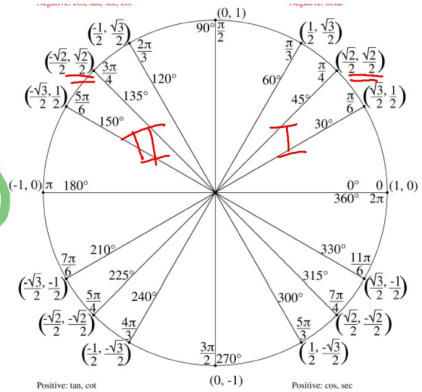
Sec 14-2: Solving Trigonometric Equations

Given $0 \le \theta \le 2\pi$ find the EXACT value of all θ that makes each equation true.

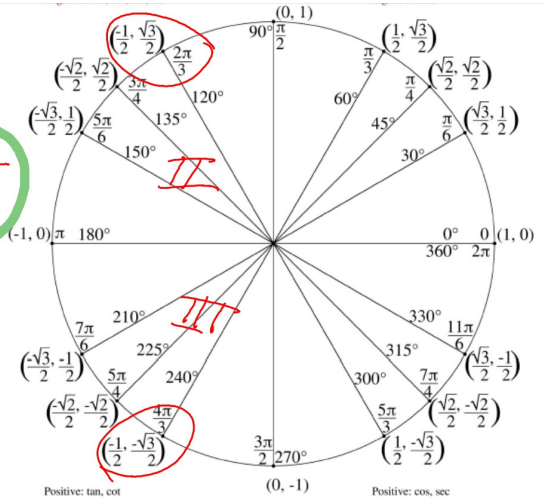
1. $\sin\theta = \frac{\sqrt{2}}{2}$

$\theta = \pi/4, 3\pi/4$



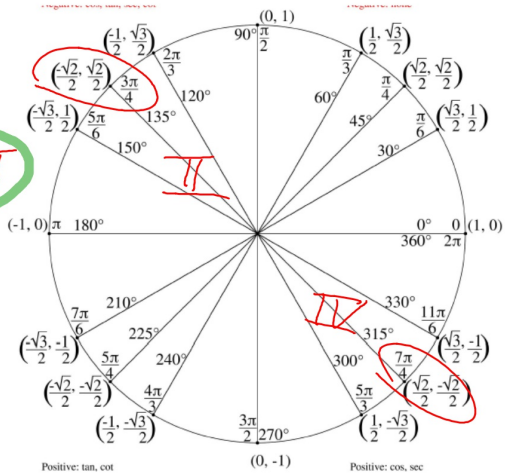
2. $\cos\theta = -\frac{1}{2}$

$\theta = \frac{2\pi}{3}, \frac{4\pi}{3}$



3. $\tan\theta = -1$

$\theta = \frac{3\pi}{4}, \frac{7\pi}{4}$



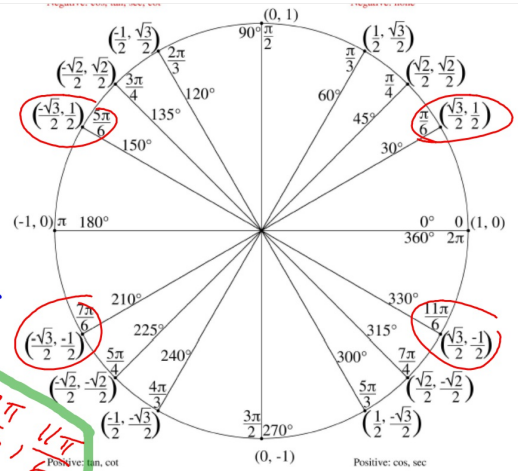
4. $4(\sin\theta)^2 = 1$

$\frac{4}{4} \quad \frac{1}{4}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{1}{4}}$

$\sin\theta = \pm\frac{1}{2}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$



