

CHAPTER 3 TEST

Draw each of the following angles in standard position and then name the reference angle:

- | | |
|--------------------|------------------|
| 1. 235° | 2. 117.8° |
| 3. $410^\circ 20'$ | 4. -225° |

Use a calculator to find each of the following:

- | | |
|--------------------------|--------------------------|
| 5. $\cot 320^\circ$ | 6. $\cot (-25^\circ)$ |
| 7. $\csc (-236.7^\circ)$ | 8. $\sec 322.3^\circ$ |
| 9. $\sec 140^\circ 20'$ | 10. $\csc 188^\circ 50'$ |

Use a calculator to find θ , to the nearest tenth of a degree, if θ is between 0° and 360° and

- | | |
|--|---|
| 11. $\sin \theta = 0.1045$ with θ in QII | 12. $\cos \theta = -0.4772$ with θ in QIII |
| 13. $\cot \theta = 0.9659$ with θ in QIII | 14. $\sec \theta = 1.545$ with θ in QIV |

Give the exact value of each of the following:

- | | |
|----------------------|----------------------|
| 15. $\sin 225^\circ$ | 16. $\cos 135^\circ$ |
| 17. $\tan 330^\circ$ | 18. $\sec 390^\circ$ |

Convert each of the following to radian measure. Write each answer as an exact value.

- | | |
|-----------------|------------------|
| 19. 250° | 20. -390° |
|-----------------|------------------|

Convert each of the following to degree measure:

- | | |
|--------------|---------------|
| 21. $4\pi/3$ | 22. $7\pi/12$ |
|--------------|---------------|

Give the exact value of each of the following:

- | | |
|---|---|
| 23. $\sin \frac{2\pi}{3}$ | 24. $\cos \frac{2\pi}{3}$ |
| 25. $4 \cos \left(-\frac{3\pi}{4}\right)$ | 26. $2 \cos \left(-\frac{5\pi}{3}\right)$ |
| 27. $\sec \frac{5\pi}{6}$ | 28. $\csc \frac{5\pi}{6}$ |

29. Evaluate $2 \cos \left(3x - \frac{\pi}{2}\right)$ when x is $\frac{\pi}{3}$.

30. Evaluate $4 \sin \left(2x + \frac{\pi}{4}\right)$ when x is $\frac{\pi}{4}$.

31. Show that cotangent is an odd function.

32. Prove the identity $\sin(-\theta) \sec(-\theta) \cot(-\theta) = 1$.

For Problems 33 and 34, θ is a central angle in a circle of radius r . In each case, find the length of arc s cut off by θ to the nearest hundredth.

33. $\theta = \pi/6$, $r = 12$ m

34. $\theta = 60^\circ$, $r = 6$ ft

In Problems 35 and 36, θ is a central angle that cuts off an arc of length s . In each case, find the radius of the circle.

35. $\theta = \pi/4$, $s = \pi$ cm

36. $\theta = 2\pi/3$, $s = \pi/4$ cm

Find the area of the sector formed by central angle θ in a circle of radius r if

37. $\theta = 90^\circ$, $r = 4$ inches

38. $\theta = 2.4$, $r = 3$ cm

39. **Arc Length** The minute hand of a clock is 2 centimeters long. How far does the tip of the minute hand travel in 30 minutes?

40. **Distance** A boy is twirling a model airplane on a string 5 feet long. If he twirls the plane at 0.5 revolutions per minute, how far does the plane travel in 2 minutes?

41. **Area of a Sector** A central angle of 4 radians cuts off an arc of length 8 inches. Find the area of the sector formed.

Find the distance s covered by a point moving with linear velocity v for a time t if

42. $v = 30$ ft/sec and $t = 3$ sec

43. $v = 66$ ft/sec and $t = 1$ min

In the problems that follow, point P moves with angular velocity ω on a circle of radius r . In each case, find the distance s traveled by the point in time t .

44. $\omega = 4$ rad/sec, $r = 3$ inches, $t = 6$ sec

45. $\omega = 3\pi/4$ rad/sec, $r = 8$ ft, $t = 20$ sec

For Problems 46 and 47, find the angular velocity, in radians per minute, associated with the given revolutions per minute.

46. 6 rpm

47. 2 rpm

For each problem below, a point is rotating with uniform circular motion on a circle of radius r .

48. Find ω if $r = 10$ cm and $v = 5$ cm/sec.

49. Find ω if $r = 3$ cm and $v = 5$ cm/sec.

50. Find v if $r = 2$ ft and the point rotates at 20 rpm.

51. Find v if $r = 1$ ft and the point rotates at 10 rpm.

52. **Angular Velocity** A belt connects a pulley of radius 8 centimeters to a pulley of radius 6 centimeters. Each point on the belt is traveling at 24 centimeters per second. Find the angular velocity of each pulley (Figure 1).

