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

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

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

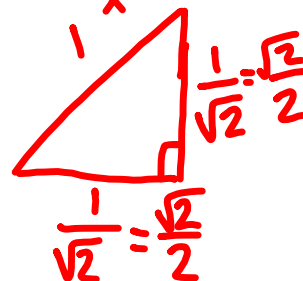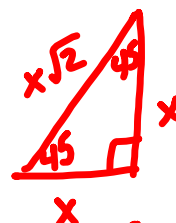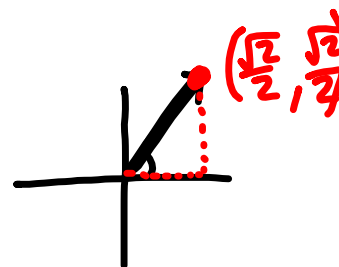$$\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2} \qquad \csc \frac{\pi}{4} = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \sqrt{2}$$

$$\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} \qquad \sec \frac{\pi}{4} = \sqrt{2}$$

$$\tan \frac{\pi}{4} = 1 \qquad \cot \frac{\pi}{4} = 1$$

$\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right)$

$x\sqrt{2}$ 45°

45° x

x

1

$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

EXAMPLE

Finding the Exact Value of a Trigonometric Expression

(a) $(\sin 45°)(\tan 45°)$

$$\left(\frac{\sqrt{2}}{2}\right)(1)$$

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

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

$$(\sqrt{2})(1)$$

$$\sqrt{2}$$

4 **Find the Exact Values of the Trigonometric Functions**

of $\dfrac{\pi}{6} = 30°$ and $\dfrac{\pi}{3} = 60°$

EXAMPLE **Finding the Exact Values of the Trigonometric**

Functions of $\dfrac{\pi}{3} = 60°$

Find the exact values of the six trigonometric functions of $\dfrac{\pi}{3} = 60°$.

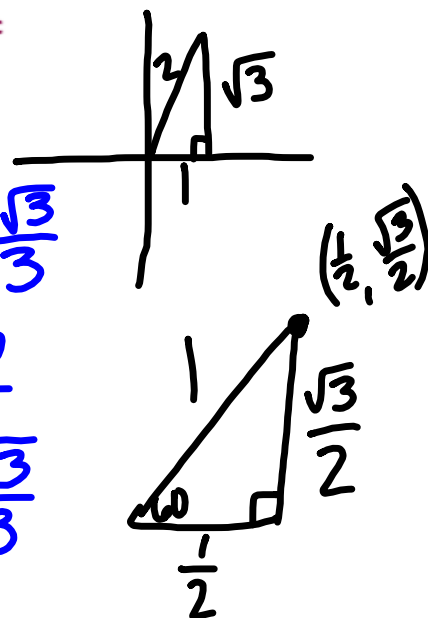$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

$$\csc \frac{\pi}{3} = \frac{2\sqrt{3}}{3}$$

$$\cos \frac{\pi}{3} = \frac{1}{2}$$

$$\sec \frac{\pi}{3} = 2$$

$$\tan \frac{\pi}{3} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$$

$$\cot \frac{\pi}{3} = \frac{\sqrt{3}}{3}$$

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

Find the exact values of the trigonometric functions of $\frac{\pi}{6} = 30°$.
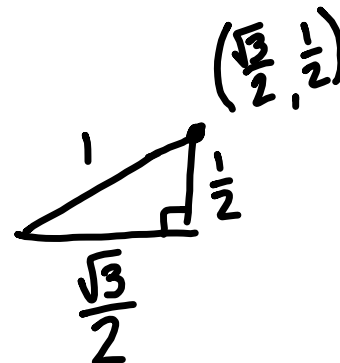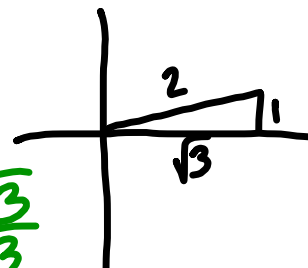
$\sin \frac{\pi}{6} = \frac{1}{2}$

$\cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$

$\tan \frac{\pi}{6} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\csc \frac{\pi}{6} = 2$

$\sec \frac{\pi}{6} = \frac{2\sqrt{3}}{3}$

$\cot \frac{\pi}{6} = \sqrt{3}$

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

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 $\theta = 30°$, $\theta = 45°$, and $\theta = 60°$.

$$\frac{\pi}{6} \qquad \frac{\pi}{4} \qquad \frac{\pi}{3}$$
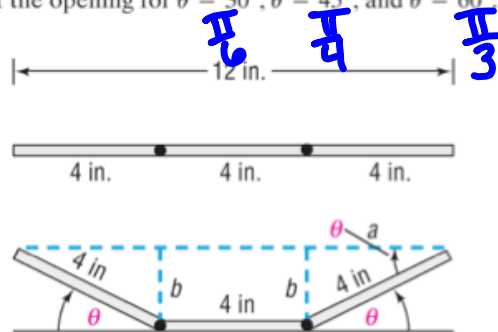
$$A\left(\frac{\pi}{6}\right) = 16 \sin \frac{\pi}{6} \left(\cos \frac{\pi}{6} + 1\right)$$

$$= 16 \left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2} + 1\right)$$

$$= 14.93 \ in^2$$

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Notes 6.2 Day 3