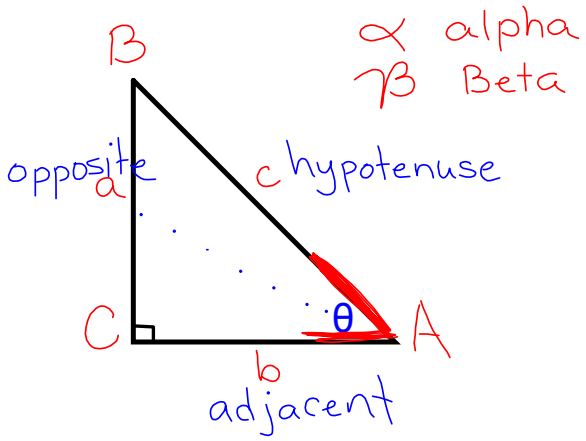
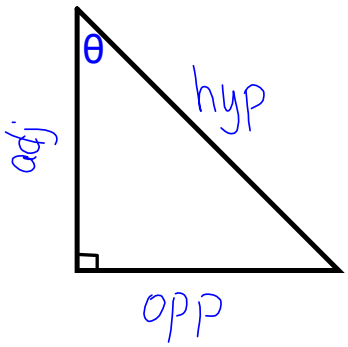
Right Triangle Trigonometry

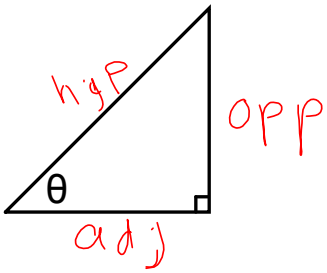


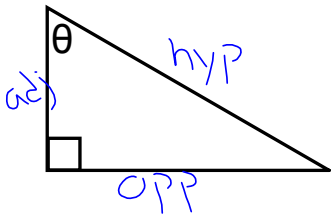


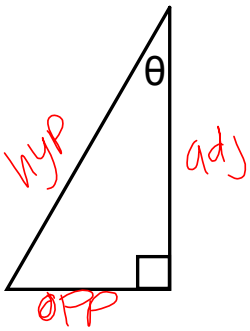
Label the sides based from the angle θ

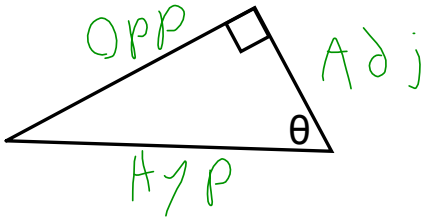
Label the sides of each right triangle relative to **θ**, with hypotenuse, opposite and adjacent.

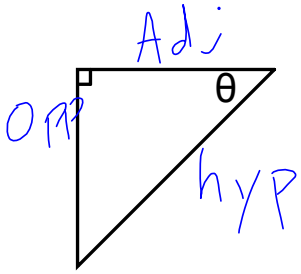
θ is read as theta











How do you set up a trig function?

Trig Name (angle) = ratio of the sides

Example: $\sin\theta = \frac{4}{5}$

angle

Trig name

ratio of the sides

A trigonometric ratio is a ratio of the lengths of two sides of a right triangle.

Soh-Cah-Toa

Pull

6 Trig functions

Sine

$\sin\theta = \frac{opp}{hyp}$

cosine

$\cos\theta = \frac{adj}{hyp}$

tangent

$\tan\theta = \frac{opp}{adj}$

reciprocal

cosecant

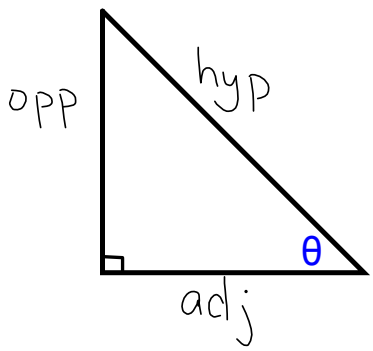
$\csc\theta = \frac{hyp}{opp}$

Secant

$\sec\theta = \frac{hyp}{adj}$

Cotangent

$\cot\theta = \frac{adj}{opp}$



Express each trig ratio as a fraction.

