## Chapter 10 Problem 42 [†]

**Given**

$\omega_0 = 3600\ rpm$
$\omega = 1800\ rpm$
$t = 1.4\ s$

**Solution**

Find the number of revolutions made during this time.

Since the given information and the answer desired are in revolutions, we will not convert to radians. However, we do need to convert the minutes into seconds.

$$\omega_0 = \frac{3600\ rev}{min}\left(\frac{1\ min}{60\ s}\right) = 60\ rev/s$$

$$\omega = \frac{1800\ rev}{min}\left(\frac{1\ min}{60\ s}\right) = 30\ rev/s$$

The angular acceleration is

$$\bar{\alpha} = \frac{\Delta\omega}{\Delta t} = \frac{(30\ rev/s - 60\ rev/s)}{1.4\ s} = -21.4\ rev/s^2$$

The distance travelled is then

$$\theta = \omega_0 t + \tfrac{1}{2}\alpha t^2 = (60\ rev/s)(1.4\ s) - \tfrac{1}{2}(21.4\ rev/s^2)(1.4\ s)^2$$

$$\theta = 63.0\ rev$$

[†] Problem from Essential University Physics, Wolfson