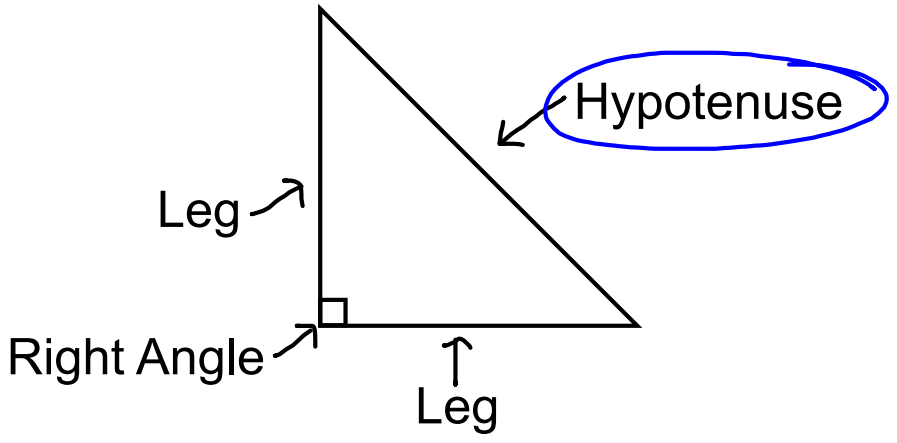
5-2

Solving Right Triangles and Pythagorean Theorem

Right Triangle

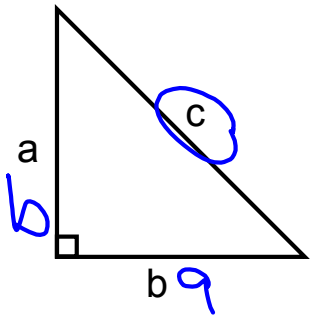


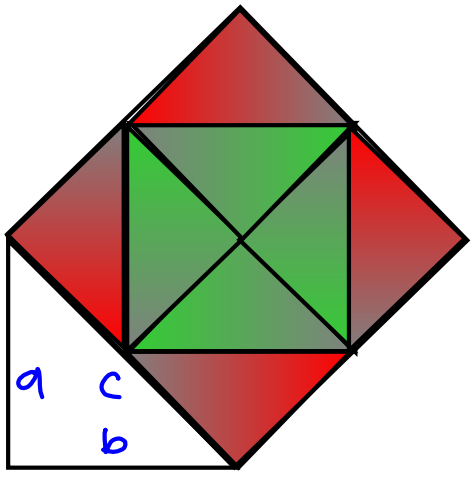
Pythagorean Theorem

In a right triangle where a and b are the legs and c is the hypotenuse,

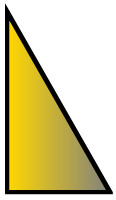
$$a^2 + b^2 = c^2$$

Side lengths



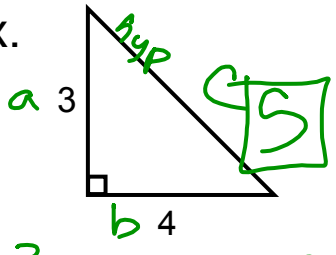


$a^2+b^2=c^2$



Find the missing side in the right triangle using the pythagorean theorem: $a^2+b^2=c^2$

ex.



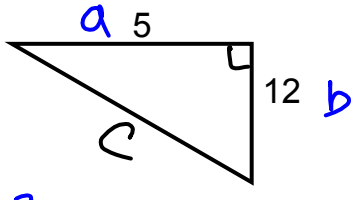
$3^2+4^2=c^2$

$9+16=c^2$

$\sqrt{25}=\sqrt{c^2}$

$5=c$

ex.



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

$25+144=c^2$

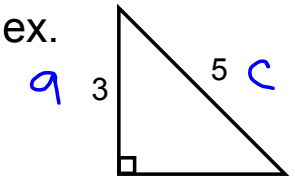
$\sqrt{169}=\sqrt{c^2}$

$13=c$

Find the missing side in the right triangle using the pythagorean theorem:

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

ex.



$3^2+b^2=5^2$

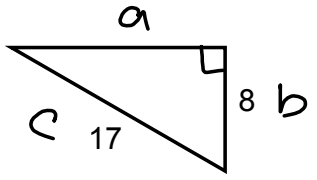
$9+b^2=25$

$-9 \quad -9$

$\sqrt{b^2}=\sqrt{16}$

$b=4$

ex.



$a^2+8^2=17^2$

$a^2+64=289$

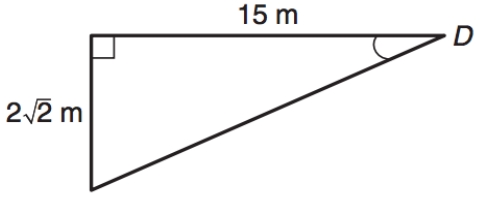
$-64 \quad -64$

$\sqrt{a^2}=\sqrt{225}$

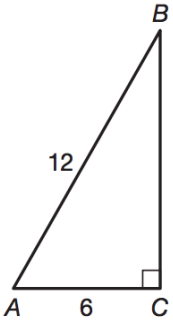
$a=15$

Find the missing side in the right triangle using the pythagorean theorem:

ex.



ex.



