Solution to Physlets 8

Problem 10.3

a) Both coins have the same angular speed since both sit on the same turntable.

b) I observe the coins to make 6 complete revolutions in 8 seconds. The period is therefore \( 8 \text{ s} / 6 \text{ revolutions} = 1.33 \text{ s} \).

\[ \omega = \frac{2\pi}{T} = 1.5\pi \text{ s}^{-1} \]

Problem 10.7

Before the finger touches the rotating disk, I observe 2 revolutions in 1 second. The period is therefore 0.5 s.

\[ \omega = \frac{2\pi}{T} = 4\pi \text{ s}^{-1}. \]

After the finger touches the disk at time \( t = 1.0 \text{ s} \), the disk slows to a stop at time \( t = 3.5 \text{ s} \). That means

\[ \alpha = \frac{\Delta \omega}{\Delta t} = \frac{\omega_f - \omega_i}{t_f - t_i} = \frac{0 - 4\pi \text{ s}^{-1}}{3.5\text{s} - 1.0\text{s}} = -5.0 \text{ s}^{-2} \]

And \( \tau = I\alpha = \frac{1}{2}MR^2\alpha = \frac{1}{2}(5.0 \text{ kg})(0.3 \text{ m})^2(-5.0 \text{ s}^{-2}) = -1.1 \text{ Nm} \)