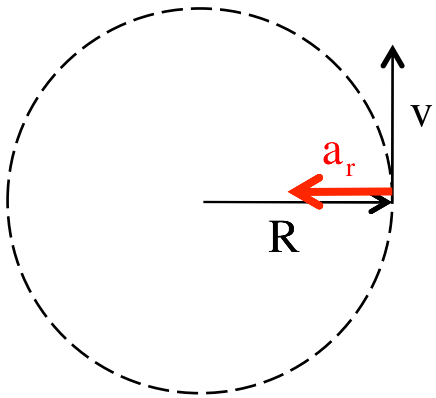
Problem 4.30



a.) translational speeds:

$$v_{tr,6m} = (8.00 \text{ rev/sec}) \frac{(2\pi \text{ radians})}{(1 \text{ rev})} \frac{(0.600 \text{ m})}{(1 \text{ radian})}$$

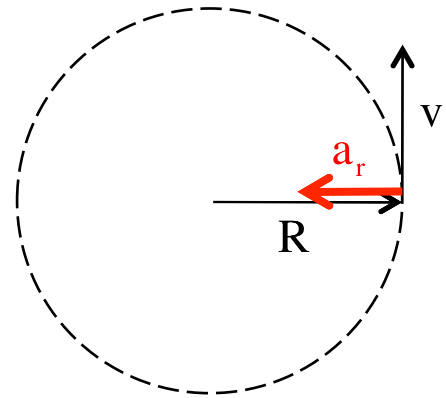
$$= 30.2 \text{ m/s}$$

$$v_{tr,9m} = (6.00 \text{ rev/sec}) \frac{(2\pi \text{ radians})}{(1 \text{ rev})} \frac{(0.900 \text{ m})}{(1 \text{ radian})}$$

$$= 34.0 \text{ m/s}$$

Apparently in this case, the slower rotational speed farther out produces a larger translational speed.

b.) centripetal acceleration at 0.600 meters:



$$a = \frac{\left(v_{tr,6m}\right)^2}{R} = \frac{(30.2\ \text{m/s})^2}{0.600\ \text{m}} = 1520\ \text{m/s}^2$$

c.) centripetal acceleration at 0.900 meters:

$$a = \frac{\left(v_{tr,9m}\right)^2}{R} = \frac{(34\ \text{m/s})^2}{0.900\ \text{m}} = 1284\ \text{m/s}^2$$

So even though the slower rotational speed farther out produced a larger translational speed, being farther out gave it a smaller centripetal acceleration!