

45. We apply Eq. 4-32 to solve for speed  $v$  and Eq. 4-33 to find the period  $T$ .

(a) We obtain

$$v = \sqrt{ra} = \sqrt{(5.0 \text{ m})(7.0)(9.8 \text{ m/s}^2)} = 19 \text{ m/s} .$$

(b) The time to go around once (the period) is  $T = 2\pi r/v = 1.7 \text{ s}$ . Therefore, in one minute ( $t = 60 \text{ s}$ ), the astronaut executes

$$\frac{t}{T} = \frac{60}{1.7} = 35$$

revolutions. Thus, 35 rev/min is needed to produce a centripetal acceleration of  $7g$  when the radius is 5.0 m.

(c) As noted above,  $T = 1.7 \text{ s}$ .