

1. The initial speed of the car is $v = (80.0)(1000/3600) = 22.2$ m/s. The tire radius is $R = 0.750/2 = 0.375$ m.

(a) The initial speed of the car is the initial speed of the center of mass of the tire, so Eq. 12-2 leads to

$$\omega_0 = \frac{v_{\text{com } 0}}{R} = \frac{22.2}{0.375} = 59.3 \text{ rad/s} .$$

(b) With $\theta = (30.0)(2\pi) = 188$ rad and $\omega = 0$, Eq. 11-14 leads to

$$\omega^2 = \omega_0^2 + 2\alpha\theta \implies |\alpha| = \frac{59.3^2}{2(188)} = 9.31 \text{ rad/s}^2 .$$

(c) Eq. 12-1 gives $R\theta = 70.7$ m for the distance traveled.