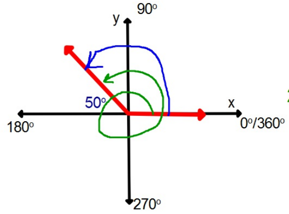
Friday, March 27, 2020

Sec 7-2: Coterminal Angles.

Find two positive measures of this angle, in degrees.



1. Start on the initial side and rotate CCW until you reach the terminal side.

   $\theta = 180 - 50 = 130^\circ$

2. Start on the initial side, make one full CCW rotation around, then continue rotating until you reach the terminal side.

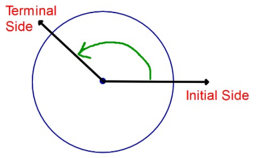
   $\theta = 360 + 130 = 490^\circ$

These two angles have the same initial side and terminal side yet have a different degree measure.

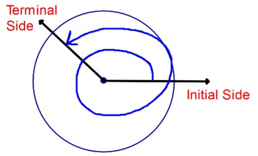
<u>Coterminal Angles</u>: Angles in Standard Position that have the same terminal side.

They start and stop in the same spot but aren't the same angle.

θ_1

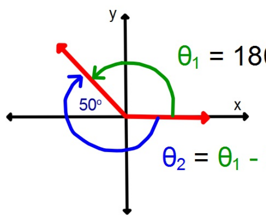


$\theta_2 = \theta_1 + 360$



θ_1 and θ_2 are coterminal angles

In this diagram, θ_1 and θ_2 are coterminal.



$\theta_1 = 180 - 50 = 130^\circ$

$\theta_2 = \theta_1 - 360 = 130 - 360 = -230^\circ$

When measuring in degrees you can find a coterminal angle of any given angle θ by adding or subracting 360° or any multiple of 360°.

Coterminal to angle $\theta = \theta \pm 360n$

n = an integer

Find a positive and a negative coterminal angle for each given angle. $\theta = 800°$

Pos: $800 + 360 = \boxed{1160°}$

or $800 - 360 = \boxed{440°}$

Neg: $800 - 360 = 440$

$440 - 360 = 80$

$80 - 360 = \boxed{-280°}$

Find a positive and a negative coterminal angle for each given angle. $\theta = -430°$

Pos: $-430 + 360 = -70$

$-70 + 360 = \boxed{290°}$

Neg: $-430 - 360 = \boxed{-790}$

or

$-430 + 360 = \boxed{-70°}$

When measuring in radians you can find a coterminal angle of any given angle θ by adding or subracting 2π or any multiple of 2π.

This means that if your angle is measured in radians it may very well be a fraction!

Keep in mind the number 2 as a fraction will always mean the numerator is twice as big as the denominator.

For example: $\frac{\pi}{5} + 2\pi = \frac{\pi}{5} + \frac{10\pi}{5} = \frac{11\pi}{5}$

Find a positive and a negative coterminal angle for each given angle. Give each answer in radians and in terms of π. Reduce fractions.

$\theta = \frac{8\pi}{3}$ $2\pi = \frac{6\pi}{3}$

Pos: $\frac{8\pi}{3} + \frac{6\pi}{3} = \boxed{\frac{14\pi}{3}}$

or $\frac{8\pi}{3} - \frac{6\pi}{3} = \boxed{\frac{2\pi}{3}}$

Neg: $\frac{8\pi}{3} - \frac{6\pi}{3} = \frac{2\pi}{3}$

$\frac{2\pi}{3} - \frac{6\pi}{3} = \boxed{\frac{-4\pi}{3}}$

Find a positive and a negative coterminal angle for each given angle. Give each answer in radians and in terms of π. Reduce fractions.

$\theta = -\frac{13\pi}{6}$ $2\pi = \frac{12\pi}{6}$

Pos: $\frac{-13\pi}{6} + \frac{12\pi}{6} = \frac{-\pi}{6}$

$\frac{-\pi}{6} + \frac{12\pi}{6} = \boxed{\frac{11\pi}{6}}$

Neg: $\frac{-13\pi}{6} - \frac{12\pi}{6} = \boxed{\frac{-25\pi}{6}}$

or $\frac{-13\pi}{6} + \frac{12\pi}{6} = \boxed{\frac{-\pi}{6}}$

We usually like angles to be measured somewhere between 0° and 360°, when measured in degrees, and between 0 and 2π, when measured in radians.

Use the concept of coterminal angles to find a coterminal angle in degrees such that $0° \leq \theta \leq 360°$

1. $\theta = 780°$

780 - 360 = 420

420 - 360 = $\boxed{60°}$

Sometimes you have to add or subtract 360 more than once. It's helpful to know some multiple of 360 to speed up the process:

2(360) = 720
3(360)= 1080

These are two of the more commonly used multiples of 360

Use the concept of coterminal angles to find a coterminal angle in degrees such that $0^\circ \leq \theta \leq 360^\circ$

2. $\theta = -1300^\circ$

-1300 +1080 = -220
-220 + 360 = $\boxed{140^\circ}$

Use the concept of coterminal angles to find a coterminal angle in radians such that $0 \leq \theta \leq 2\pi$

1. $\theta = \frac{19\pi}{4}$

$$2\pi = \frac{8\pi}{4}$$

$$\frac{19\pi}{4} - \frac{8\pi}{4} = \frac{11\pi}{4}$$

$$\frac{11\pi}{4} - \frac{8\pi}{4} = \boxed{\frac{3\pi}{4}}$$

Use the concept of coterminal angles to find a coterminal angle in radians such that $0 \leq \theta \leq 2\pi$

2. $\theta = \frac{-11\pi}{5}$

$$2\pi = \frac{10\pi}{5}$$

$$\frac{-11\pi}{5} + \frac{10\pi}{5} = \frac{-1\pi}{5}$$

$$\frac{-1\pi}{5} + \frac{10\pi}{5} = \boxed{\frac{9\pi}{5}}$$

You can now do Practice #10
which is posted on my blog.