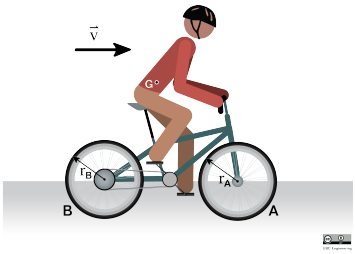
22-R-WE-TW-29



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 $\cdot$ m to the wheels. If the radius of the wheels is 0.559 m and the bike rolls without slipping, what is Sam's average power output?

Solution:

$$U = M\Delta\theta$$

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

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

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