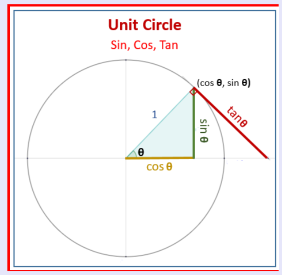
Trigonometry

Lecture 5



Feb 19-8:47 AM

Class QZ 1

Use quadratic formula $\boxed{x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}}$

to solve $x^2 - 2x - 15 = 0.$

$a = 1$ $b = -2$ $c = -15$

$b^2 - 4ac =$

$(-2)^2 - 4(1)(-15) =$

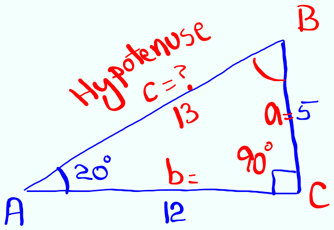
$4 + 60 = \boxed{64}$ ✓

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a} = \dfrac{-(-2) \pm \sqrt{64}}{2(1)} = \dfrac{2 \pm 8}{2}$

$x = \dfrac{2+8}{2} = \boxed{5}$ ✓ , $x = \dfrac{2-8}{2} = \boxed{-3}$ ✓ $\Rightarrow \boxed{\{-3, 5\}}$

Aug 29-11:30 AM

Consider the triangle below



1) Find the missing angle.

$A + B + C = 180°$

$20° + B + 90° = 180°$

$\boxed{B = 70°}$

2) Find the missing side.

$a^2 + b^2 = c^2$

$5^2 + 12^2 = c^2$

$c^2 = 169$

$\boxed{c = 13}$

3) Find

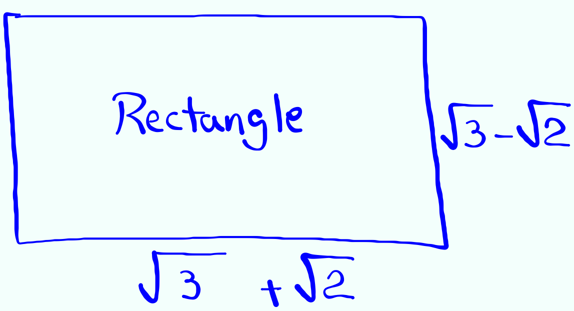
$\sin A = \frac{5}{13}$ $\qquad$ $\csc A = \frac{13}{5}$

$\cos A = \frac{12}{13}$ $\qquad$ $\sec A = \frac{13}{12}$

$\tan A = \frac{5}{12}$ $\qquad$ $\cot A = \frac{12}{5}$

Sep 3-10:29 AM

Find area & Perimeter:



$A = LW$

$= (\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})$

$= \sqrt{9} \cancel{- \sqrt{6}} \cancel{+ \sqrt{6}} - \sqrt{4}$

$= 3 - 2 = \boxed{1}$

$P = 2L + 2W$

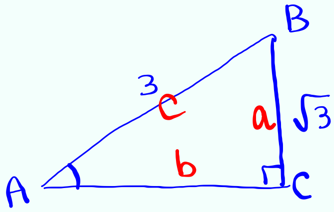
$P = 2(\sqrt{3} + \sqrt{2}) + 2(\sqrt{3} - \sqrt{2})$

$= 2\sqrt{3} \cancel{+ 2\sqrt{2}} + 2\sqrt{3} \cancel{- 2\sqrt{2}}$

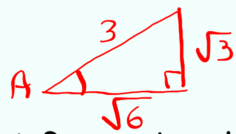
$= \boxed{4\sqrt{3}}$

Sep 3-10:38 AM

Given



1) find the missing Side.



$a^2+b^2=c^2$

$(\sqrt{3})^2+b^2=3^2$

$3+b^2=9$

$b^2=6$

$\boxed{b=\sqrt{6}}$

2) Complete the table below

$\sin A=\frac{\sqrt{3}}{3}$	$\csc A=\frac{\cancel{3}}{\cancel{\sqrt{3}}}\cdot\frac{\sqrt{3}}{\cancel{\sqrt{3}}}=\sqrt{3}$
$\cos A=\frac{\sqrt{6}}{3}$	$\sec A=\frac{3}{\sqrt{6}}\cdot\frac{\sqrt{6}}{\sqrt{6}}=\frac{\sqrt{6}}{2}$
$\tan A=\frac{\sqrt{2}}{2}$	$\cot A=\sqrt{2}$

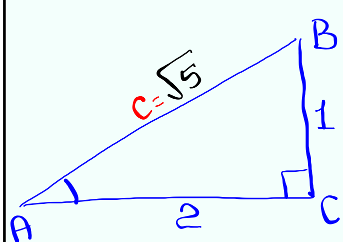
$\tan A=\frac{\sqrt{3}}{\sqrt{6}}=\frac{1\cdot\cancel{\sqrt{3}}}{\sqrt{2}\,\cancel{\sqrt{3}}}=\frac{1}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}=\frac{\sqrt{2}}{2}$ | $\frac{3}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\frac{\cancel{3}\sqrt{3}}{\cancel{3}}$

Sep 3-10:43 AM

Consider a right triangle ABC with

$\tan A=\frac{1}{2}$.

1) Draw & clearly label all three Sides.



