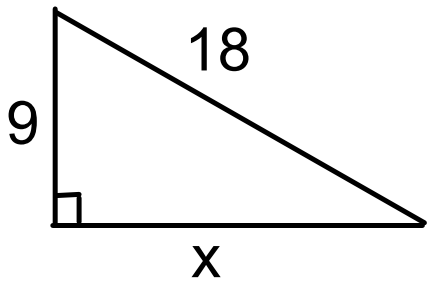
Explain (in words) two ways to solve for the value of x.



Pythagorean Theorem

30-60-90 special right △

Unit 9 Day 6:
Trigonometry
(9.4/9.5) Sine, Cosine and Tangent

Today's I Can Statements:

TR- 5: I can determine the sine, cosine, and tangent ratios.

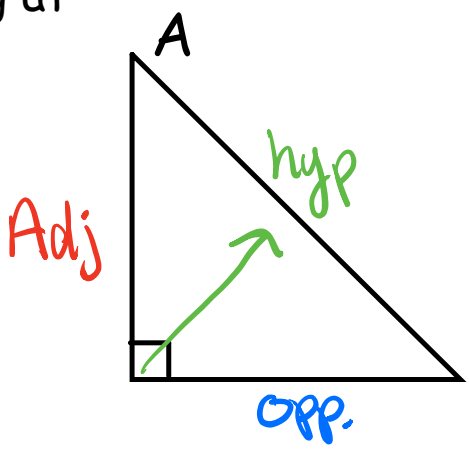
Last time, we learned about special right triangles. We were able to find the missing sides of a triangle without using the pythagorean theorem. But, what if the triangle was not a special triangle? What if we were only given one side of the triangle, but it did not fit any of our known relationships?

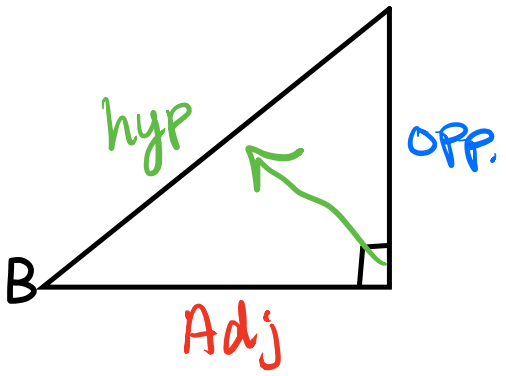
-->We use TRIG!!

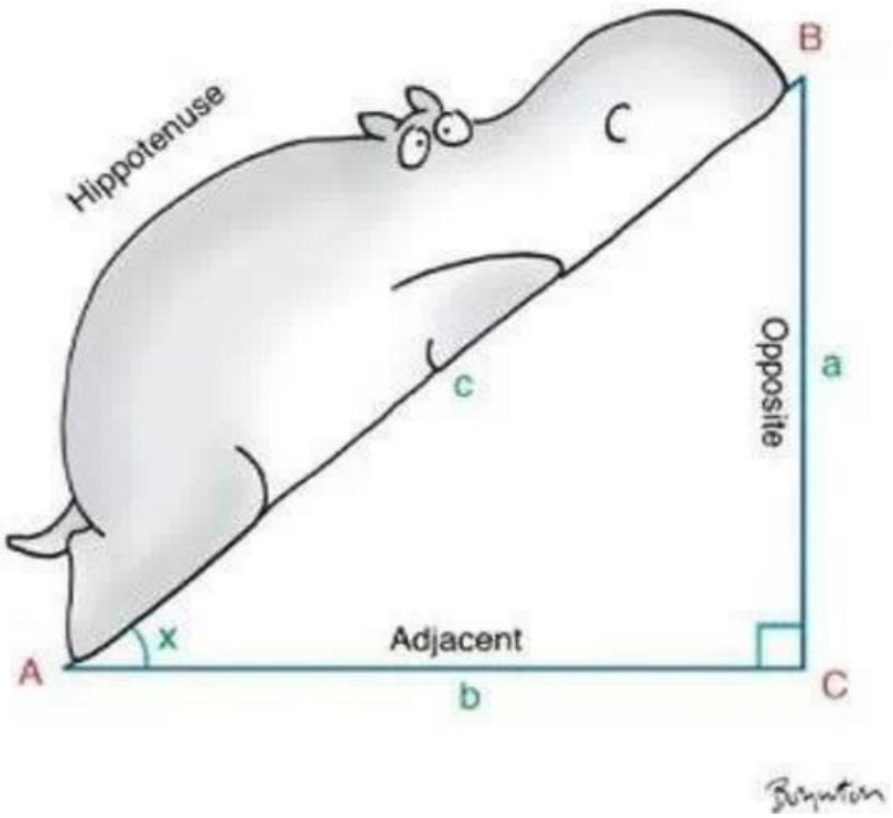
Naming the sides of the triangle.

Opposite Leg, **Adjacent Leg**, and **Hypotenuse**.

