

S.1 Hw Solutions : #'s 73, 77, 81, 85, 89, 91, 93, 95, 101

$$73.) s = r\theta \rightarrow 2 = r \cdot \frac{1}{3} \rightarrow 3 \cdot 2 = r \cdot \frac{1}{3} \cdot 3 \rightarrow \boxed{6 \text{ ft} = r}$$

$$77.) s = r\theta \rightarrow s = 2 \left( 30^\circ \cdot \frac{\pi}{180} \right) \rightarrow s = 2 \cdot \frac{\pi}{6} = \frac{\pi}{3} \approx \boxed{1.047 \text{ in}}$$

$$81.) A = \frac{1}{2} r^2 \theta \rightarrow 2 = \frac{1}{2} r^2 \left( \frac{1}{3} \right) \rightarrow 2 = \frac{1}{6} r^2 \rightarrow$$

$$6 \cdot 2 = \frac{1}{6} r^2 \cdot 6 \rightarrow 12 = r^2 \rightarrow r = 2\sqrt{3} \approx \boxed{3.464 \text{ ft}^2}$$

$$85.) A = \frac{1}{2} r^2 \theta \rightarrow A = \frac{1}{2} (2)^2 \left( 30^\circ \cdot \frac{\pi}{180} \right) \rightarrow A = \frac{1}{2} \cdot 4 \cdot \frac{\pi}{6}$$

$$A = \frac{\pi}{3} \approx \boxed{1.047 \text{ in}^2}$$

$$89.) s = r\theta \rightarrow s = 12 \left( 70^\circ \cdot \frac{\pi}{180} \right) \approx \boxed{14.661 \text{ yds}}$$

$$A = \frac{1}{2} r^2 \theta \rightarrow A = \frac{1}{2} (12)^2 \left( 70^\circ \cdot \frac{\pi}{180} \right) \approx \boxed{87.965 \text{ yd}^2}$$

$$91.) s = r\theta$$

$r = 6 \text{ in}$ , 15 mins is  $\frac{1}{4}$  turn so  $\theta = 90^\circ = \frac{\pi}{2}$   
 every 5 mins is  $30^\circ$ , so 25 mins =  $150^\circ = \frac{5\pi}{6}$

$$a.) s = r\theta \rightarrow s = 6 \left( \frac{\pi}{2} \right) = 3\pi \approx \boxed{9.4248 \text{ in}}$$

$$b.) s = r\theta \rightarrow s = 6 \left( \frac{5\pi}{6} \right) = 5\pi \approx \boxed{15.708 \text{ in}}$$

$$93.) \text{ Area of a sector} = \frac{1}{2} r^2 \theta = \frac{1}{2} (4)^2 \left(45^\circ \cdot \frac{\pi}{180}\right) \rightarrow$$

$$\text{Area} = \frac{1}{2} \cdot 16 \cdot \frac{\pi}{4} = 2\pi \approx \boxed{6.28 \text{ m}^2}$$

$$95.) A = \frac{1}{2} r^2 \theta \rightarrow A = \frac{1}{2} (30)^2 \left(135^\circ \cdot \frac{\pi}{180}\right)$$

$$A = \frac{1}{2} (900) \left(\frac{3\pi}{4}\right) \approx \boxed{1060.29 \text{ Ft}^2}$$

101.)  $s = r\theta$  [Use arc length b/c you are measuring the distance b/w the two cities on the same longitude line, which is along an arc]

- radius of earth = 3960 mi
- $\theta = 35^\circ 9' - 29^\circ 57' = 34^\circ 69' - 29^\circ 57' = \underline{5^\circ 12'}$
- Convert to decimal degrees and then to radians  
 $\hookrightarrow 5^\circ 12' = 5^\circ + 12 \left(\frac{1}{60}\right) = \underline{5.2^\circ}$   
 $\hookrightarrow 5.2^\circ \cdot \frac{\pi}{180} = \theta \text{ (in radians)}$

Solution

$$s = r\theta \rightarrow s = 3960 \left(5.2^\circ \cdot \frac{\pi}{180}\right) = \boxed{359.398 \text{ mi.}}$$