**82.** $r = 40$ centimeters, $\theta = \dfrac{3\pi}{4}$

$s = r\theta = 40\left(\dfrac{3\pi}{4}\right) = 30\pi$ centimeters

**84.** $r = 4000$ miles

$\theta = 31^\circ\,47' + 26^\circ\,11' = 57^\circ\,58' \approx 1.0117$ rad

$s = r\theta = 4000(1.0117) \approx 4046.8$ miles

**86.** $r = 6378, s = 400$

$\theta = \dfrac{s}{r} = \dfrac{400}{6378} \approx 0.0627 \text{ rad} \approx 3.59^\circ$

**88.** $\theta = \dfrac{s}{r} = \dfrac{24 \text{ inches}}{5 \text{ inches}} = 4.8 \text{ rad} \approx 275.02^\circ$

**90.** (a) $65 \text{ mph} = 65\left(\dfrac{5280}{60}\right) = 5720 \text{ ft/min}$

Circumference of wheel $= \pi(2.5)$ feet

Number of revolutions per minute is

$\dfrac{5720}{2.5\pi} = \dfrac{2288}{\pi} \approx 728.3$ rev/min

(b) $\theta = \dfrac{5720}{2.5\pi}(2\pi) = 4576$ radian

Angular speed $= \dfrac{\theta}{t} = \dfrac{4576}{1} = 4576$ rad/min

**92.** (a) $\dfrac{\text{Revolutions}}{\text{Second}} = \dfrac{2400}{60} = 40$ rev/sec

Angular speed $= (2\pi)(40) = 80\pi$ rad/sec

(b) Radius of saw blade $= \dfrac{7.5}{2} = 3.75$ in.

Radius in feet $= \dfrac{3.75 \text{ in.}}{12 \text{ in./ft}} = 0.3125$ ft

$\text{Speed} = \dfrac{s}{t} = \dfrac{r\theta}{t} = r\dfrac{\theta}{t}$

$= r(\text{angular speed})$

$= 0.3125(80\pi) = 78.54$ ft/sec

**94.** No, $-1260^\circ$ is coterminal with $180^\circ$.

**96.** Let $A$ be the area of a circular sector of radius $r$ and central angle $\theta$. Then

$$\frac{A}{\pi r^2} = \frac{\theta}{2\pi} \Rightarrow A = \frac{1}{2}r^2\theta.$$

**98.** Because $s = r\theta$, $\theta = \frac{12}{15}$. Hence, $A = \frac{1}{2}r^2\theta = \frac{1}{2}15^2\left(\frac{12}{15}\right) = 90 \text{ ft}^2$.

**100.** If a fan of greater diameter is installed, the speed of the tips will increase.

**102.** $y = -6.59x + 38.1$

**104.** $54x^2 - 6x^4 = 6x^2(9 - x^2) = 6x^2(3 - x)(3 + x)$

Zeros: $3, -3, 0, 0$

**106.** $4x^4 + 44x^3 + 96x^2 = 4x^2(x^2 + 11x + 24) = 4x^2(x + 8)(x + 3)$

Zeros: $-3, -8, 0, 0$