Pre-Calculus Name: Date: Period:

Assignment 7A.1: Angles and Arcs

Answer the following problems with as much detail, explanation, and work that is appropriate.

1. Convert the angles in to degrees rounded to 3 decimal places
   a. $35°25'27''$

$$35 + \frac{25}{60} + \frac{27}{3600} \approx 35.424°$$

   b. $452°17'52''$

$$452 + \frac{17}{60} + \frac{52}{3600} \approx 452.298°$$

2. Convert these angles to degrees, minutes, and seconds. Round to the nearest second.
   a. $75.2365°$

$$.2365 \cdot 60 = 14.19'$$
$$.19 \cdot 60 = 11.4"$$
$$75°14'11"$$

   b. $-215.0456°$

$$.0456 \cdot 60 = 2.736'$$
$$.736 \cdot 60 = 44.16"$$
$$-215°2'44"$$

3. Find the angle between 0° and 360° that is co-terminal with the given angle. Show/explain how you do this.
   a. $872°$

$$872 - 2(360) = 152°$$

   b. -1746°

$$0 < -1746 + 360n < 360$$
$$n = 4$$
$$-1746 + 360(5) = 54°$$

4. On a circle of radius 7 feet, find the exact length of the arc that is intercepted by a central angle of 225°.

$$s = \frac{\pi(7)(225)}{180} = \frac{\pi(7)(5)}{4} = \frac{35\pi}{4} ft.$$

5. Find the distance along an arc on the surface of the Earth that subtends (is intercepted by) a central angle of 5 minutes (1 minute = 1/60 degree). The radius of the Earth is 3960 miles.

$$\theta = \left(\frac{5}{60}\right)° = \frac{1}{12}° \cdot \frac{\pi\ rad}{180°} = \frac{\pi}{2160} rad$$
$$s = r \cdot \theta = 3960\left(\frac{\pi}{2160}\right) \approx 5.77 miles$$

Assignment 7A.2: Angles and Arcs

Answer the following problems with as much detail, explanation, and work that is appropriate.

6. Find the angle between 0 and 2π in radians that is coterminal with these angles. Show/explain how you do this.

a. $\frac{15\pi}{4}$

$$0 < \frac{15\pi}{4} + 2\pi n < 2\pi$$
$$n = -2$$
$$\frac{15\pi}{4} - 4\pi = 7\pi$$

b. $-\frac{3\pi}{2}$

$$0 < -\frac{3\pi}{2} + 2\pi n < 2\pi$$
$$n = 1$$
$$-\frac{3\pi}{2} + 2\pi = \frac{\pi}{2}$$

7. Convert to radian Measure.

a) $-60°$

$$-60° \cdot \frac{\pi}{180°} = -\frac{\pi}{3}$$

b) $315°$

$$315° \cdot \frac{\pi}{180°} = 7 \cdot \frac{\pi}{4} = \frac{7\pi}{4}$$

c) $900°$

$$900 \cdot \frac{\pi}{180°} = 5\pi$$

8. Convert to Degrees.

a) $\frac{3\pi}{4}$

$$\frac{3\pi}{4}\cdot\frac{180°}{\pi}=\frac{3}{1}\cdot\frac{45}{1}$$
$$=135°$$

b) $-\frac{8\pi}{15}$

$$-\frac{8\pi}{15}\cdot\frac{180°}{\pi}=-\frac{8}{1}\cdot\frac{12}{1}$$
$$=-96°$$

c) $\frac{5\pi}{18}$

$$\frac{5\pi}{18}\cdot\frac{180°}{\pi}=\frac{5}{1}\cdot\frac{10}{1}$$
$$=50°$$

9. Find the length of an arc on a circle of radius 8cm that is intercepted by an angle of $\frac{\pi}{3}$ radians.

$$s=r\theta$$
$$s=8\cdot\frac{\pi}{3}=\frac{8\pi}{3}cm$$

10. An ant walks 18 feet around a circle with radius 3 feet. How many radians did it travel?

$$18=3\theta$$
$$\theta=\frac{18}{3}=6\,radians$$

11. A truck with 32-in.-diameter wheels is traveling at 60 mi/h. Find the angular speed of the wheels in rad/min. How many revolutions per minute do the wheels make?

$$\frac{60mi}{1hr}\cdot\frac{5280ft}{1mi}\cdot\frac{12in}{1ft}\cdot\frac{1rad}{16in}\cdot\frac{1rev}{2\pi rad}\cdot\frac{1hr}{60min}\approx 630.3RPM$$

12. A CD has diameter of 120 millimeters. When playing audio, the angular speed varies to keep the linear speed constant where the disc is being read. When reading along the outer edge of the disc, the angular speed is about 200 RPM (revolutions per minute). Find the linear speed.

$$\frac{200Rev}{1min}\cdot\frac{2\pi rad}{1rev}\cdot\frac{60mm}{1rad}=24000\pi\frac{mm}{min}\approx 75398.22\frac{mm}{min}$$