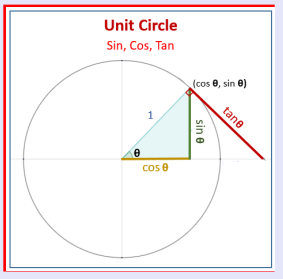
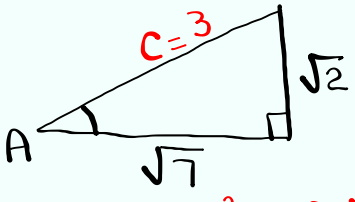
Trigonometry

Lecture 14



Feb 19-8:47 AM

Given



$c^2 = (\sqrt{7})^2 + (\sqrt{2})^2$

$= 7 + 2 = 9 \rightarrow c = 3$

Find

$\sin A = \frac{\sqrt{2}}{3}$ $\quad \csc A = \frac{3\sqrt{2}}{2}$

$\cos A = \frac{\sqrt{7}}{3}$ $\quad \sec A = \frac{3\sqrt{7}}{7}$

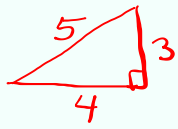
$\tan A = \frac{\sqrt{2}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{14}}{7}$ $\quad \cot A = \frac{\sqrt{14}}{2}$

$\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$, $\frac{3}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$

$\frac{\sqrt{7}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{14}}{2}$

Sep 18-10:36 AM

Suppose $\sin\alpha = \frac{-3}{5}$



Find $\sin(-\alpha) = -\sin\alpha = -\left(\frac{-3}{5}\right) = \frac{3}{5}$ $\csc(-\alpha) = \frac{5}{3}$

Where is α?

QIII or QIV

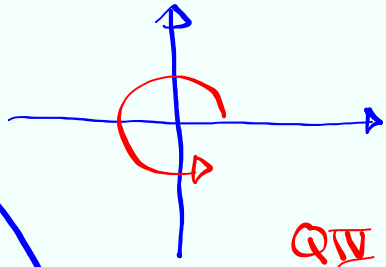
$\cos(-\alpha) = \cos\alpha = \frac{4}{5}$ $\sec(-\alpha) = \frac{5}{4}$

?

$\tan(-\alpha) = -\tan\alpha = -\frac{3}{4}$ $\cot(-\alpha) = -\frac{4}{3}$

Sep 18-10:43 AM

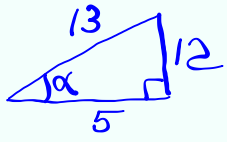
$\cos\alpha = \frac{5}{13}$, $270° < \alpha < 360°$



QIV

$\sin\alpha = \frac{-12}{13}$ $\csc\alpha = \frac{-13}{12}$

$\cos\alpha = \frac{5}{13}$ $\sec\alpha = \frac{13}{5}$

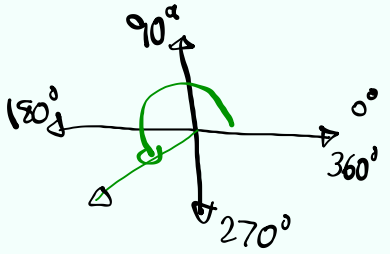


$\tan\alpha = \frac{-12}{5}$ $\cot\alpha = \frac{-5}{12}$

Sep 18-10:50 AM

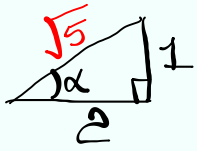
$\tan\alpha = \frac{1}{2}$, $180° < \alpha < 270°$

QIII



Find

$\sin\alpha = -\frac{1}{\sqrt{5}} = -\frac{\sqrt{5}}{5}$ $\quad \csc\alpha = -\sqrt{5}$

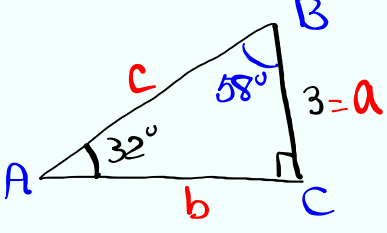


$\cos\alpha = -\frac{2}{\sqrt{5}} = -\frac{2\sqrt{5}}{5}$ $\quad \sec\alpha = -\frac{\sqrt{5}}{2}$

