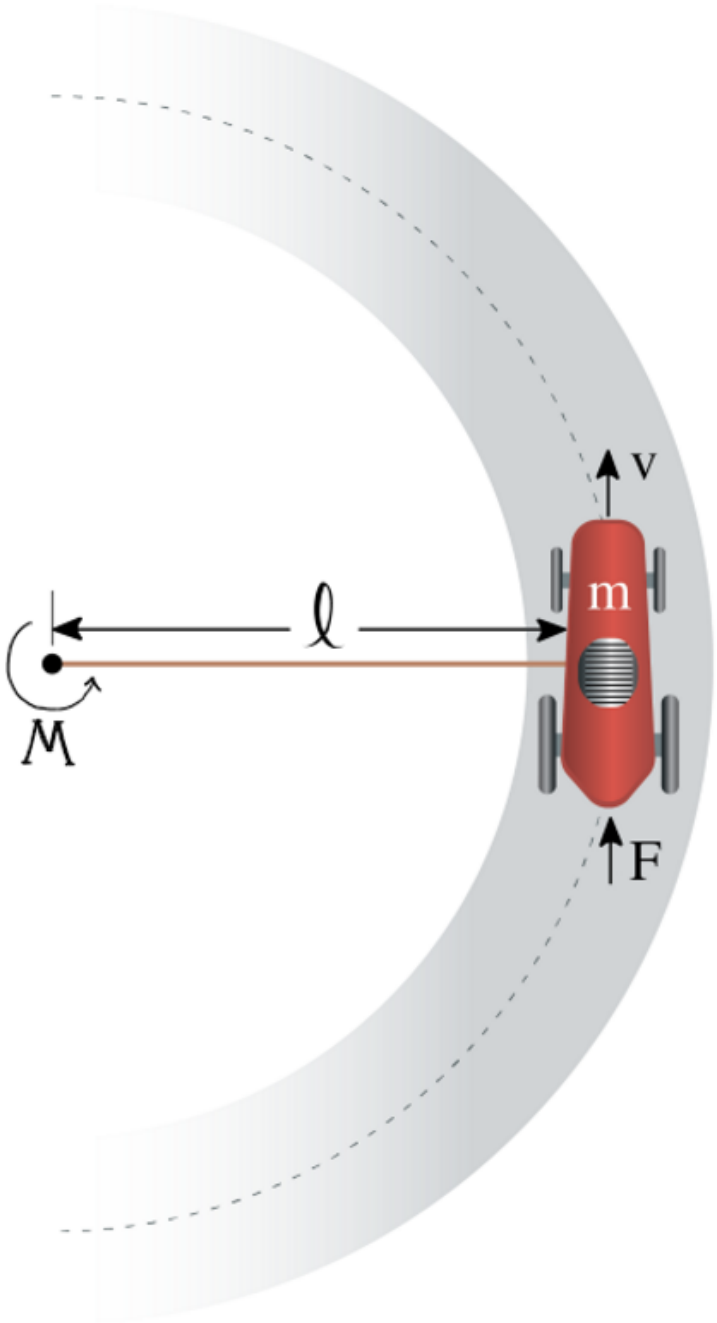
21-P-MOM-GD-011

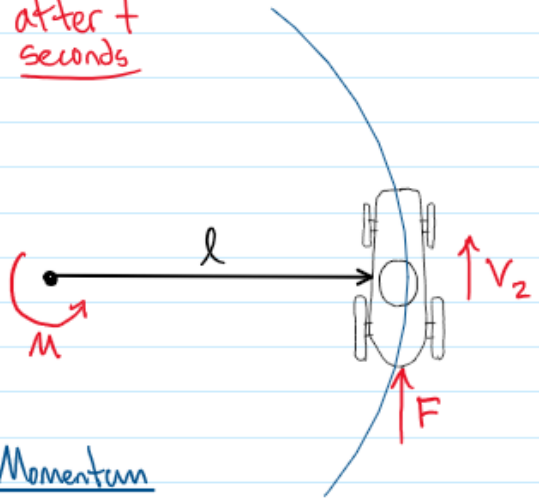


A couple moment $M = At^2$ Nm is applied to the l m wooden stick and the wind-up mechanism in the car applies a driving force of $F = Bt$ N, where t is in seconds. If the car has a mass of m kg and the car starts at rest, how fast is the car moving at $t = t$ s?

(Neglect the mass of the wooden stick)

given A, l, B, m, t after t seconds

find v_2



Conservation of Angular Momentum

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

$$mlv_1 + \int_0^t At^2\,dt + \int_0^t Bt\,l\,dt = mlv_2$$

$$\tfrac{1}{3}At^3 + \tfrac{1}{2}Blt^2 = mlv_2$$

$$v_2 = \frac{\tfrac{1}{3}At^3 + \tfrac{1}{2}Blt^2}{ml}$$