Name ______________________ Date ____________ Class ____________

LESSON 10-3

Practice B

The Unit Circle

Convert each measure from degrees to radians or from radians to degrees.

1. $\frac{5\pi}{12}$ ____________
2. 215° ____________
3. $-\frac{29\pi}{18}$ ____________
4. –180° ____________
5. $\frac{5\pi}{3}$ ____________
6. $-\frac{7\pi}{6}$ ____________
7. 400° ____________
8. $\frac{3\pi}{10}$ ____________
9. 35° ____________

Use the unit circle to find the exact value of each trigonometric function.

10. $\cos\frac{2\pi}{3}$ ____________
11. $\tan\frac{5\pi}{4}$ ____________
12. $\tan\frac{5\pi}{6}$ ____________
13. sin 315° ____________
14. cos 225° ____________
15. tan 60° ____________

Use a reference angle to find the exact value of the sine, cosine, and tangent of each angle.

16. 150° ____________
17. –225° ____________
18. –300° ____________
19. $\frac{11\pi}{6}$ ____________
20. $-\frac{2\pi}{3}$ ____________
21. $\frac{5\pi}{4}$ ____________

Solve.

22. San Antonio, Texas, is located about 30° north of the equator. If Earth's radius is about 3959 miles, approximately how many miles is San Antonio from the equator?

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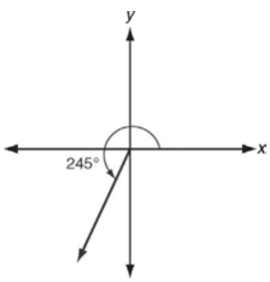
Problem Solving

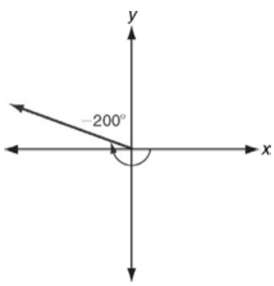
1. 180°
2. 60°
3. a. $\frac{330}{360} \times 60$ min
   b. 55 min
   c. 25 min
   d. 150°
4. a. 2 h 20 min
   b. $2\frac{1}{3}$
   c. 60°
5. a. $\tan\theta = \frac{3}{2}$
   b. 2.2 km
6. A
7. J

Reading Strategy

1. Possible answer: The angle is positive and measures between 180° and 270°.
2. Possible answer: The angle is negative and measures between –270° and –360°.
3. a.



   b. –115°
   c. 65°
4. a.



   b. 160°
   c. 20°
5. Yes; because you can find coterminal angles by either adding 360° to or subtracting 360° from the measure of the angle
6. Yes; because by definition, reference angles are the measure of the positive acute angle made by the terminal side of an angle and the *x*-axis.

10-3 THE UNIT CIRCLE

Practice A

1. $\frac{\pi}{3}$ radians
2. –72°
3. 150°
4. $\frac{7\pi}{4}$ radians
5. –135°
6. $-\frac{7\pi}{12}$ radians
7. 240°
8. –30°
9. $\frac{5\pi}{3}$ radians
10. $-\frac{\pi}{18}$ radians
11. 320°
12. a. $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ b. $\frac{\sqrt{3}}{2}$
13. $\frac{1}{2}$
14. 1
15. 0
16. $-\frac{1}{2}$
17. $-\frac{\sqrt{3}}{2}$
18. $\sqrt{3}$
19. 628 ft

Practice B

1. 75°
2. $\frac{43\pi}{36}$ radians
3. –290°
4. $-\pi$ radians
5. 300°
6. 210°
7. $\frac{20\pi}{9}$ radians
8. 54°
9. $\frac{7\pi}{36}$ radians
10. $-\frac{1}{2}$
11. 1
12. $-\frac{\sqrt{3}}{3}$
13. $-\frac{\sqrt{2}}{2}$
14. $-\frac{\sqrt{2}}{2}$

