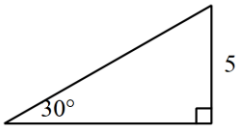
8.5

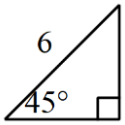
Date: 3/4/24

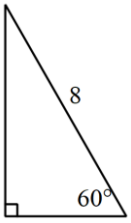
Objective: I can find the angle given the trig function.

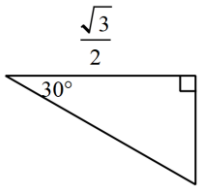
Review

Find the missing sides of the following.

1. 

2. 

3. 

4. 

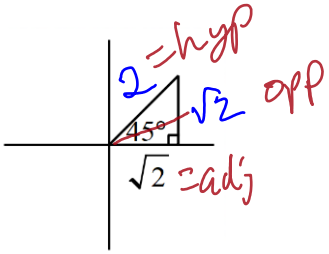
What is standard position?

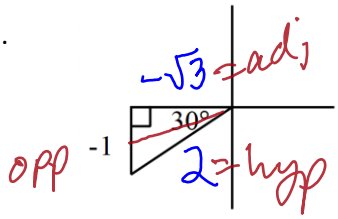
Now let's put the special right triangles in standard position.

x = adj

y = opp

Find the missing sides of the following.

1. 

2. 

What are the adjacent, opposite, and hypotenuse for each of the above triangles?

What if you are given the trigonometric ratio? Can you draw a triangle?

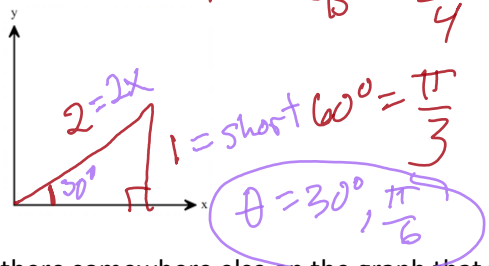
Draw a right triangle in standard position in the first quadrant and find the missing sides. Then find the angle in degrees and radians.

30° = π/6

45° = π/4

60° = π/3

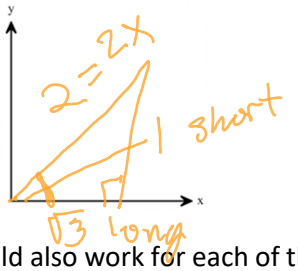
1. $\sin\theta = \frac{1}{2}$ — opp / hyp



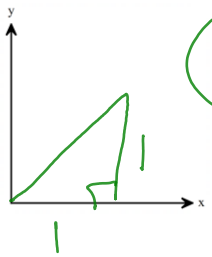
θ = 30°, π/6

2. $\cos\alpha = \frac{\sqrt{3}}{2}$ adj / hyp

30°, π/6 = α

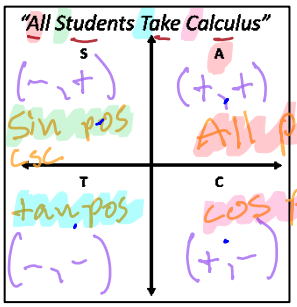


3. $\tan\theta = \frac{1}{1}$ opp / adj

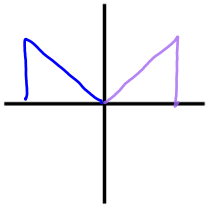


45°, π/4 = θ

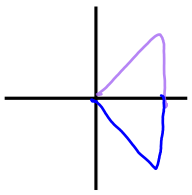
Is there somewhere else on the graph that would also work for each of these?



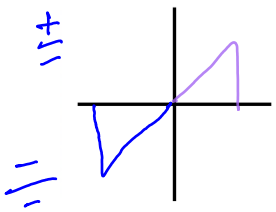
Where is $\sin\theta$ positive?



Where is $\cos\theta$ positive?



Where is $\tan\theta$ positive?



x = adj = cos

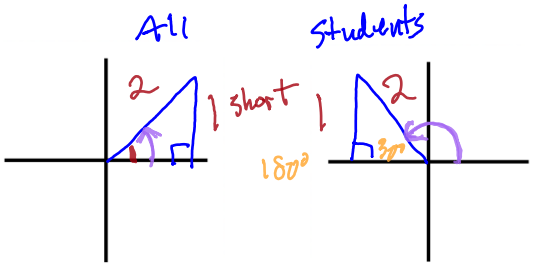
y = opp = sin

$\tan\theta = \frac{y}{x}$

Find all angles in the interval $[0°, 360°)$ and $[0, 2\pi)$ that satisfy each equation. Remember to use your special right triangle patterns.

1. $\sin\theta = \frac{1}{2}$ opp / hyp — ref∠ = 30°, $\frac{\pi}{6}$

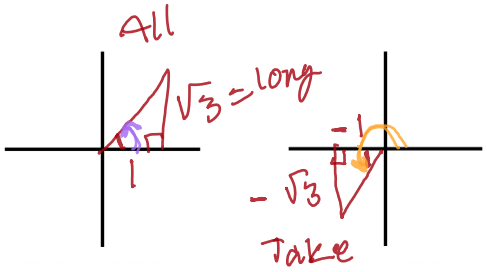
What two quadrants is sin θ positive?



