

Name _____

Date _____

Converting Angle Measurements 4.2 WSI

On the unit circle, the angles are given in degrees. Another way to measure an angle is with radians. π Radians = 180° . The two unit conversions are as follows:

radians to degrees	degrees to radians
$\frac{180^\circ}{\pi}$	$\frac{\pi}{180^\circ}$

Convert the angle from degrees to radians, leaving your answer as a fraction.

Example: 90° Simply multiply. $\frac{90^\circ}{1} \times \frac{\pi}{180^\circ} = \frac{90^\circ\pi}{180^\circ} = \frac{1}{2}\pi$

1. 310°

2. 150°

3. 30°

4. 420°

5. 120°

6. 350°

Convert from radians to degrees.

Example: $\frac{3}{2}\pi$ Simply multiply. $\frac{3}{2}\pi \times \frac{180^\circ}{\pi} = \frac{540^\circ}{2} = 270^\circ$

1. $\frac{5}{4}\pi$

2. 4π

3. $\frac{7}{6}\pi$

4. $\frac{1}{6}\pi$

5. $\frac{7}{4}\pi$

6. $\frac{9}{2}\pi$

2

Coterminal Angles

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Find two coterminal angles for each given angle.

1) -5°

2) 5°

3) 45°

4) -45°

5) $\frac{5\pi}{2}$

6) $-\pi$

7) $\frac{17\pi}{9}$

8) $\frac{13\pi}{18}$

State if the two given angles are coterminal or not.

9) $110^\circ, -250^\circ$

10) $125^\circ, -415^\circ$

11) $140^\circ, -220^\circ$

12) $160^\circ, -380^\circ$

13) $\frac{19\pi}{18}, -\frac{53\pi}{18}$

14) $\frac{35\pi}{36}, \frac{107\pi}{36}$

15) $\frac{41\pi}{36}, \frac{61\pi}{36}$

16) $\frac{5\pi}{4}, -\frac{3\pi}{4}$

Angles and Angle Measure

Date _____ Period _____

Convert each degree measure into radians and each radian measure into degrees.

1) 325°

2) 60°

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

4) $\frac{23\pi}{12}$

5) 570°

6) -315°

Convert each decimal degree measure into degrees-minutes-seconds and each degrees-minutes-seconds into decimal degrees.

7) 128.77°

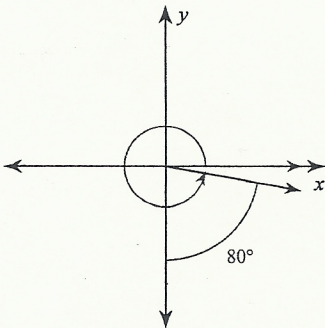
8) $232^\circ 7' 57''$

9) $-154^\circ 47' 42''$

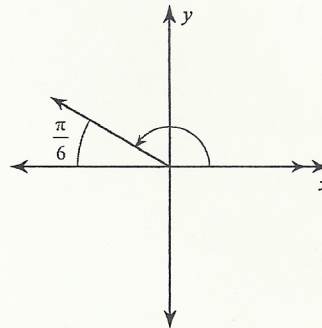
10) -0.9225°

Find the measure of each angle.

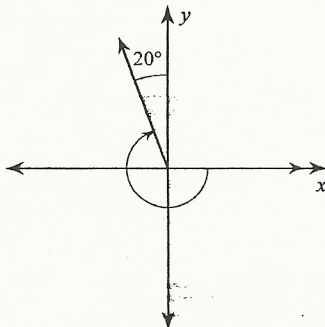
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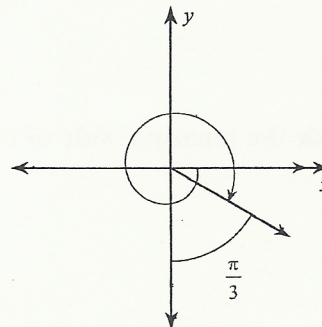
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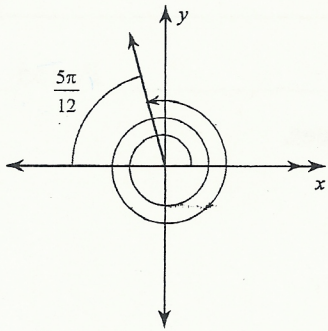
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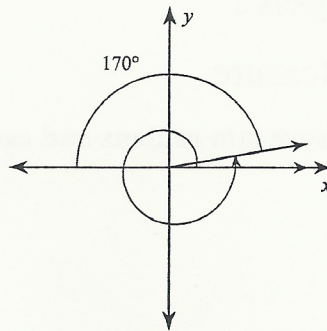
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15)

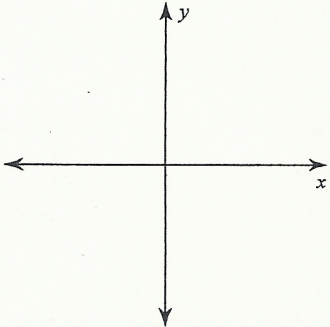


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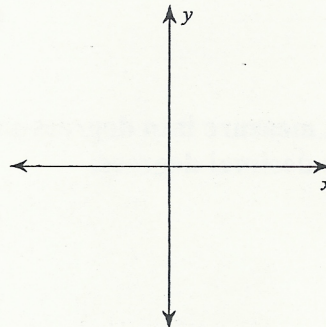


Draw an angle with the given measure in standard position.