15. $\sqrt{3}$

16. $\frac{1}{2}; -\frac{\sqrt{3}}{2}; -\frac{\sqrt{3}}{3}$

17. $\frac{\sqrt{2}}{2}; -\frac{\sqrt{2}}{2}; -1$

18. $\frac{\sqrt{3}}{2}; \frac{1}{2}; \sqrt{3}$

19. $-\frac{1}{2}; \frac{\sqrt{3}}{2}; -\frac{\sqrt{3}}{3}$

20. $-\frac{\sqrt{3}}{2}; -\frac{1}{2}; \sqrt{3}$

21. $-\frac{\sqrt{2}}{2}; -\frac{\sqrt{2}}{2}; 1$

22. 2073 mi

Practice C

1. –270°
2. $\frac{5\pi}{2}$ radians
3. 50°
4. $-\frac{10\pi}{9}$ radians
5. 315°
6. –330°
7. $\frac{35\pi}{18}$ radians
8. 63°
9. $\frac{\pi}{15}$ radians
10. 234°
11. $\frac{37\pi}{30}$ radians
12. $-\frac{7\pi}{12}$ radians
13. $-\frac{1}{2}; \frac{\sqrt{3}}{2}; -\frac{\sqrt{3}}{3}$
14. $-\frac{\sqrt{2}}{2}; \frac{\sqrt{2}}{2}; -1$
15. $-\frac{\sqrt{3}}{2}; -\frac{1}{2}; \sqrt{3}$
16. $\frac{1}{2}; -\frac{\sqrt{3}}{2}; -\frac{\sqrt{3}}{3}$
17. $-\frac{\sqrt{2}}{2}; -\frac{\sqrt{2}}{2}; 1$
18. $\frac{\sqrt{3}}{2}; -\frac{1}{2}; -\sqrt{3}$
19. $\frac{\sqrt{2}}{2}; \frac{\sqrt{2}}{2}; 1$
20. 0; –1; 0
21. $-\frac{1}{2}; -\frac{\sqrt{3}}{2}; -\frac{\sqrt{3}}{3}$
22. $-\frac{\sqrt{2}}{2}; \frac{\sqrt{2}}{2}; -1$
23. $-\frac{\sqrt{3}}{2}; \frac{1}{2}; -\sqrt{3}$
24. $\frac{\sqrt{2}}{2}; -\frac{\sqrt{2}}{2}; -1$
25. 138 ft

Reteach

1. $-\frac{\pi}{4}$ radians
2. $\frac{5\pi}{6}$ radians
3. $\frac{7\pi}{6}$ radians
4. $-\frac{2\pi}{3}$ radians
5. 240°
6. –270°
7. 30°
8. 300°
9. 45°
10. $\sin 45° = \frac{\sqrt{2}}{2}$
    $\cos 45° = \frac{\sqrt{2}}{2}$
    $\tan 45° = 1$
11. $\sin 315° = -\frac{\sqrt{2}}{2}$
    $\cos 315° = \frac{\sqrt{2}}{2}$
    $\tan 315° = -1$

Challenge

1. 6080 ft
2. 1,600,921 mi; 66,705 mi/h
3. Area of circle = πr^2; A sector whose central angle has a measure of θ radians has an area of $\frac{\theta}{2\pi}$ times the area of the circle. So Area of sector $= \frac{\theta}{2\pi}\left(\pi r^2\right) = \frac{1}{2}\theta r^2$.
4. $\frac{\pi}{4}$

Problem Solving

1. a. $r = \frac{\pi}{2}$
   b. $\theta = \frac{2\pi}{6}$ or $\frac{\pi}{3}$
   c. $S = r\theta = \frac{\pi}{2} \cdot \frac{\pi}{3} = \frac{\pi^2}{6}$
   d. 1.64 in.
   e. Yes; possible answer: because the arc length of the fragment is very close to the arc length that would be expected for a plate of diameter π
2. $\frac{1}{4}$
3. C
4. H
5. B
6. F

Reading Strategy

1. 2π
2. 0