Degrees: 30°, 150° Radians: $\frac{\pi}{6}$, $\frac{5\pi}{6}$

2. $\tan\theta = \frac{\sqrt{3}}{1}$ opp / adj — ref∠ = 60°, $\frac{\pi}{3}$

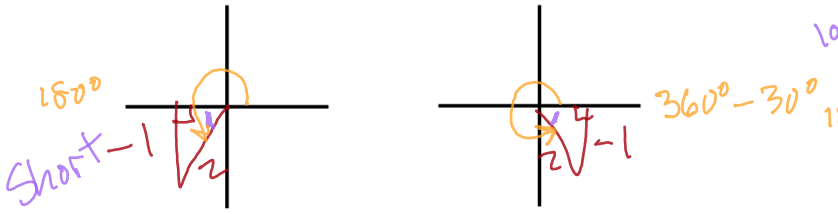
What two quadrants is tan θ positive?



Degrees: 60°, 240° Radians: $\frac{\pi}{3}$, $\frac{4\pi}{3}$

3. $\sin\theta = -\frac{1}{2}$ opp / hyp = $\frac{-1}{2}$ — ref∠ = 30°, $\frac{\pi}{6}$

What two quadrants is sin θ negative?



Degrees: 210°, 330° Radians: $\frac{7\pi}{6}$, $\frac{11\pi}{6}$

4. $\tan\theta = \frac{-\sqrt{3}}{1}$ = opp / adj — ref∠ = 60°, $\frac{\pi}{3}$

What two quadrants is tan θ negative?

Degrees: 120°, 300° Radians: $\frac{2\pi}{3}$, $\frac{5\pi}{3}$

Now try this one: $7\sqrt{3} - \cos\theta = 8\sqrt{3} + \cos\theta$

What should you do first? $-7\sqrt{3}$ $-7\sqrt{3}$

$-\cos\theta = \sqrt{3} + \cos\theta$

$-\cos\theta$ $-\cos\theta$

$\frac{-2\cos\theta}{-2} = \frac{\sqrt{3}}{-2}$

$\cos\theta = \frac{\sqrt{3}}{-2}$

STEPS

1. add/subtract numbers
2. add/subtract trig
3. ÷ coef (± in front of trig)
4. draw Δ's like examples above

Examples:

Find all angles in the interval $[0°, 360°)$ and $[0, 2\pi)$ that satisfy each equation.

ref ∠ = 30°, $\frac{\pi}{6}$

1. $7\sqrt{3} - \cos\theta = 8\sqrt{3} + \cos\theta$

$-7\sqrt{3}$ $-7\sqrt{3}$

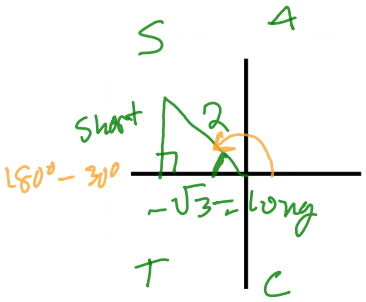
$-\cos\theta = \sqrt{3} + \cos\theta$

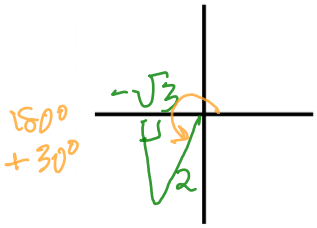
$-\cos\theta$ $-\cos\theta$

$-2\cos\theta = \sqrt{3}$

$\frac{-2}{-2}\cos\theta = \frac{\sqrt{3}}{-2}$

$\cos\theta = -\frac{\sqrt{3}}{2}$ adj / hyp

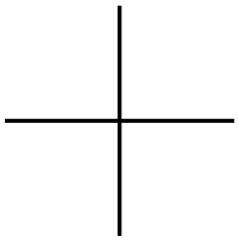


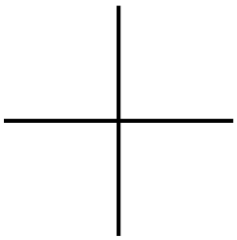


Degrees: 150°, 210° Radians: $\frac{5\pi}{6}$, $\frac{7\pi}{6}$

2. $2\cos\alpha = -1$

$\cos\alpha = -\frac{1}{2}$





Degrees: _____ Radians: _____

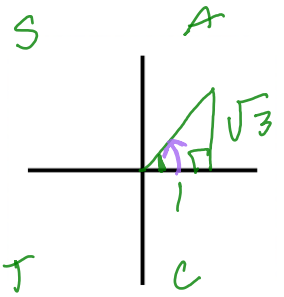
3. $-3\sqrt{3} + 4\tan\theta = \sqrt{3}$

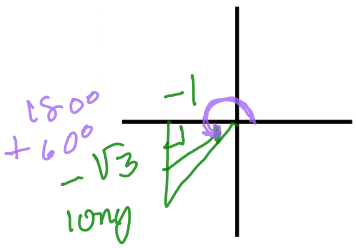
$+3\sqrt{3}$ $+3\sqrt{3}$

$\frac{4\tan\theta}{4} = \frac{4\sqrt{3}}{4}$

$\tan\theta = \frac{\sqrt{3}}{1}$ opp / adj

ref ∠ = 60°, $\frac{\pi}{3}$





Degrees: 60°, 240° Radians: $\frac{\pi}{3}$, $\frac{4\pi}{3}$