

3 Find the Exact Values of the Trigonometric Functions of $\frac{\pi}{4} = 45^\circ$

EXAMPLE Finding the Exact Values of the Trigonometric Functions of $\frac{\pi}{4} = 45^\circ$

Find the exact values of the six trigonometric functions of $\frac{\pi}{4} = 45^\circ$.

EXAMPLE**Finding the Exact Value of a Trigonometric Expression**

(a) $(\sin 45^\circ)(\tan 45^\circ)$

(b) $\left(\sec \frac{\pi}{4}\right)\left(\cot \frac{\pi}{4}\right)$

4 Find the Exact Values of the Trigonometric Functions

$$\text{of } \frac{\pi}{6} = 30^\circ \text{ and } \frac{\pi}{3} = 60^\circ$$

EXAMPLE Finding the Exact Values of the Trigonometric Functions of $\frac{\pi}{3} = 60^\circ$

Find the exact values of the six trigonometric functions of $\frac{\pi}{3} = 60^\circ$.

EXAMPLE**Finding the Exact Values of the Trigonometric
Functions of $\frac{\pi}{6} = 30^\circ$**

Find the exact values of the trigonometric functions of $\frac{\pi}{6} = 30^\circ$.

| θ (Radians) | θ (Degrees) | $\sin \theta$ | $\cos \theta$ | $\tan \theta$ | $\csc \theta$ | $\sec \theta$ | $\cot \theta$ |
|--------------------|--------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|----------------------|
| $\frac{\pi}{6}$ | 30° | $\frac{1}{2}$ | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{3}}{3}$ | 2 | $\frac{2\sqrt{3}}{3}$ | $\sqrt{3}$ |
| $\frac{\pi}{4}$ | 45° | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{2}}{2}$ | 1 | $\sqrt{2}$ | $\sqrt{2}$ | 1 |
| $\frac{\pi}{3}$ | 60° | $\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$ | $\sqrt{3}$ | $\frac{2\sqrt{3}}{3}$ | 2 | $\frac{\sqrt{3}}{3}$ |

EXAMPLE **Constructing a Rain Gutter**

A rain gutter is to be constructed of aluminum sheets 12 inches wide. After marking off a length of 4 inches from each edge, this length is bent up at an angle θ . See Figure 27. The area A of the opening may be expressed as a function of θ as

$$A(\theta) = 16 \sin \theta (\cos \theta + 1)$$

Find the area A of the opening for $\theta = 30^\circ$, $\theta = 45^\circ$, and $\theta = 60^\circ$.



