Worksheet 4.1 Precalculus w/ Trig Name Key
Period

1. Determine the quadrant in which each angle lies.

a) $\frac{14\pi}{9}$ IV b) 3.7 III c) $-115°$ III

On questions 2 and 3, the answers must be in the same units as given.

2. Determine a positive coterminal angle for each angle.

a) $\frac{3\pi}{4} + 2\pi = \frac{11\pi}{4}$ b) $-300° + 360° = 60°$

3. a. Find the complement of $\frac{\pi}{7}$. $\frac{\pi}{2} - \frac{\pi}{7} = \frac{7\pi}{14} - \frac{2\pi}{14} = \frac{5\pi}{14}$

b. Find the supplement of $\frac{1}{5}$ $\pi - \frac{1}{5} = \frac{5\pi}{5} - \frac{1}{5} = \frac{5\pi - 1}{5}$

4. Rewrite each angle in radian measure as a multiple of π.

a) $240°\left(\frac{\pi}{180°}\right) = \frac{4\pi}{3}$ b) $165°\left(\frac{\pi}{180°}\right) = \frac{11\pi}{12}$

5. Rewrite each angle in degree measure.

a) $\frac{4\pi}{3}\left(\frac{180°}{\pi}\right) = 240°$ b) $\frac{7\pi}{12}\left(\frac{180°}{\pi}\right) = 105°$

6. Find the radian measure of the central angle of a circle of radius 3 *cm* that intercepts an arc of length 7 *cm*.

$\theta = \frac{7\,cm}{3\,cm} = \frac{7}{3}\,rad$

7. Convert the angle measure to radians. Round to the nearest thousandth.

72.5° $72.5°\left(\frac{\pi}{180°}\right) = 1.265\,rad$

8. Convert from radians to degrees. Round to the nearest thousandth.

$\frac{7\pi}{13}\left(\frac{180°}{\pi}\right) =$ 96.923° or 96.923°

9. Find the length of the arc on a circle of radius 15 *inches* intercepted by a central angle 240°. Express your answer in terms of π.

$\frac{4\pi}{3} = \frac{s}{15 in}$ $\quad s = 20\pi$ inches ≈ 62.831 62.832

10. Find the distance between Fayetteville, with latitude 34° 30′ 52", and Kansas City, with latitude 39° 47′ 52". Assume Earth is a sphere of radius 4000 miles and the cities are on the same longitude (one city is due north of the other). Round to the nearest mile.

$\theta = 39°47'52" - 34°30"52" \approx 5.283^{\circ}\left(\frac{\pi}{180^{\circ}}\right) \approx .092211562$ rad.

$\theta = \frac{s}{r}$

$.092211562 = \frac{s}{4000 \text{ miles}}$

$368.846 \text{ mi.} \approx 369$ miles

11. A satellite in circular orbit 2000 kilometers above Earth makes one complete revolution every 120 minutes. What is its linear speed to the nearest thousandth of a kilometer per minute ? Assume the earth is a sphere with a radius of 6400 km.

$C = 2\pi(8400 \text{ km}) = 439.822 \frac{km}{min}$ OR $439.823 \frac{km}{min}$
$120 \text{ min} \qquad 120 \text{ min}$

$\frac{1 \text{ rev}}{120 \text{ min}}\left(\frac{2\pi \text{ rad}}{1 \text{ rev}}\right) = \frac{\pi}{60} \frac{\text{rad}}{\text{min}}$

Linear Speed = (Angular Speed)(radius)

LINEAR Speed $= \left(\frac{\pi}{60} \frac{rad}{min}\right)(8400 \text{ km})$

L.S $= 439.823 \frac{km}{min}$

12. A car is moving at a rate of 70 miles per hour, and the diameter of its wheel is 4 feet.

LINEAR Speed $= \frac{70 \text{ mi}}{1 \text{ hr}}\left(\frac{5280 \text{ ft}}{1 \text{ mi}}\right)\left(\frac{1 \text{ hr}}{60 \text{ min}}\right) = 6160 \frac{ft}{min}$ radius = 2 ft

a. Find the angular speed of the wheels in radians per minute. 5280 feet = 1 mile.

LINEAR SPEED = (ANGULAR SPEED)(RADIUS)

$6160 \frac{ft}{min} = (\text{ANG. SPEED})(2 ft)$

$3080 \frac{rad}{min} = \text{ANGULAR SPEED}$

b. Find the number of revolutions per minute the wheels are rotating. Round to the nearest revolution per minute.

$3080 \frac{rad}{min}\left(\frac{1 \text{ revolution}}{2\pi \text{ rad}}\right)$

$490 \frac{rev}{min}$