

**Chapter 6 Trigonometric Functions**

Name \_\_\_\_\_

*In Problems 1 and 2, convert each angle in degrees to radians. Express your answer as a multiple of  $\pi$ .*

1.  $210^\circ$

$$\frac{7\pi}{6}$$

2.  $15^\circ$

$$\frac{\pi}{12}$$

*In Problems 3 and 4, convert each angle in radians to degrees.*

3.  $\frac{2\pi}{3}$

120

4.  $-\frac{3\pi}{2}$

$-270^\circ$

*In Problems 5 - 12, find the exact value of each expression. Do not use a calculator.*

5.  $\cos \frac{\pi}{3} + \sin \frac{\pi}{2}$

$\frac{1}{2}$

6.  $4 \cos 60^\circ + 3 \tan \frac{\pi}{3}$

$2 + 3\sqrt{3}$

7.  $3 \sin \frac{2\pi}{3} - 4 \cos \frac{5\pi}{2}$

$\frac{3\sqrt{3}}{2}$

8.  $4 \csc \frac{3\pi}{4} - \cot \left( -\frac{\pi}{4} \right)$

$4\sqrt{2} + 1$

$$9. \cos \frac{\pi}{2} - \csc \left( -\frac{\pi}{2} \right)$$

$$\frac{-1}{\sin -\frac{\pi}{2}}$$

$$0 + 1 = 1$$

$$10. \sin 270^\circ + \cos(-180^\circ)$$

$$-1 + -1 = -2$$

$$11. \tan 10^\circ \cot 10^\circ$$

$$\tan 10 \cdot \frac{1}{\tan 10} = 1$$

$$12. \cot 200^\circ \cot(-70^\circ)$$

$$\frac{1}{\tan 200} \cdot \frac{1}{\tan 290}$$

$$-1$$

In Problems 13 – 15, find the exact value of each of the remaining trigonometric functions.

$$13. \tan \theta = \frac{1}{4}; \theta \text{ is acute}$$

$$\sin \theta = \frac{1}{\sqrt{17}} = \frac{\sqrt{17}}{17}$$

$$\cos \theta = \frac{4\sqrt{17}}{17}$$

$$14. \cot \theta = \frac{12}{5}; \cos \theta < 0$$

$$\frac{1}{\tan \theta} = \frac{5}{12}$$

$$\cos = \frac{12}{13}$$

$$\sec = \frac{13}{12}$$

$$\sin = \frac{5}{13}$$

$$\csc = \frac{13}{5}$$

$$15. \csc \theta = -\frac{5}{3}; \cot \theta < 0$$

$$\sin = \frac{3}{5}$$

$$\cos = \frac{4}{5} \quad \tan = -\frac{3}{4} \quad \cot = -\frac{4}{3}$$

$$\sec = \frac{5}{4}$$

16. Find the exact value of the six trigonometric functions of  $t$  if  $P = \left(\frac{3}{4}, -\frac{\sqrt{7}}{4}\right)$  is the point on the unit circle that corresponds to  $t$ .

$$\sin = -\frac{\sqrt{7}}{4} \quad \csc = -\frac{4\sqrt{7}}{7}$$

$$\cos = \frac{3}{4} \quad \sec = \frac{4}{3}$$

$$\tan = -\frac{\sqrt{7}}{3} \quad \cot = -\frac{3\sqrt{7}}{7}$$

17. Use a calculator to approximate  $\cos \frac{2\pi}{7}$ . Use a calculator to approximate  $\csc 230^\circ$ . Round answers to two decimal places.

$$.623$$

$$\frac{1}{\sin 230^\circ} = -1.305$$

18. Determine the signs of the six trigonometric functions of an angle  $\theta$  whose terminal side is in quadrant IV.

$$\begin{array}{ll} \sin - & \csc - \\ \cos + & \sec + \\ \tan - & \cot - \end{array}$$

19. Find the reference angle of  $\frac{36\pi}{5}$ .

$$\frac{\pi}{5}$$

20. (a) Convert the angle  $70^\circ 27' 38''$  to a decimal in degrees. Round the answer to two decimal places.

$$70.46056$$

(b) Convert the angle  $27.09^\circ$  to  $D^\circ M'S''$  form. Express the answer to the nearest second.

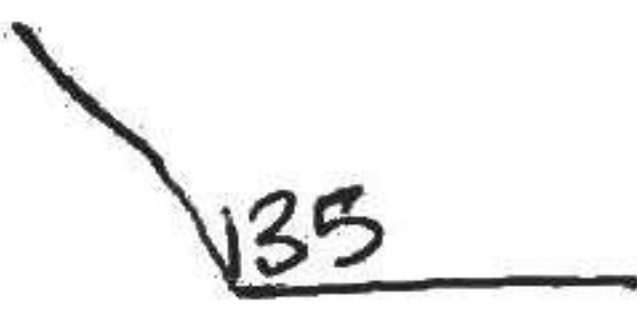
$$27 + .09 \cdot 60$$

$$27^\circ 5' .4 \cdot 60$$

$$27^\circ 5' 24''$$

$$27^\circ 5' 24''$$

21. Find the length of the arc subtended by a central angle of  $135^\circ$  on a circle of radius 4 meters. What is the area of the sector?

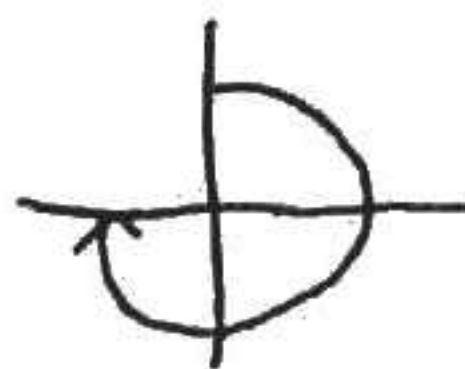


$135 \cdot \frac{\pi}{180} = \frac{3\pi}{4}$

$$A = \frac{1}{2} r^2 \theta$$
$$\frac{1}{2} (4)^2 \cdot \frac{3\pi}{4}$$
$$\frac{1}{2} \cdot 16 \cdot \frac{3\pi}{4}$$
$$A = 8 \cdot \frac{3\pi}{4} = \underline{6\pi}$$

22. How far does the end of the second hand on a huge clock travel in 45 seconds. The radius of the clock is 25 feet.

$$\frac{3\pi}{2} \cdot 25 = \frac{75\pi}{2}$$



$$\frac{45}{60} \cdot 2\pi$$

$$\frac{3}{4} 2\pi$$

$$\frac{3\pi}{2} \cdot 25$$