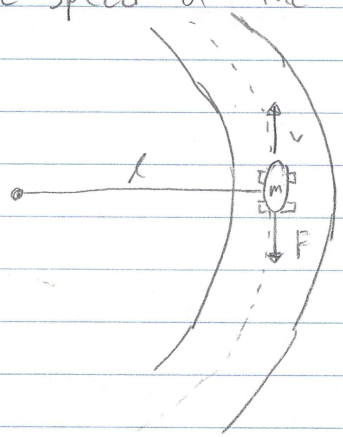
20-P-MOM-DY-18

Tether cars are small vehicles that are designed to go on a circular track while tethered to a central post. A $m = 1\,kg$ tether car is traveling at the velocity $v = 90\,m/s$ when the brakes are applied. The brakes can be thought of as the force $F = 10\,N$ applied to the car. If the tether is $5\,m$, $= l$ determine the speed of the tether car when time $t = 5s$.



Solution: $(H)_1 + \sum \int_{t_1}^{t_2} M\,dt = (H)_2$

$$rmv_1 + \int_{t_1}^{t_2} lF\,dt = rmv_2$$

$$rmv_1 + lFt = rmv_2 \qquad r = l \qquad F = -10N$$

$$v_2 = \frac{rmv_1 + lFt}{rm} = 40\ m/s$$