$\tan\alpha = \frac{1}{2}$ $\quad \cot\alpha = 2$

Sep 18-10:53 AM

Solve triangle below



$A + B = 90°$

$32 + B = 90$

$\boxed{B = 58}$

$\sin 32° = \frac{3}{c}$ $\quad c\sin 32° = 3$ $\quad c = \frac{3}{\sin 32°}$

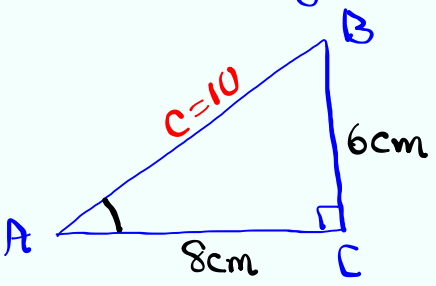
$c \approx 5.7$

$\cos 32° = \frac{b}{5.7}$ $\quad b = 5.7\cos 32°$

$b \approx 4.8$

Sep 18-10:58 AM

Solve triangle ABC below



$C^2 = 6^2 + 8^2 = 100$

$C = 10$

$\sin A = \frac{6}{10}$

$\sin A = .6$ $\quad A \approx \sin^{-1}(.6)$

$A \approx 37^\circ$

$A + B = 90^\circ$

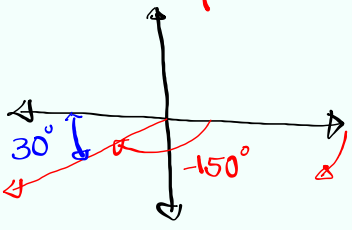
$37^\circ + B = 90^\circ$

$B \approx 53^\circ$

Sep 18-11:03 AM

Draw angle -150°, find its ref. angle.

30°

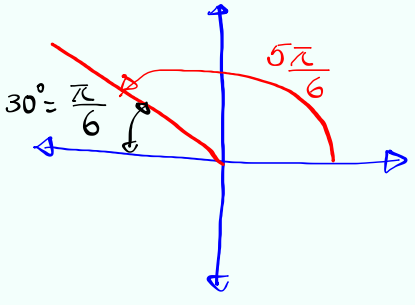


Draw $\frac{5\pi}{6}$, find its ref. angle.

π Rad $= 180^\circ$

$\frac{\pi}{6} = 30^\circ$

$\frac{5\pi}{6} = 150^\circ$



Sep 18-11:07 AM

Convert to radians

1) $120^\circ = 180^\circ - 60^\circ = \pi - \frac{\pi}{3} = \frac{3\pi}{3} - \frac{\pi}{3} = \boxed{\frac{2\pi}{3}}$

$180^\circ = \pi$ Rad.

$1^\circ = \frac{\pi}{180}$ Rad.

$\Rightarrow 120^\circ = \frac{120\pi}{180} = \frac{2\pi}{3}$

2) 225°

$= 180^\circ + 45^\circ = \pi + \frac{\pi}{4} = \frac{4\pi}{4} + \frac{\pi}{4}$

$= \boxed{\frac{5\pi}{4}}$

3) $330^\circ = 360^\circ - 30^\circ$

$= 2\pi - \frac{\pi}{6} = \frac{12\pi}{6} - \frac{\pi}{6} = \boxed{\frac{11\pi}{6}}$

4) $22.5^\circ = \frac{45^\circ}{2} = \frac{1}{2}(45^\circ) = \frac{1}{2}\left(\frac{\pi}{4}\right) = \boxed{\frac{\pi}{8}}$

5) $75^\circ = 45^\circ + 30^\circ = \frac{\pi}{4} + \frac{\pi}{6} = \frac{3\pi + 2\pi}{12}$

$= \boxed{\frac{5\pi}{12}}$

6) $37.5^\circ = \frac{1}{2}(75^\circ) = \frac{1}{2}\left(\frac{5\pi}{12}\right) = \boxed{\frac{5\pi}{24}}$

Sep 18-11:12 AM

Simplify

$\sin x(\sec x + \csc x) - \tan x - 1$

$= \sin x \cdot \frac{1}{\cos x} + \sin x \cdot \frac{1}{\sin x} - \tan x - 1$

$= \tan x + 1 - \tan x - 1 = 0$

Sep 18-11:25 AM

Verify $\frac{1}{\sec x - \tan x} = \sec x + \tan x$

$\frac{1}{\sec x - \tan x} = \frac{1}{\frac{1}{\cos x} - \frac{\sin x}{\cos x}} = \frac{\cos x}{1 - \sin x}$

Multiply by $\cos x$

multiply by Conjugate of deno.

$= \frac{\cos x (1 + \sin x)}{(1 - \sin x)(1 + \sin x)} = \frac{\cos x (1 + \sin x)}{(1)^2 - (\sin x)^2}$

$A - B \quad A + B$

$= \frac{\cos x (1 + \sin x)}{1 - \sin^2 x}$

$\sin^2 x + \cos^2 x = 1$

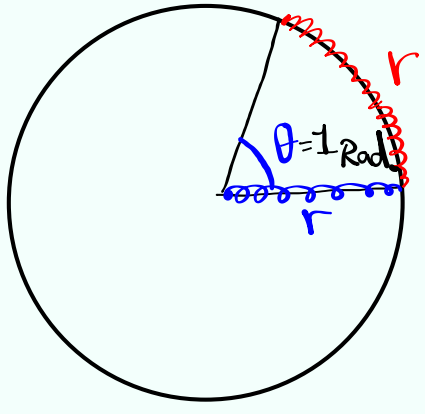
$= \frac{\cos x (1 + \sin x)}{\cos^2 x}$

$\cos^2 x = 1 - \sin^2 x$

$= \frac{1 + \sin x}{\cos x} = \frac{1}{\cos x} + \frac{\sin x}{\cos x}$

$= \sec x + \tan x$

Sep 18-11:29 AM



$S = r\theta$

$r = r\theta$

$\theta = \frac{r}{r} = 1$ Rad.

Sep 18-11:38 AM