reciprocal functions

Sin θ= $\frac{opp}{hyp} = \frac{5}{13}$

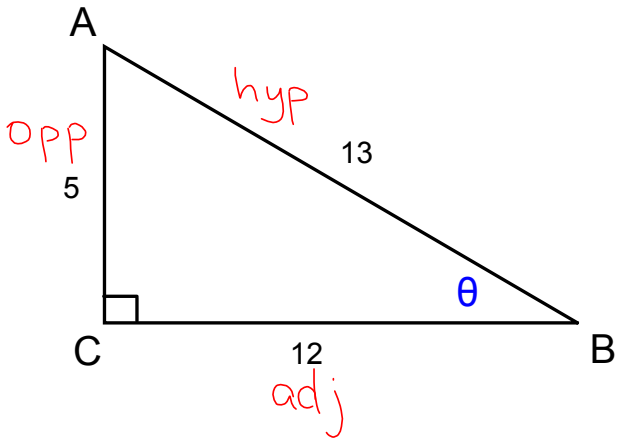
Csc θ= $\frac{13}{5}$

Cos θ = $\frac{12}{13}$

Sec θ = $\frac{13}{12}$

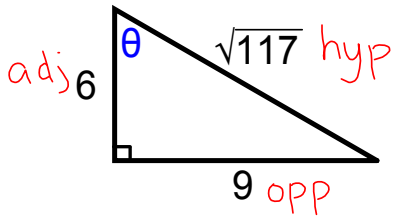
Tan θ = $\frac{5}{12}$

Cot θ = $\frac{12}{5}$



Given the following triangle.

Name the 6 Trig functions.



Sin θ= $\frac{9}{\sqrt{117}} \cdot \frac{\sqrt{117}}{\sqrt{117}} = \frac{9\sqrt{117}}{117} = \frac{\sqrt{117}}{13}$

Csc θ= $\frac{\sqrt{117}}{9}$

Cos θ= $\frac{6}{\sqrt{117}} \cdot \frac{\sqrt{117}}{\sqrt{117}} = \frac{6\sqrt{117}}{\cancel{117}} = \frac{2\sqrt{117}}{39}$

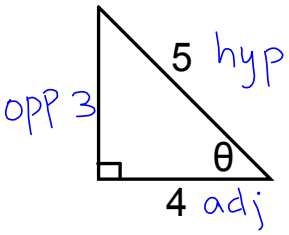
Sec θ= $\frac{\sqrt{117}}{6}$

Tan θ= $\frac{9}{6} = \frac{3}{2}$

Cot θ= $\frac{2}{3}$

Given the following triangle.

Name the 6 Trig functions.



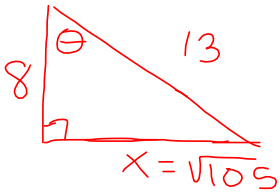
$\sin\theta = \frac{3}{5}$ $\csc\theta = \frac{5}{3}$

$\cos\theta = \frac{4}{5}$ $\sec\theta = \frac{5}{4}$

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

Given that $\cos\theta = \frac{8}{13}$ $\frac{adj}{hyp}$

Name the 6 Trig functions.



