

115. We apply Eq. 4-34 to solve for speed v and Eq. 4-35 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, $T = 1.7 \text{ s}$.