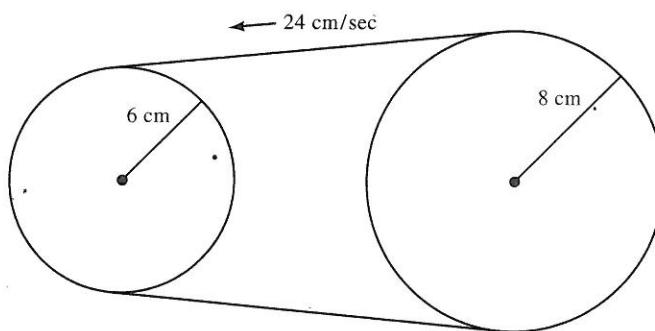


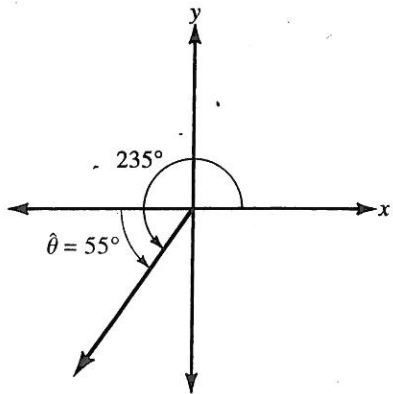
Figure 1

53. **Linear Velocity** A propeller with radius 1.50 feet is rotating at 900 revolutions per minute. Find the linear velocity of the tip of the propeller. Give the exact value and an approximation to three significant digits.

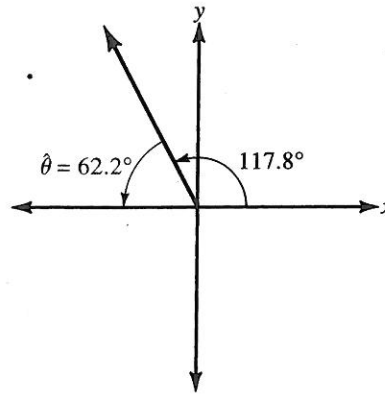
54. **Velocity of a Diskette** A $3\frac{1}{2}$ -inch diskette, when placed in the disk drive of a computer, rotates at 300 revolutions per minute. Find the linear velocity of a point 1.5 inches from the center of the diskette.

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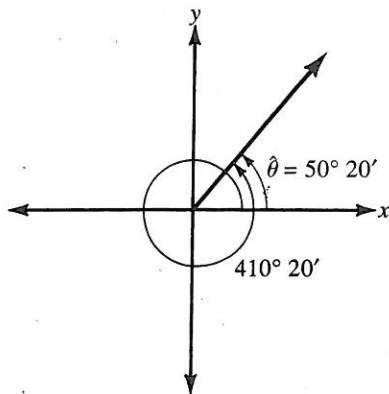
1.



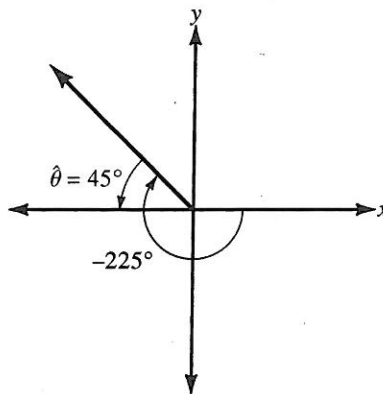
2.



3.



4.



5. -1.1918 6. -2.1445 7. 1.1964 8. 1.2639 9. -1.2991 10. -6.5121 11. 174.0° 12. 241.5°

13. 226.0° 14. 310.3° 15. $-\frac{1}{\sqrt{2}}$ 16. $-\frac{1}{\sqrt{2}}$ 17. $-\frac{1}{\sqrt{3}}$ 18. $\frac{2}{\sqrt{3}}$ 19. $\frac{25\pi}{18}$ 20. $-\frac{13\pi}{6}$

21. 240° 22. 105° 23. $\frac{\sqrt{3}}{2}$ 24. $-\frac{1}{2}$ 25. $-2\sqrt{2}$ 26. 1 27. $-\frac{2}{\sqrt{3}}$ 28. 2 29. 0 30. $2\sqrt{2}$

31. Begin by writing $\cot(-\theta) = \frac{\cos(-\theta)}{\sin(-\theta)}$ 32. First use odd and even functions to write everything in terms of θ instead

of $-\theta$. 33. $2\pi \text{ m} \approx 6.28 \text{ m}$ 34. $2\pi \text{ ft} \approx 6.28 \text{ ft}$ 35. 4 cm 36. 0.375 cm 37. $4\pi \text{ inches}^2 \approx 12.6 \text{ inches}^2$

38. 10.8 cm^2 39. $2\pi \text{ cm} \approx 6.28 \text{ cm}$ 40. $10\pi \text{ ft} \approx 31.4 \text{ ft}$ 41. 8 inches^2 42. 90 ft 43. $3,960 \text{ ft}$ 44. 72 inches

45. $120\pi \text{ ft} \approx 377 \text{ ft}$ 46. $12\pi \text{ rad/min} \approx 37.7 \text{ rad/min}$ 47. $4\pi \text{ rad/min} \approx 12.6 \text{ rad/min}$ 48. 0.5 rad/sec

49. $\frac{5}{3} \text{ rad/sec}$ 50. $80\pi \text{ ft/min} \approx 251 \text{ ft/min}$ 51. $20\pi \text{ ft/min} \approx 62.8 \text{ ft/min}$ 52. 4 rad/sec for the 6-cm pulley and

3 rad/sec for the 8-cm pulley 53. $2,700\pi \text{ ft/min} \approx 8,480 \text{ ft/min}$ 54. $900\pi \text{ inches/min} \approx 2,830 \text{ inches/min}$

55. 17.5 mi/hr , 26.2 mi/hr 56. 22.0 rpm 57. 41.6 km/hr