$a^2+b^2=c^2$

$1^2+2^2=c^2$

$\boxed{c=\sqrt{5}}$

2)

$\sin A=\frac{1}{\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}}\boxed{\frac{\sqrt{5}}{5}}$ $\quad\csc A=\sqrt{5}$

$\cos A=\frac{2}{\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}}=\boxed{\frac{2\sqrt{5}}{5}}$ $\quad\sec A=\frac{\sqrt{5}}{2}$

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

Sep 3-10:53 AM

8 Fundamental Identities:

1) $\sin^2 A + \cos^2 A = 1$

2) $1 + \tan^2 A = \sec^2 A$

3) $1 + \cot^2 A = \csc^2 A$

4) $\csc A = \dfrac{1}{\sin A}$

5) $\sec A = \dfrac{1}{\cos A}$

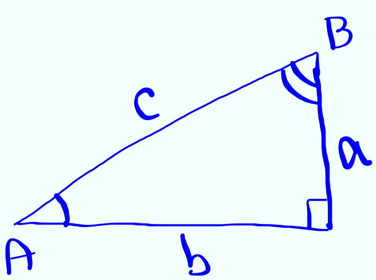
6) $\cot A = \dfrac{1}{\tan A}$

7) $\tan A = \dfrac{\sin A}{\cos A}$

8) $\cot A = \dfrac{\cos A}{\sin A}$

Sep 3-11:01 AM

Verify $1 + \cot^2 A = \csc^2 A$



$$1 + \left(\frac{b}{a}\right)^2 =$$

$$1 + \frac{b^2}{a^2} = \frac{a^2}{a^2} + \frac{b^2}{a^2}$$

$$= \frac{a^2 + b^2}{a^2}$$

$$= \frac{c^2}{a^2} = \left(\frac{c}{a}\right)^2$$

$$= \csc^2 A$$

$\sin A = \dfrac{a}{c}$

$\csc A = \dfrac{c}{a}$

Sep 3-11:06 AM

Simplify

$$(\sin A + \cos A)^2 - 2\sin A\cos A$$

Hint: $(A+B)^2 = A^2 + 2AB + B^2$

$$(\sin A + \cos A)^2 - 2\sin A\cos A =$$

$$\sin^2 A + \cancel{2\sin A\cos A} + \cos^2 A - \cancel{2\sin A\cos A} =$$

$$\sin^2 A + \cos^2 A = \boxed{1}$$

Sep 3-11:10 AM

Simplify

$$\underbrace{(\sin x + \cos x)^2} + (\underbrace{\sin x - \cos x})^2$$

$$= \sin^2 x + \cancel{2\sin x\cos x} + \cos^2 x +$$

$$\sin^2 x - \cancel{2\sin x\cos x} + \cos^2 x$$

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

$$= 2(\underbrace{\sin^2 x + \cos^2 x}) = 2\cdot 1 = \boxed{2}$$

Sep 3-11:15 AM

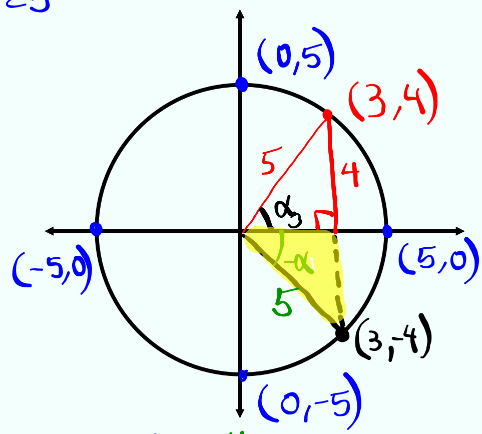
Consider $x^2 + y^2 = 25$

$(x-0)^2 + (y-0)^2 = 5^2$

Circle

centered @ $(0,0)$

Radius 5



$\sin\alpha = \frac{4}{5}$

$\cos\alpha = \frac{3}{5}$

$\tan\alpha = \frac{4}{3}$

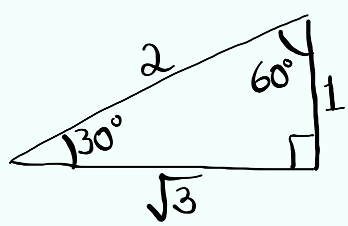
$\sin(-\alpha) = \frac{-4}{5}$

$\cos(-\alpha) = \frac{3}{5}$

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

Sep 3-11:25 AM

$30^\circ - 60^\circ - 90^\circ$



$\sin 30^\circ = \frac{1}{2}$

$\cos 30^\circ = \frac{\sqrt{3}}{2}$

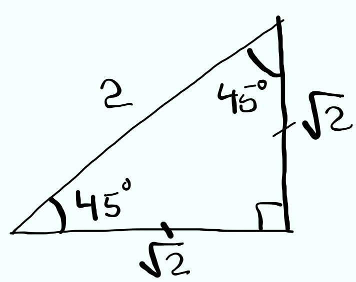
$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{2}$

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

$\cos 60^\circ = \frac{1}{2}$

$\tan 60^\circ = \sqrt{3}$

$45^\circ - 45^\circ - 90^\circ$



$\sin 45^\circ = \frac{\sqrt{2}}{2}$

$\cos 45^\circ = \frac{\sqrt{2}}{2}$

$\tan 45^\circ = \frac{\sqrt{2}}{\sqrt{2}} = 1$

Sep 3-11:32 AM