$x^2 + 8^2 = 13^2$

$x^2 + 64 = 169$

$-64 \quad -64$

$x^2 = 105$

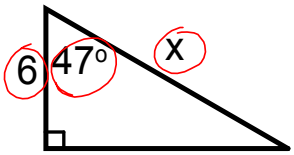
$x = \sqrt{105}$

$\sin\theta = \frac{\sqrt{105}}{13}$ $\csc\theta = \frac{13\sqrt{105}}{105}$

$\cos\theta = \frac{8}{13}$ $\sec\theta = \frac{13}{8}$

$\tan\theta = \frac{\sqrt{105}}{8}$ $\cot\theta = \frac{8\sqrt{105}}{105}$

Find x

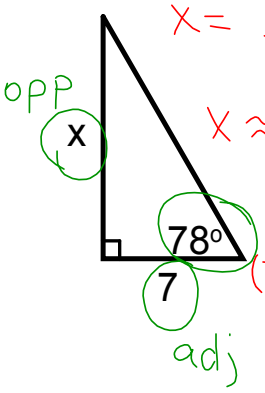


$(x)\cos 47° = \frac{6}{\cancel{x}}\cancel{(x)}$

$x\cos 47° = 6$

$x = \frac{6}{\cos 47°}$

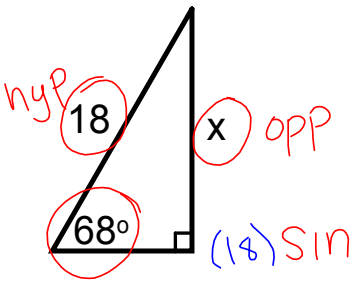
$x \approx 8.8$



$(7)\tan 78° = \frac{x}{\cancel{7}}\cancel{(7)}$

$7(\tan 78°) = x$

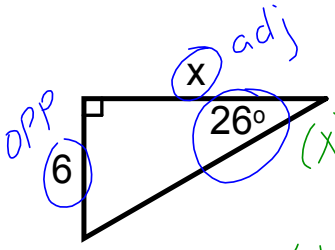
$x = 32.9$



$(18)\sin 68° = \frac{x}{\cancel{18}}\cancel{(18)}$

$18(\sin 68°) = x$

$x \approx 16.7$



$(x)\tan 26° = \frac{6}{\cancel{x}}\cancel{(x)}$

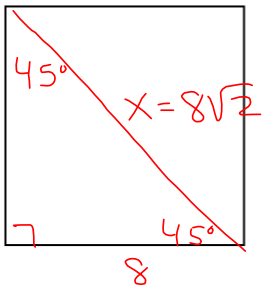
$\frac{x\tan 26°}{\tan 26°} = \frac{6}{\tan 26°}$

$x = \frac{6}{\tan 26°}$

$x \approx 12.3$

Find the length of the Diagonal of the given squares.

8



$8^2 + 8^2 = x^2$

$64 + 64 = x^2$

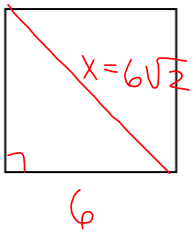
$x^2 = 128$

$x = \sqrt{128}$

64 2

$x = 8\sqrt{2}$

6



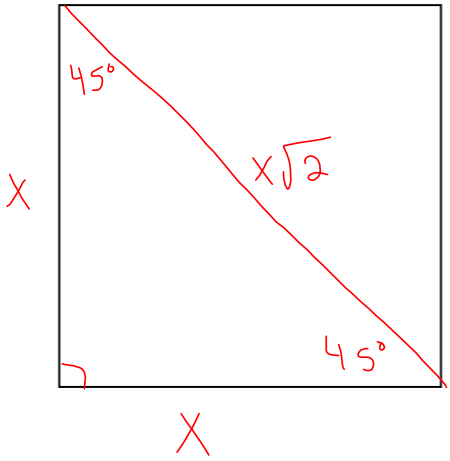
$6^2 + 6^2 = x^2$

$x^2 = 72$

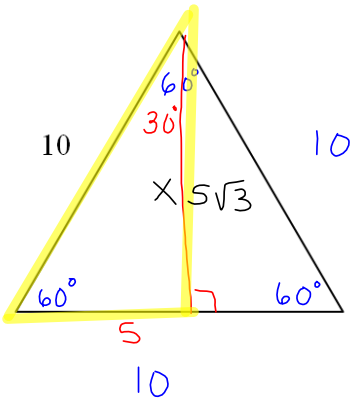
$x = \sqrt{72}$

36 2

$x = 6\sqrt{2}$



Find the altitude of the given equilateral triangles.



