

Obj. 17 Radian Measure  
Homework Problems  
SOLUTIONS

College Algebra, pg. 565: 30, 50, 68, 80, 88, 90

$$30. \frac{15\pi}{4} \left( \frac{180}{\pi} \right) = 675^\circ$$

$$50. 122^\circ 37' = \left( 122 + \frac{37}{60} \right) \left( \frac{\pi}{180} \right) = 2.140$$

$$68. \theta = \frac{7\pi}{4}, s = 14\pi, \text{ find } r$$

$$s = r\theta$$

$$14\pi = r \left( \frac{7\pi}{4} \right)$$

$$14\pi \left( \frac{4}{7\pi} \right) = \left( \frac{7\pi}{4} \right) \left( \frac{4}{7\pi} \right) r$$

$$8 = r$$

$$80. r = 12.4 \text{ ft.}, \theta = 330^\circ$$

$$s = (12.4)(330^\circ) \left( \frac{\pi}{180} \right)$$

$$= 71.4 \text{ ft.}$$

88. Charleston, SC and Toronto, Canada are 1100 km apart and lie on the same north-south line. The latitude of Charleston is  $33^\circ$  N. What is the latitude of Toronto?

$$s = r\theta$$

$$1100 = (6400) \left[ (x - 33) \left( \frac{\pi}{180} \right) \right]$$

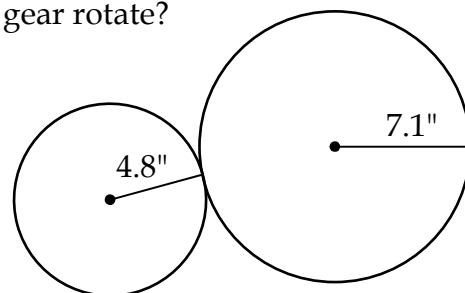
$$\frac{1100}{6400} = (x - 33) \left( \frac{\pi}{180} \right)$$

$$\left( \frac{11}{64} \right) \left( \frac{180}{\pi} \right) = x - 33$$

$$x = 9.85 + 33$$

$$= 43^\circ \text{N}$$

90. Two gears are adjusted so that the smaller gear (radius 4.8 in) drives the larger one (radius 7.1 in). If the smaller gear rotates through an angle of  $315^\circ$ , through how many degrees will the larger gear rotate?



Because the both gears rotate through the same arc, we can set the arc formulas equal to each other:

$$r_1\theta_1 = r_2\theta_2$$

$$(4.8)(315^\circ) \left( \frac{\pi}{180} \right) = 7.1\theta_2 \left( \frac{\pi}{180} \right)$$

$$8.4\pi = 7.1\theta_2 \left( \frac{\pi}{180} \right)$$

$$\theta_2 = \left( \frac{8.4\pi}{7.1} \right) \left( \frac{180}{\pi} \right)$$

$$= 213^\circ$$