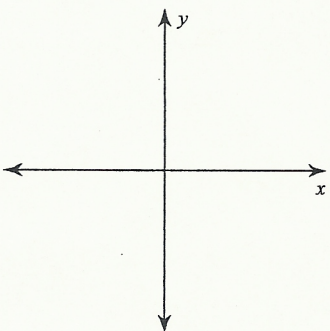
17) 280°



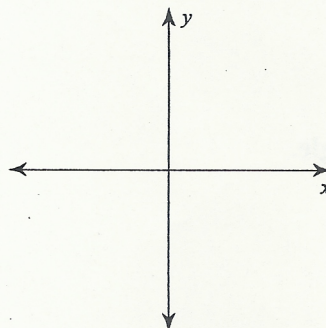
18) 710°



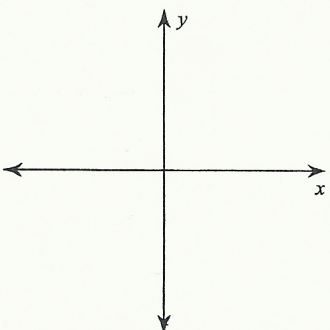
19) -120°



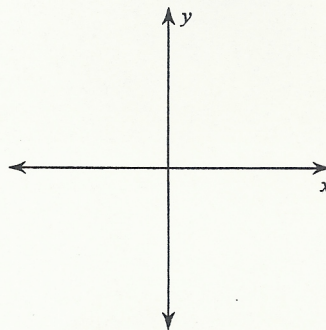
20) $\frac{11\pi}{6}$



21) $-\frac{10\pi}{3}$



22) 440°



State the quadrant in which the terminal side of each angle lies.

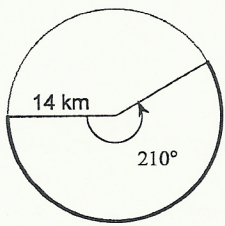
23) -509°

24) $-\frac{5\pi}{6}$

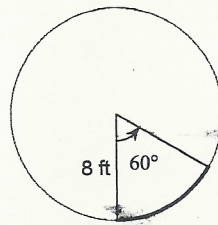
4-2 Arc Length and Area of Sector

Find the length of each arc.

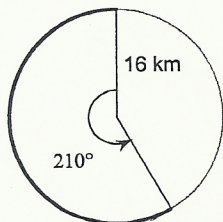
1)



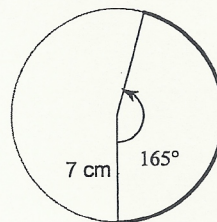
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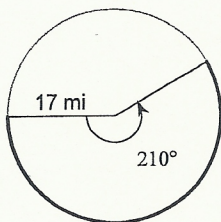
3)



4)



5)



6) $r = 6 \text{ mi}, \theta = \frac{\pi}{3}$

7) $r = 14 \text{ cm}, \theta = \frac{5\pi}{4}$

8) $r = 14 \text{ ft}, \theta = \frac{\pi}{3}$

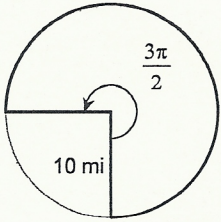
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9) $r = 12$ in, $\theta = \frac{3\pi}{2}$

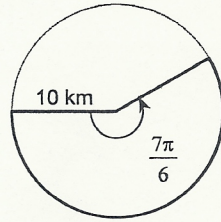
10) $r = 14$ yd, $\theta = \frac{\pi}{4}$

Find the area of each sector.

