

Lesson 71- Special Right Triangles.notebook

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Lesson 31 Objective: SWBAT find exact values of trig functions.

Kickoff

If $\sec \theta = \frac{\sqrt{6}}{2}$ and $\sin \theta < 0$ evaluate all six trigonometric functions.

$$\begin{aligned} (\sqrt{6})^2 &= a^2 + b^2 \\ 6 &= 4 + b^2 \\ 2 = b^2 & \\ \sqrt{2} = b & \\ \text{If } \sec \theta = \frac{\sqrt{6}}{2} \text{ and } \sin \theta < 0, \text{ then } \theta & \text{ is in the third quadrant.} \\ \sin \theta &= -\frac{\sqrt{2}}{2}, \cos \theta = -\frac{\sqrt{2}}{2} \\ \cos \theta &= -\frac{\sqrt{2}}{2}, \sec \theta = -\frac{\sqrt{2}}{2} \\ \tan \theta &= \frac{\sqrt{2}}{2}, \cot \theta = -\frac{\sqrt{2}}{2} \\ \text{④ } \sin \theta &= -\frac{2\sqrt{3}}{7}, \cos \theta = -\frac{\sqrt{3}}{7} \\ \cos \theta &= -\frac{2\sqrt{3}}{7}, \sec \theta = -\frac{\sqrt{3}}{7} \\ \tan \theta &= -\frac{2}{3}, \cot \theta = -\frac{3}{2} \end{aligned}$$

Given: Equilateral $\triangle ABC$, $AB = 1$ and altitude \overline{CD} is drawn to the base \overline{AB} .

$$\begin{aligned} \text{For } \triangle ACD: & \\ \text{Hypotenuse } AC &= 1, \text{ opposite } \angle A = \frac{\sqrt{3}}{2} \\ \text{Adjacent } \angle A &= \frac{1}{2} \\ \text{Hypotenuse } AD &= \frac{1}{2}, \text{ opposite } \angle C = \frac{\sqrt{3}}{2} \\ \text{Adjacent } \angle C &= \frac{1}{2} \\ \text{For } \triangle CBD: & \\ \text{Hypotenuse } BC &= 1, \text{ opposite } \angle B = \frac{\sqrt{3}}{2} \\ \text{Adjacent } \angle B &= \frac{1}{2} \\ \text{Hypotenuse } BD &= \frac{1}{2}, \text{ opposite } \angle C = \frac{\sqrt{3}}{2} \\ \text{Adjacent } \angle C &= \frac{1}{2} \\ \sin 60^\circ &= \frac{\sqrt{3}}{2}, \cos 60^\circ = \frac{1}{2} \\ \sin 30^\circ &= \frac{1}{2}, \cos 30^\circ = \frac{\sqrt{3}}{2} \\ \tan 60^\circ &= \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{1} = \sqrt{3}, \tan 30^\circ = \frac{1}{2} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3} \end{aligned}$$

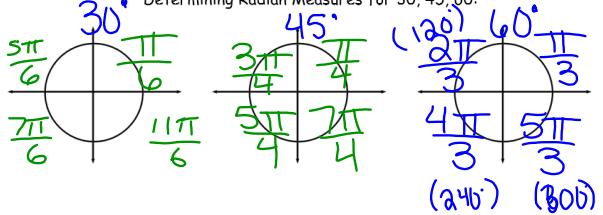
Given: Isosceles Right $\triangle ABC$, the hypotenuse $AC = 1$.

$$\begin{aligned} a^2 + b^2 &= 1^2 \\ x^2 + x^2 &= 1^2 \\ 2x^2 &= 1 \\ x^2 &= \frac{1}{2} \\ x &= \frac{1}{\sqrt{2}} \rightarrow \frac{\sqrt{2}}{2} \\ \sin 45^\circ &= \frac{\sqrt{2}}{2} \\ \cos 45^\circ &= \frac{\sqrt{2}}{2} \\ \tan 45^\circ &= 1 \end{aligned}$$

Exact Value Chart:

	30° ($\frac{\pi}{6}$)	45° ($\frac{\pi}{4}$)	60° ($\frac{\pi}{3}$)
$\sin \theta$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
$\cos \theta$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$
$\tan \theta$	$\frac{1}{\sqrt{3}} \rightarrow \frac{\sqrt{3}}{3}$	$\frac{\sqrt{2}}{\sqrt{2}} = 1$	$\frac{\sqrt{3}}{1} = \sqrt{3}$

Determining Radian Measures for $30^\circ, 45^\circ, 60^\circ$:



Directions: Find the exact value of each.

$$\sin 240^\circ = \frac{-\sqrt{3}}{2}$$

$$\text{ref} \rightarrow 240^\circ - 180^\circ = 60^\circ$$

$$\sin 60^\circ = \frac{\sqrt{3}}{2}$$

S: -

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

$$\text{ref} \rightarrow 30^\circ$$

$$\tan 30^\circ = \frac{\sqrt{3}}{3}$$

$$\frac{3}{\sqrt{3}} \rightarrow \frac{3\sqrt{3}}{3} = \sqrt{3}$$

Draw the exact value chart and the unit circle for reference: