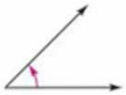
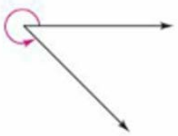
Vocabulary: Fill in the blanks.

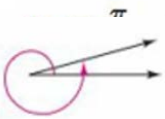
Write out the entire statement.

1. Two angles that have the same initial and terminal sides are _____.
2. One _____ is the measure of a central angle that intercepts an arc equal to the radius of the circle.
3. Two positive angles that have a sum of $\pi/2$ are _____ angles, whereas two positive angles that have a sum of π are _____ angles.
4. The angle measure that is equivalent to a rotation of $\frac{1}{360}$ of a complete revolution about an angle's vertex is one _____.
5. The _____ speed of a particle is the ratio of the arc length to the time traveled, and the _____ speed of a particle is the ratio of the central angle to the time traveled.
6. The area A of a sector of a circle with radius r and central angle θ, where θ is measured in radians, is given by the formula _____.

Estimating an Angle **In Exercises 7–10, estima angle to the nearest one-half radian.**

7. 

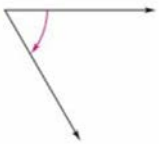
8. 

10. 

Estimating an Angle **In Exercises 21–24, estimate the number of degrees in the angle.**

21. 

22. 

23. 

Converting from Degrees to Radians **In Exercises 35 and 36, rewrite each angle in radian measure as a multiple of π. (Do not use a calculator.)**

35. (a) $120°$ (b) $-20°$
36. (a) $-60°$ (b) $144°$

Converting from Degrees to Radians **In Exercises 39–42, convert the angle measure from degrees to radians. Round to three decimal places.**

41. $0.54°$ 42. $345°$

Converting from Radians to Degrees **In Exercises 43–46, convert the angle measure from radians to degrees. Round to three decimal places.**

43. $\frac{5\pi}{11}$ 44. $\frac{15\pi}{8}$ 45. -4.2π

Determining Quadrants **In Exercises 11 and 12, determine the quadrant in which each angle lies.**

(b) $\frac{5\pi}{4}$

12. (a) $-\frac{\pi}{6}$ (b) $-\frac{11\pi}{9}$

Angles **In Exercises 13 and 14, sketch each angle in standard position.**

13. (a) $\frac{\pi}{3}$ (b) $-\frac{2\pi}{3}$ 14. (a) $\frac{5\pi}{2}$ (b) 4

Finding Coterminal Angles **In Exercises 15 and 16, determine two coterminal angles (one positive and one negative) for each angle. Give your answers in radians.**

16. (a) $\frac{2\pi}{3}$ (b) $-\frac{9\pi}{4}$

Complementary and Supplementary Angles **In Exercises 17–20, find (if possible) the complement and the supplement of each angle.**

17. (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ 18. (a) $\frac{\pi}{12}$ (b) $\frac{11\pi}{12}$
19. (a) 1 (b) 2 20. (a) 3 (b) 1.5

Converting from Radians to Degrees **In Exercises 37 and 38, rewrite each angle in degree measure. (Do not use a calculator.)**

37. (a) $\frac{3\pi}{2}$ (b) $\frac{7\pi}{6}$ 38. (a) $-\frac{7\pi}{12}$ (b) $\frac{5\pi}{4}$

Finding Arc Length **In Exercises 51 and 52, find the length of the arc on a circle of radius r intercepted by a central angle θ.**

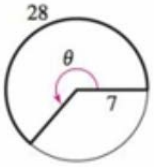
51. $r = 15$ inches, $\theta = 120°$ 52. $r = 3$ meters, $\theta = 150°$

Finding the Central Angle **In Exercises 53 and 54, find the radian measure of the central angle of a circle of radius r that intercepts an arc of length s.**

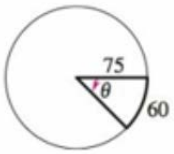
53. $r = 80$ kilometers, $s = 150$ kilometers
54. $r = 14$ feet, $s = 8$ feet

Finding an Angle **In Exercises 55 and 56, use the given arc length and radius to find the angle θ (in radians).**

55.



56.



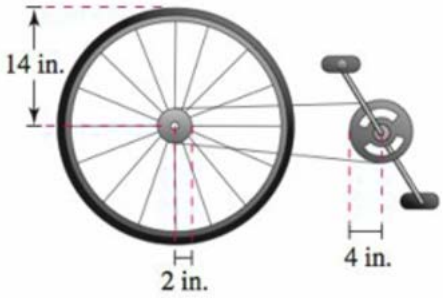
66. Angular Speed A car is moving at a rate of 65 miles per hour, and the diameter of its wheels is 2 feet.

(a) Find the number of revolutions per minute the wheels are rotating.

(b) Find the angular speed of the wheels in radians per minute.

68. Speed of a Bicycle

The radii of the pedal sprocket, the wheel sprocket, and the wheel of the bicycle in the figure are 4 inches, 2 inches, and 14 inches, respectively. A cyclist is pedaling at a rate of 1 revolution per second.



(a) Find the speed of the bicycle in feet per second and miles per hour.

(b) Use your result from part (a) to write a function for the distance d (in miles) a cyclist travels in terms of the number n of revolutions of the pedal sprocket.

(c) Write a function for the distance d (in miles) a cyclist travels in terms of the time t (in seconds). Compare this function with the function from part (b).