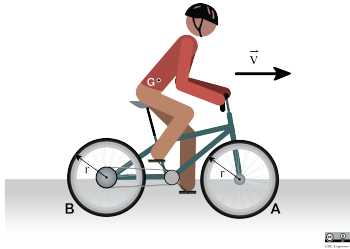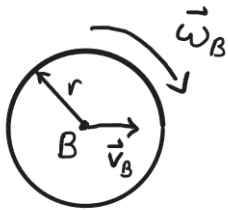# 22-R-WE-TW-29

Sam is riding his bike and wants to determine his average power output. He measures his average speed to be 6 m/s and is applying a constant moment of 3 N · m to the rear wheel. If the radius of the wheels is 0.559 m and the bike rolls without slipping, what is Sam's average power output?

Solution:

Note that because we have transnational motion of the rider and frame of the bike, v_B will be the same as $v_\text{person} = 6$ m/s

$$U = M(\Delta\theta)_B$$

$$P = \frac{U}{\Delta t} = \frac{M(\Delta\theta)_B}{\Delta t} = M\overline{\omega}_B$$

$$\overline{v}_B = \overline{\omega}_B r \Rightarrow \overline{\omega}_B = \frac{\overline{v}_B}{r}$$

$$P = \frac{M\overline{v}_B}{r} = \frac{(3)(6)}{0.559} = 32.2 \ [\text{W}]$$