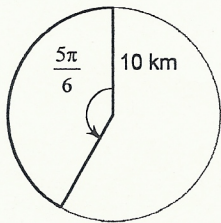
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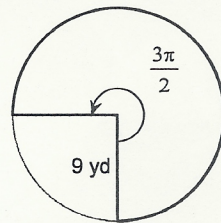
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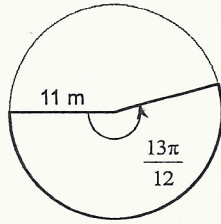
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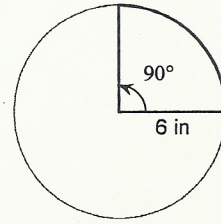
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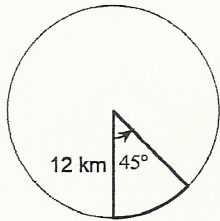
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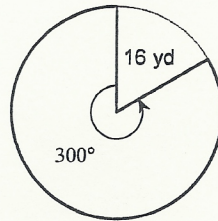
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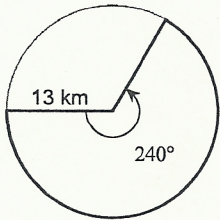
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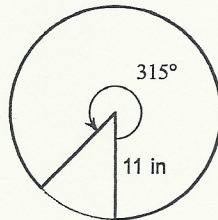
18)



19)



20)



21) $r = 8 \text{ m}, \theta = 150^\circ$

22) $r = 12 \text{ ft}, \theta = 270^\circ$

23) $r = 15 \text{ ft}, \theta = 270^\circ$

24) $r = 9 \text{ ft}, \theta = 105^\circ$

25) $r = 9 \text{ m}, \theta = 90^\circ$

ADVANCED PRECALCULUS

4-2 WS 2

$$\frac{? \text{ miles}}{1 \text{ hr}} = \frac{? \text{ rev.}}{1 \text{ min.}} \times \frac{2\pi \text{ rad}}{1 \text{ rev.}} \times \frac{? \text{ in}}{1 \text{ radius}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1 \text{ mi.}}{5280 \text{ ft}} \times \frac{60 \text{ min}}{1 \text{ hr}}$$

1.) The wheels on a racing bicycle have a radius of 13 in. How fast is the cyclist traveling in miles per hour, if the wheels are turning at 300 rpm?

2.) A Merry-Go-Round at a local park has a radius of 56 in., and is rotating at a rate of $\frac{3}{4}$ revolutions per SECOND. How fast in miles per hour is little Johnny traveling, if he is sitting on the out edge of the Merry-Go-Round?

3.) 2012 Olympics gold medalist Mariana Pajon races on a BMX bike with 10-in.-radius wheels. When he is traveling at a speed of 16.5 mph, how many revolutions per minute are her wheels making?

4.) The city of Pittsburgh, PA is directly north of West Palm Beach, FL. Pittsburgh is at 40.3° North latitude, while West Palm Beach is at 26.4° North latitude. Assuming the Earth has a radius of 3960 miles, how far apart are these cities?

9

Arc Length, Sector Area, Linear & Angular Velocity WORD PROBLEMS

- 1) A clock has a pendulum 22 cm long. If it swings through an angle of 32° , how far does the bottom of the bob travel in one swing?
- 2) An electrical wind generator has propeller blades that are 5.00 meters long. If the blades are rotating at 8π rad/sec, what is the linear velocity (to the nearest meter per second) of a point on the tip of one of the blades?
- 3) A particular man, when standing straight up and facing forward, can swing a leg through an angle of $\frac{2\pi}{3}$ radian. Find the length of the arc (to the nearest cm) his heel traces out for one complete swing of the leg. The length of his leg from the pivot point in his hip to the bottom of his heel is 102 cm while his leg is kept straight and his foot is kept at right angles to his leg.
- 4) You are working at a pizza delivery store and someone calls in a special order. They want a large pizza (15 inches in diameter) but only want $\frac{1}{10}$ of the pizza to have pepperoni. What is the area of the slice of pizza that will have pepperoni?
- 5) Rotation of a drive wheel with radius 26 mm causes a shaft with radius 12 mm to rotate. If the drive wheel completes 3 revolutions, how many revolutions will the shaft complete? Through how many radians will the shaft turn? Compute answers to one decimal place.
- 6) A bicycle has a front wheel with a diameter of 24 cm and a back wheel with a diameter of 60 cm. Through what angle does the front wheel turn if the back wheel turns through 12 radians?
- 7) The 25,000 pound Hubble space telescope was launched April 1990 and placed in a 380 mile circular orbit above the earth's surface. It completes one orbit every 97 minutes, going from a dawn-to-dusk cycle nearly 15 times a day. If the radius of the earth is 3964 miles, what is the linear velocity of the space telescope in miles per hour?
- 8) If the bob on the bottom of the 22 cm pendulum traces a 9.5 cm arc on each swing, through what angle (in degrees) does the pendulum rotate on each swing?
- 9) The velocity of sound in air is approximately 335.3 m/sec. If an airplane has a 3000 meter diameter propeller, at what angular velocity will its tip pass through the sound barrier?
- 10) Two circular shelves, 28 inches in diameter, have a "cut-out" portion of 90° . Approximately how much shelf paper is needed to cover both shelves (rounded to the nearest square inch)?