

49. (a) Since the wheel completes 5 turns each minute, its period is one-fifth of a minute, or 12 s.
- (b) The magnitude of the centripetal acceleration is given by  $a = v^2/R$ , where  $R$  is the radius of the wheel, and  $v$  is the speed of the passenger. Since the passenger goes a distance  $2\pi R$  for each revolution, his speed is

$$v = \frac{2\pi(15\text{ m})}{12\text{ s}} = 7.85\text{ m/s}$$

and his centripetal acceleration is

$$a = \frac{(7.85\text{ m/s})^2}{15\text{ m}} = 4.1\text{ m/s}^2 .$$

When the passenger is at the highest point, his centripetal acceleration is downward, toward the center of the orbit.

- (c) At the lowest point, the centripetal acceleration vector points up, toward the center of the orbit. It has the same magnitude as in part (b).