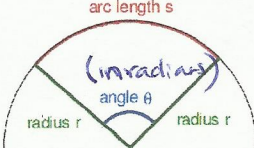
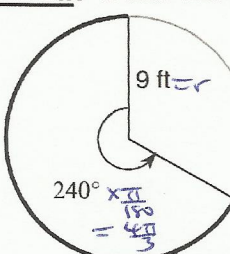
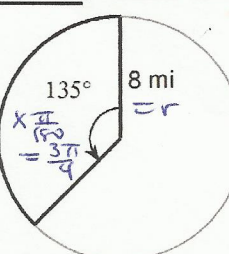


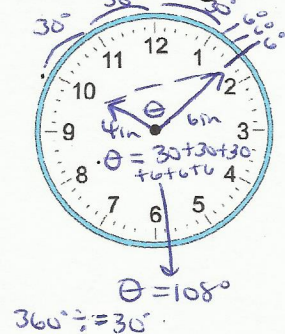
## 8.1 (Part II) – Applications with Angle Measure

Type  $\pi$  in for these

Arc Length $\rightarrow s = r \cdot \theta$ (in radians)	Sector Area $\rightarrow A = \frac{1}{2} \cdot r^2 \cdot \theta$ (in radians)
 <p><b>Ex 1a: Find the arc length</b></p>  $s = r\theta$ $s = 9\left(\frac{4\pi}{3}\right)$ $s = 37.7 \text{ ft}$	 <p><b>Ex 1b: Find the sector area</b></p> $A = \frac{1}{2} r^2 \theta$ $A = \frac{1}{2} (8)^2 \left(\frac{3\pi}{4}\right)$ $A = 75.4 \text{ mi}^2$

**Example 2:** Using the appropriate formula(s), find what is asked. Round to tenth place.

- a.) What is the distance between the tips of the minute and the hour hand of a clock at 10:08 when the minute hand is 6 in long and the hour hand is 4 in long?

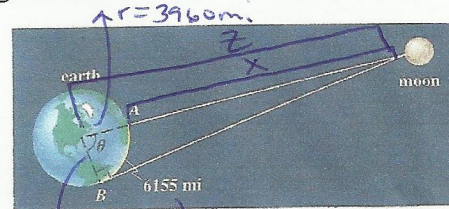


$$x^2 = 4^2 + 6^2 - 2(4)(6)\cos 108$$

$$\sqrt{x^2} = \sqrt{66.83281573}$$

$$x = 8.2 \text{ in}$$

- b.) What is the distance between point A and the moon given the radius of the earth 3,960 miles?



$$s = r\theta$$

$$6155 = 3960 \theta$$

$$\theta = \frac{6155}{3960} \times \frac{180}{\pi}$$

$$\theta = 89.1^\circ$$

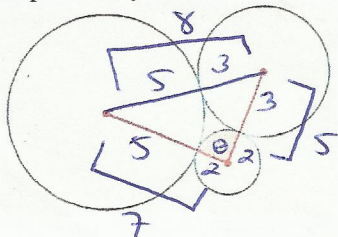
$$\cos 89.1 = \frac{3960}{z}$$

$$z = 25211.8 \text{ mi}$$

$$x = z - 3960$$

$$x = 24815.8 \text{ mi}$$

- c.) Three circles with radii of 2, 3, and 5 inches respectively. What is the area of the shaded region?



$$8^2 = 7^2 + 5^2 - 2(7)(5)\cos \theta$$

$$64 = 74 - 70\cos \theta$$

$$-10 = -70\cos \theta$$

$$\theta = \cos^{-1}\left(\frac{-10}{-70}\right)$$

$$\theta = 81.8^\circ$$

$$\theta = 81.8^\circ \times \frac{\pi}{180}$$

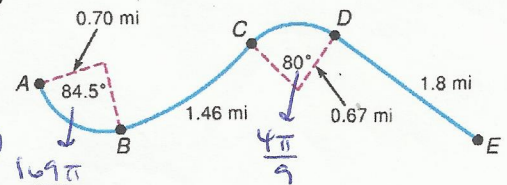
$$\theta = \frac{409\pi}{900}$$

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

$$A = \frac{1}{2} (2)^2 \left(\frac{409\pi}{900}\right)$$

$$A = 2.9 \text{ in}^2$$

- d.) The figure below shows a stretch of roadway where the curves are arcs of circles. What is the length of this stretch of road?



$$AB = r\theta$$

$$\widehat{AB} = .7\left(\frac{169\pi}{360}\right)$$

$$\widehat{AB} = 1.03 \text{ mi}$$

$$\widehat{CD} = r\theta$$

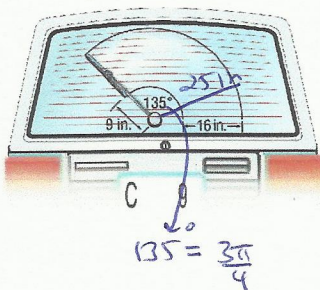
$$\widehat{CD} = .67\left(\frac{4\pi}{9}\right)$$

$$\widehat{CD} = .94 \text{ mi}$$

$$\text{length of road} = 1.02 + 1.46 + .94 + 1.8$$

$$= 5.2 \text{ miles}$$

- e.) What is the area swept by the rear windshield wiper?



$$\text{sector area entire space}$$

$$= A = \frac{1}{2} (25)^2 \left(\frac{3\pi}{4}\right)$$

$$A = 736.3 \text{ in}^2$$

$$\text{sector area of unwiped}$$

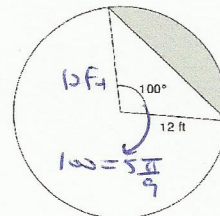
$$A = \frac{1}{2} (9)^2 \left(\frac{3\pi}{4}\right)$$

$$A = 95.4 \text{ in}^2$$

$$\text{Area swept} = 736.3 - 95.4$$

$$= 640.9 \text{ in}^2$$

- f.) What is the area of the shaded region?



$$\text{sector area} = \frac{1}{2} (12)^2 \left(\frac{5\pi}{9}\right)$$

$$A = 125.7 \text{ ft}^2$$

$$\Delta \text{ area} = \frac{1}{2} (12)(12) \sin 100$$

$$A = 70.9 \text{ ft}^2$$

$$\text{Area Shaded} = 125.7 - 70.9$$

$$= 54.8 \text{ ft}^2$$