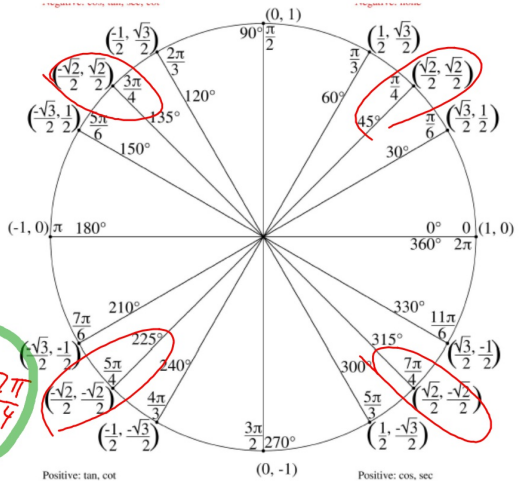
5. $6(\tan\theta)^2 = 6$

$\frac{6}{6}$

$\sqrt{\tan^2\theta} = \sqrt{1}$

$\tan\theta = \pm 1$

$\theta = \pi/4, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$



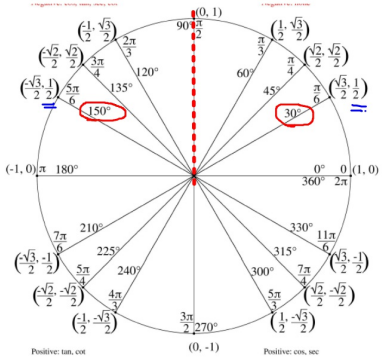
Using the unit circle find two angles that have the same Sine value.

What is the relationship between these two angles?

- They are reflections over the y-axis
- They are Supplementary:

  $\sin\theta = \sin(180° - \theta)$

  $\sin(\pi - \theta)$

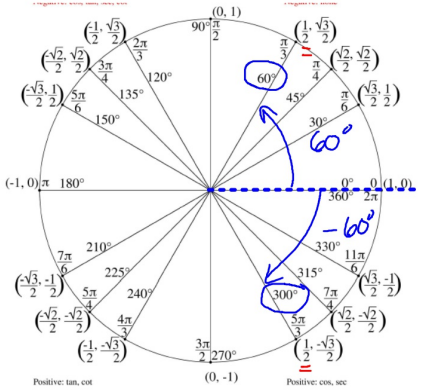


Using the unit circle find two angles that have the same Cosine value.

What is the relationship between these two angles?

- They are reflections over the x-axis
- They are opposites of each other

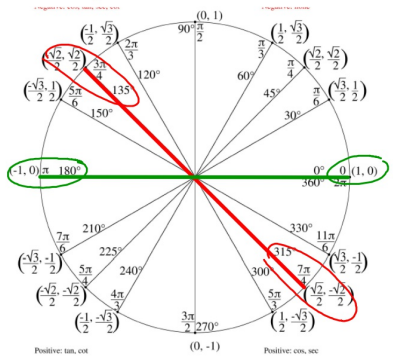
  $\cos\theta = \cos(-\theta)$



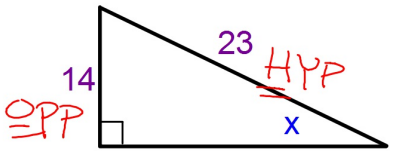
Using the unit circle find two angles that have the same Tangent value.

What is the relationship between these two angles?

- The angles are half a circle away from each other
- $\tan\theta = \tan(\theta \pm 180°) = \tan(\theta \pm \pi)$



Find the value of x.



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$\sin X = \frac{14}{23}$

$X = \sin^{-1}\left(\frac{14}{23}\right)$

$= 37.50^\circ$

Find all values of θ for $0 \le \theta \le 360^\circ$ that makes this equation true. Round to the nearest hundredth.

$\frac{8\tan\theta}{8} = \frac{-9}{8}$

$\tan\theta = -1.125$

$\theta = \tan^{-1}(-1.125)$

$\theta = -48.37^\circ = -48.37^\circ + 360^\circ = 311.63^\circ$

use the concept of coterminal angles to make this positive.

Use the relationship between angles that have the same Tangent to find the second angle.

$\tan\theta = \tan(\theta \pm 180^\circ) =$ $\theta = 311.63 - 180 = 131.63^\circ$