23. (a) Using Eq. 11-6, the angular velocity at $t = 5.0\,\text{s}$ is

$$\omega = \left.\frac{d\theta}{dt}\right|_{t=5.0} = \left.\frac{d}{dt}\left(0.30t^2\right)\right|_{t=5.0} = 2(0.30)(5.0) = 3.0\ \text{rad/s}\ .$$

(b) Eq. 11-18 gives the linear speed at $t = 5.0\,\text{s}$:

$$v = \omega r = (3.0\,\text{rad/s})(10\,\text{m}) = 30\ \text{m/s}\ .$$

(c) The angular acceleration is, from Eq. 11-8,

$$\alpha = \frac{d\omega}{dt} = \frac{d}{dt}\left(0.60t\right) = 0.60\ \text{rad/s}^2\ .$$

Then, the tangential acceleration at $t = 5.0\,\text{s}$ is, using Eq. 11-22,

$$a_t = r\alpha = (10\,\text{m})\left(0.60\,\text{rad/s}^2\right) = 6.0\ \text{m/s}^2\ .$$

(d) The radial (centripetal) acceleration is given by Eq. 11-23:

$$a_r = \omega^2 r = (3.0\,\text{rad/s})^2(10\,\text{m}) = 90\ \text{m/s}^2\ .$$