How to find trig in **RIGHT** triangles:

SOH CAH TOA

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

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

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

Honors*

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

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

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

Find:

sinA=

cosA=

tanA=

*cscA=

*secA=

*cotA=

sinB=

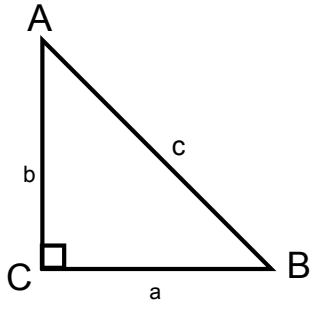
cosB=

tanB=

*cscB=

*secB=

*cotB=



Find:

sinA= sinB=

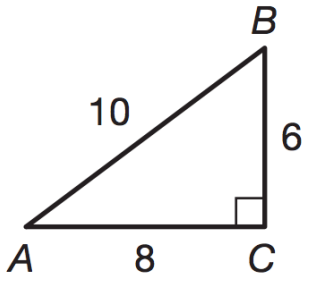
cosA= cosB=

tanA= tanB=

*cscA= *cscB=

*secA= *secB=

*cotA= *cotB=

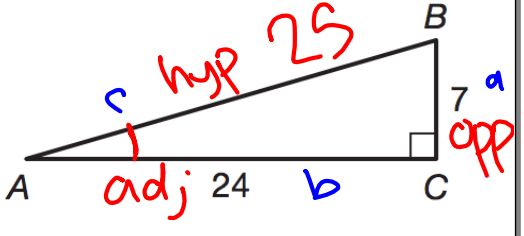


Find: sinA= $\frac{opp}{hyp} = \frac{7}{25}$

SOH CAH TOA

cosA= $\frac{adj}{hyp} = \frac{24}{25}$

tanA= $\frac{opp}{adj} = \frac{7}{24}$



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

$7^2+24^2=c^2$

$49+576=c^2$

$\sqrt{625}=\sqrt{c^2}$

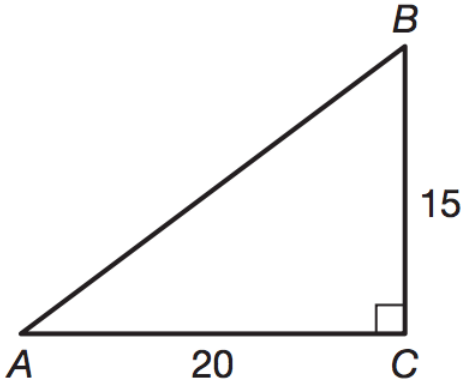
$25=c$

Find:

sinA= *cscA=

cosA= *secA=

tanA= *cotA=

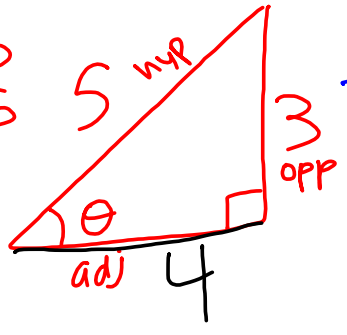


Find the all other trigonometric functions:

(hint: draw a triangle)

cos, tan

$\sin\theta = \frac{3}{5}$ ← opp / hyp



$\cos\theta = \frac{adj}{hyp} = \frac{4}{5}$

$\tan\theta = \frac{opp}{adj} = \frac{3}{4}$

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

$a^2 + 3^2 = 5^2$

$a^2 + 9 = 25$

$-9 \quad -9$

$\sqrt{a^2} = \sqrt{16}$

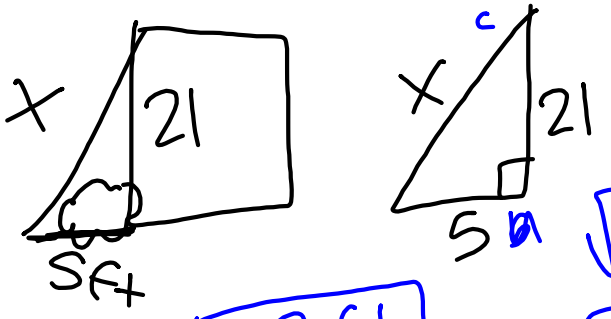
$a = 4$

Find the other six trigonometric functions:

(hint: draw a triangle)

$$\cos\theta = \frac{12}{13}$$

You want to hang up christmas lights on your house. There are bushes around your house, so the ladder has to be set up 5 feet away from your house. If your roof is 21 feet tall, to the nearest foot, how tall does your ladder need to be? Draw a diagram.



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

$5^2 + 21^2 = c^2$

$25 + 441 = c^2$

$\sqrt{466} = \sqrt{c^2}$

21.6

22ft

A moving truck is equipped with a ramp that extends from the back of the truck to the ground. When the ramp is fully extended, it touches the ground 12 feet from the back of the truck. The height of the ramp is 2.5 feet.

Draw a diagram then find the length of the ramp to the nearest tenth of a foot.