Trigonometry Review

Angles in Degrees and Radians.

1. Convert $\theta = 140^\circ$ to radians.
2. Convert $\theta = -10^\circ$ to radians.
3. Convert $\theta = 17\pi/12$ to degrees.
4. Convert $\theta = 7\pi/5$ to degrees.
5. Use your calculator to convert 4 radians to degrees. What quadrant is this angle in?
6. Find the smallest positive angle which is coterminal with $\theta = 1100^\circ$.
7. Find the smallest positive angle (in radians) which is coterminal with $\theta = -27\pi/4$.
8. Find $\theta_1$ and $\theta_2$ in radians, assuming both angles are between 0 and $2\pi$.

Arclength and Sector Area.

11. Find the arclength $S$ and the area $A$ of the wedge. Give both an exact answer and a calculator approximation.

12. Suppose a wedge shaped area (like the above) has $A = 100$ in$^2$ and $S = 10$ in. Find $\theta$ and $r$.

13. A large pizza has a diameter of 12 inches and is cut into eight slices of equal size. What is the area of one of the slices?

Trig Functions on Right Triangles.

14. Find $\cos \theta$, $\sin \theta$ and $\tan \theta$ for the triangle shown:

15. Find $\sec \theta$, $\csc \theta$ and $\cot \theta$ for the triangle shown:

16. If $\theta$ is an acute angle such that $\sin \theta = 3/4$, what is $\cos \theta$?
17. If $\theta$ is an acute angle such that $\tan \theta = 5/2$, what is $\sec \theta$?
18. If $\theta$ is an acute angle such that $\csc \theta = 3$, what is $\sec \theta$?
Applications.

19. A 30 ft tall tree has a shadow which is 46 ft long. What is the angle of elevation of the sun?

20. The top of a 10 ft ladder rests against the top of a 7 foot high wall. What is the angle between the ladder and the ground?

21. An isosceles triangle has sides of length 4, 4 and 2 inches. Find the interior angles of the triangle.

22. 80 feet from the base of a radio tower, the angle between the ground and the top of the tower is $37^\circ$. Find the height of the radio tower.

23. A 40 ft radio antenna is located on the top of a building. 260 feet from the building, the angle between the bottom of the antenna and the top is $13^\circ$. Find the height of the building.

24. If $\sin \theta > 0$ and $\cos \theta < 0$, which quadrant is $\theta$ in?

25. If $\sin \theta < 0$ and $\cot \theta < 0$, which quadrant is $\theta$ in?

26. If $\sec \theta < 0$ and $\tan \theta > 0$, which quadrant is $\theta$ in?

27. Suppose $\theta$ is an angle in standard position, and the terminal side of $\theta$ passes through the point $(2, -5)$. What are the exact values for the six trig functions?

28. Suppose $\theta$ is an angle in quadrant III such that $\sin \theta = -\frac{3}{8}$. What are the exact values for $\cos \theta$ and $\sin \theta$?

29. How many solutions are there to the equation $\sin \theta = -0.2$ on the interval $[0, 2\pi)$? What quadrants do the solutions lie in?

30. How many solutions are there to the equation $\cot \theta = 1.5$ on the interval $[0, 2\pi)$? What quadrants do the solutions lie in?

31. How many solutions are there to the equation $\cos \theta = 0.8$ on the interval $[0, 2\pi)$? What quadrants do the solutions lie in?

32. A fly lands on a circular ring of radius 2 inches at point $Q(2,0)$, then crawls 4.5 inches around the ring to position $P$. Find the $x$ and $y$ coordinates of $P$. 

Trig Functions on the Circle.
33. Fill in the blank with either < or >

\[
\begin{align*}
&\text{a. } \cos \theta \quad \cos \psi \\
&\text{b. } \sin \theta \quad \sin \psi \\
&\text{c. } \cos \theta \quad \sin \theta \\
&\text{d. } \cot \theta \quad \cot \psi
\end{align*}
\]

34. Use the unit circle below to estimate numerical values for the following, then check your answer on a calculator:

\[
\begin{align*}
&\text{a. } \cos 15^\circ \\
&\text{b. } \sin -40^\circ \\
&\text{c. } \sin 13\pi/24 \\
&\text{d. } \cos 105^\circ \\
&\text{e. } \cos 5\pi/8
\end{align*}
\]

35. Solve for \( t \), \( 0 \leq t < 2\pi \) in Probs 35 to 42:

\[
\begin{align*}
&\text{35. } \sin t = \frac{1}{2} \\
&\text{36. } \cos t = -\frac{\sqrt{2}}{2} \\
&\text{37. } \tan t = 1 \\
&\text{38. } \cot t = 0 \\
&\text{39. } \sin t = -\frac{\sqrt{3}}{2} \\
&\text{40. } \cot t = -\sqrt{3} \\
&\text{41. } \csc t = -2 \\
&\text{42. } \sec t = \sqrt{2}
\end{align*}
\]

43. Suppose \( \cos 20^\circ = a \) and \( \sin 20^\circ = b \).

\[
\begin{align*}
&\text{a. } \text{What are the \( \cos \) and \( \sin \) of } 160^\circ? \\
&\text{b. } \text{What other angles between } 0^\circ \text{ and } 360^\circ \text{ have the same reference angle?}
\end{align*}
\]

44. Find a formula for the area of an equilateral triangle as a function of its side \( x \).