6.1

1. Convert \(-\frac{\pi}{12}\) to degrees.

2. Convert 225° to radians.

3. Find the radius of a sector whose central angle is \(\frac{2\pi}{3}\) and has an arc length of \(\pi\) cm.

4. Find the area of a sector with central angle 75° and an arc length of 12π meters.

5. Convert 30 rpm (revolutions per minute) to radians per minute.

6. A bicycle wheel has a radius of 18 inches. If the bicycle wheel is rotating at 80 rpm, approximately how far does the cyclist travel in one hour?

7. Wheels are turning at \(\frac{100}{\pi}\) rev/sec when traveling at 80 ft/sec. What is the diameter of the wheel?

6.2

8. Be able to find the reference angle:
   a) \(-\frac{5}{6}\pi\), b) 495°, c) \(\frac{8\pi}{3}\)

9. Be able to find the exact value of:
   a) \(\sin\left(-\frac{5}{6}\pi\right)\), b) \(\cos\left(495^\circ\right)\), c) \(\tan\left(\frac{8\pi}{3}\right)\)

10. Given \(\theta\) is in quadrant IV and sec \(\theta = \frac{3}{\sqrt{5}}\), find cot \(\theta\)

11. Given cot \(\theta = \frac{2}{5}\), sin \(\theta < 0\), find cos \(\theta\)

12. Find an angle coterminal with:
    a) \(-60^\circ\)
    b) \(\frac{7\pi}{6}\)

13. Find the six trigonometric functions of \(\beta\) for the following figure:

14. Find cot 249°

15. Find sec 105°

16. Express \(\cos\left(\frac{3\pi}{7}\right)\) as a trigonometric function of angle \(\alpha\) where \(0 < \alpha < \frac{\pi}{4}\)

17. The angle of elevation to the top of the flagpole is 18°. If the person is six ft tall, and is standing 200 yds from the base of the flagpole, how tall is the flagpole?

18. A regular hexagon is inscribed in a circle of radius 12 cm. Find the area of the hexagon.

19. Standing on the balcony 120 feet above street level, Jim spots two restaurants directly ahead. The Pizza Palace is observed at 23° angle of depression and The Twelfth Man is located at an 18° angle of depression. How far apart are these two shops?

20. A multistage rocket is launched vertically so that its average velocity for the first 43 seconds is 1675 mi/hr at which time the first stage separates. If a photographer is situated 1.2 miles from the launch site, at what angle of elevation should the photographer aim the camera to photograph the separation?

21. A pilot takes off at sea level at a 15° angle traveling at a constant rate of 180 ft/sec. How long will it take to reach an altitude of 1 mile?

6.4

22. Factor: \(2\csc^2\theta - 5\csc\theta - 3\)

23. Add: \(\frac{\cos\theta}{2\sin\theta} + \frac{2\sin\theta}{\cos\theta}\)

24. Simplify: \(\frac{9 - \cos^2\theta}{6 + 7\cos\theta - 3\cos^2\theta}\)

25. Express \(x\) in terms of \(\sin\theta\)

26. Convert \(\frac{2x}{x^2 + 4}\) into a trigonometric expression.

ANSWERS:
1. \(-15^\circ\)
2. \(\frac{5}{4}\pi\) radians
3. \( \frac{3}{2} \) cm.

4. \( 172.8\pi \approx 542.8 \text{ m}^2 \)

5. \( 60\pi \text{ radians/min} \)

6. 8.6 miles

7. \( \frac{4}{5} \) ft.

8. a) \( \frac{\pi}{6} \), b) \( 45^\circ \), c) \( \frac{\pi}{3} \)

9. a) \( \frac{1}{2} \), b) \( -\frac{\sqrt{2}}{2} \), c) \( -\sqrt{3} \)

10. \( -\frac{\sqrt{5}}{2} \)

11. \( -\frac{2}{\sqrt{29}} \)

12. a) \( 300^\circ \), b) \( -\frac{5}{6}\pi \)

13. \( \sin \beta = \frac{5}{13} \)
   
   \( \cos \beta = \frac{12}{13} \)
   
   \( \tan \beta = \frac{5}{12} \)
   
   \( \csc \beta = \frac{13}{5} \)
   
   \( \sec \beta = \frac{13}{12} \)
   
   \( \cot \beta = \frac{12}{5} \)

14. .3839

15. \( -3.8637 \)

16. \( \sin \frac{\pi}{14} \)

17. 67 yds or 201 feet

18. \( 216\sqrt{3} \text{ cm}^2 \)

19. 87 feet

20. 86.6°

21. 1.9 minutes

22. \((2 \csc \theta + 1)(\csc \theta - 3)\)

23. \( \frac{\cos^2 \theta + 4 \sin^2 \theta}{2 \sin \theta \cos \theta} \)

24. \( \frac{3 + \cos \theta}{2 + 3 \cos \theta} \)

25. \( x = 2 \sin \theta \)

26. \( \cos \theta \cdot \sin \theta \)