$5^2 + x^2 = 10^2$

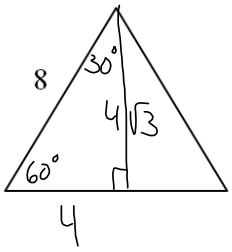
$25 + x^2 = 100$

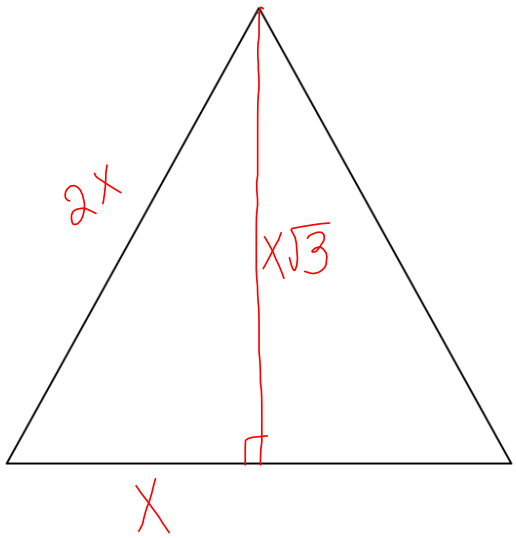
$x^2 = 75$

$x = \sqrt{75}$

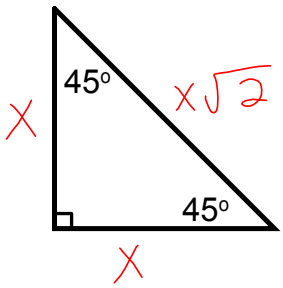
$25 \quad 3$

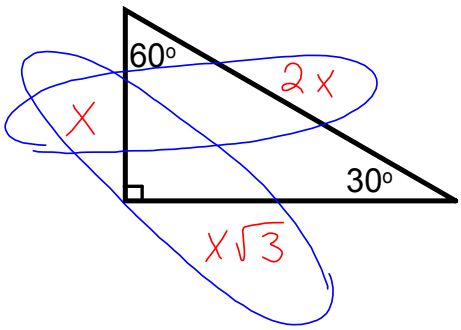
$x = 5\sqrt{3}$





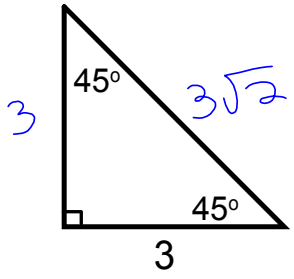
Special Right Triangles

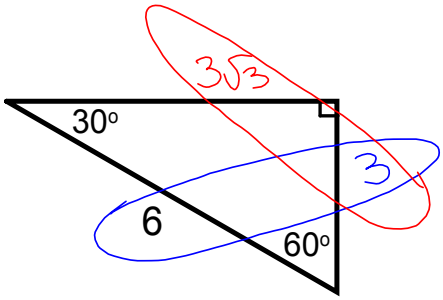


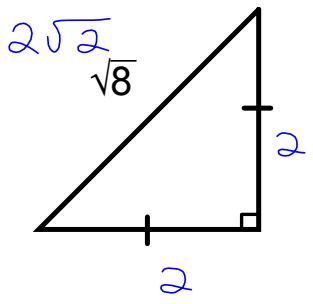


$\boxed{\sqrt{2}}$

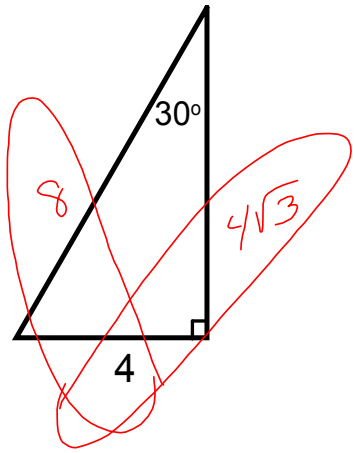
multiply or divide $\sqrt{2}$

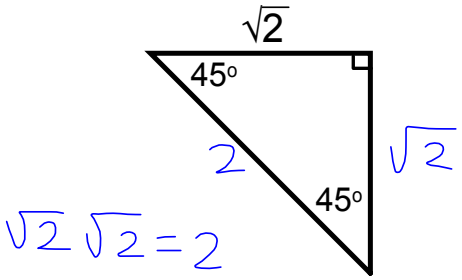

45°
45°
3
3
3√2


30°
60°
6
3
3√3

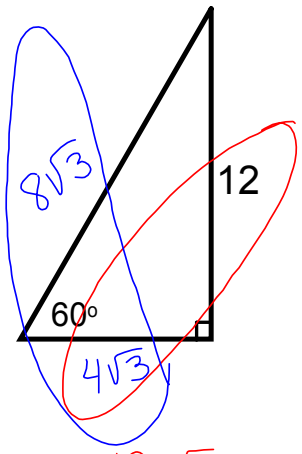


$$\frac{2\sqrt{2}}{\sqrt{2}}$$





$\sqrt{2}\sqrt{2} = 2$



$$\frac{12}{\sqrt{3}}\frac{\sqrt{3}}{\sqrt{3}} = \frac{\cancel{12}^{4}\sqrt{3}}{\cancel{3}}$$