The name of the legs is dependent on the angle that you are looking at






B
Hippotenuse
C
c
Opposite
a
x
Adjacent
A
b
C

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

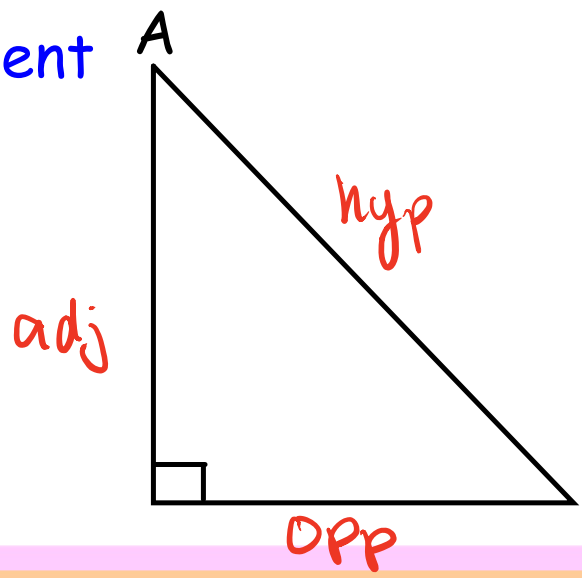
There are 3 common Trigonometric Ratios:

Sine, Cosine, and Tangent

Sine = opposite/hypotenuse SOH

Cosine = adjacent/ hypotenuse CAH

Tangent = opposite/adjacent TOA



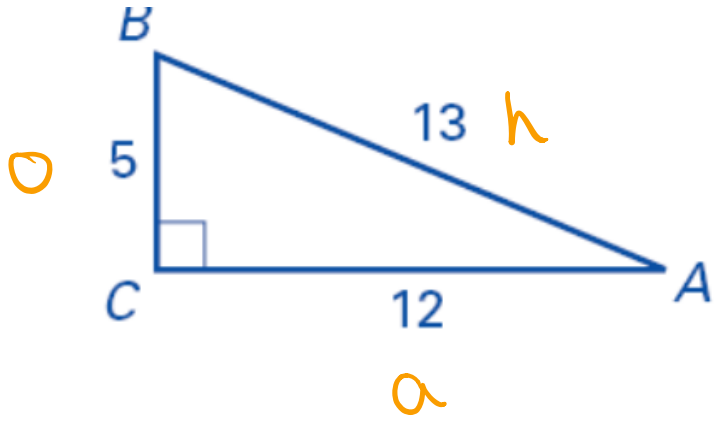
Sine	Cosine	Tangent
Opposite	Adjacent	Opposite
Hypotenuse	Hypotenuse	Adjacent

SOH CAH TOA

SOH - CAH - TOA

Example

Find Sin, Cos, and Tan, of <A



$\sin A = \frac{O}{H} = \frac{5}{13}$

$\cos A = \frac{A}{H} = \frac{12}{13}$

$\tan A = \frac{O}{A} = \frac{5}{12}$

Get out your handy dandy calculator!
(Don't have one? You really need one! Please go buy one)

Check MODE (needs to be in Degree Mode)

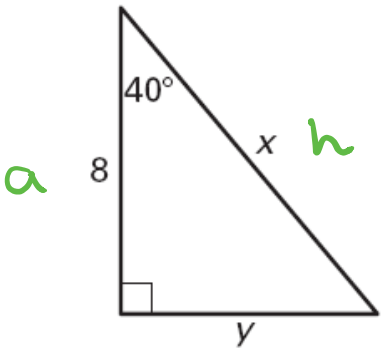
Find:

cos 32 = 0.848

Finding missing sides of a right triangle using the trig. functions.

SOH CAH TOA

1. Figure out what trig functions to use.
2. Set up the trig function with the missing sides.
3. Solve the equation for the missing variable.



a h o

$\cos 40 = \frac{A}{H}$

$x \cdot \cos 40 = \frac{8}{x}$

$\frac{x \cos 40}{\cos 40} = \frac{8}{\cos 40}$

$x = \frac{8}{\cos 40}$

$x = 10.443$

Example

$\frac{O}{A} = \tan 40$

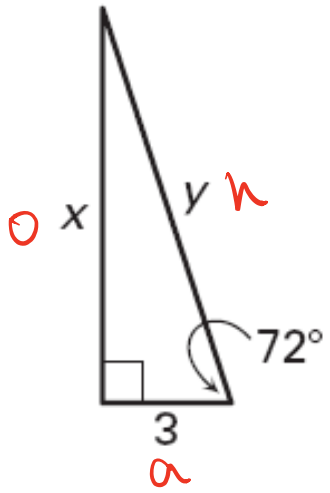
$\frac{y}{8} = \tan 40 \cdot 8$

$y = \tan 40 \cdot 8$

$y = 6.713$

SOH CAH TOA

Try this one:



o
h
a

$\frac{a}{h} = \cos 72$

$\frac{3}{y} = \cos 72$

$\frac{3}{\cos 72} = y$

$y = 9.708$

Example

$\frac{o}{a} = \tan 72$

$\frac{x}{3} = \tan 72 \cdot 3$

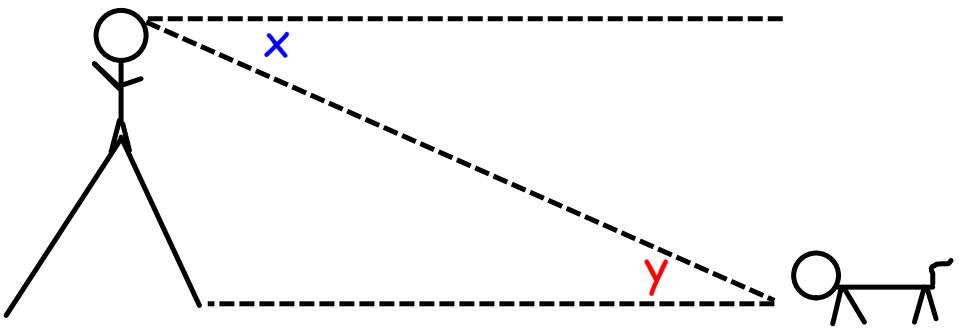
$x = \tan 72 \cdot 3$

$x = 9.233$

Terms:

Angle of Elevation: looking up = y

Angle of Depression: looking down = x

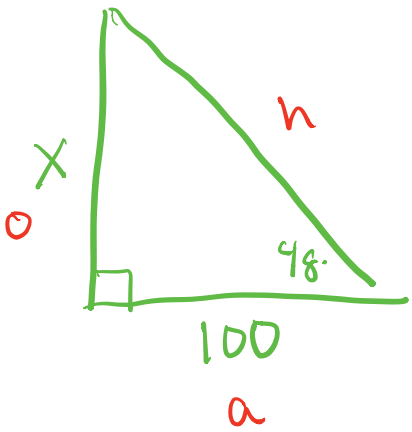


Example

You are measuring the height of a building. You stand 100 feet from the base of the building. You measure the angle of elevation from a point on the ground to the top of the building to be 48°. Estimate the height of the building.

SOH CAH TOA

If no picture is given, draw one!



$$\frac{O}{A} = \tan 48$$

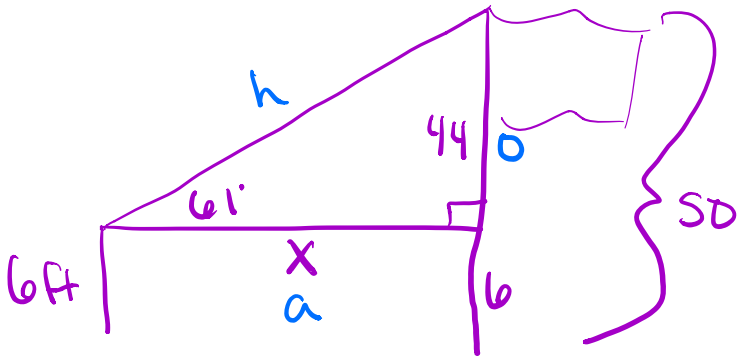
$$\frac{X}{100} = \tan 48 \cdot 100$$

$$X = \tan 48 \cdot 100$$

$$X = 111.06 \text{ ft}$$

SOH CAH TOA

You are 6ft tall looking up at the top of 50 ft flagpole and you measure the angle of elevation to be 61 degrees. How far away are you standing from the base of the flagpole to the nearest foot.



$\frac{O}{A} = \tan$

$\tan 61 = \frac{44}{x}$

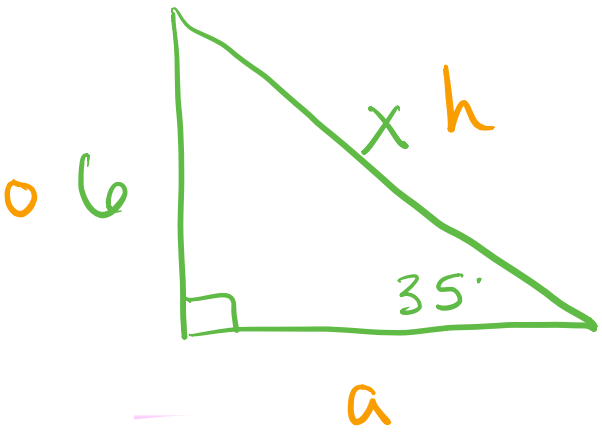
$x = \frac{44}{\tan 61}$

$x = 24.39$

24 feet

SOH CAH TOA

Bentley is throwing a water balloon (from the ground) at his father's head. Bentley figured out that he is throwing at an angle of 35^0. His father is 6 ft tall. What is the distance the water balloon traveled?



$$\frac{o}{h} = \sin$$

$$\frac{6}{x} = \sin 35$$

$$x = \frac{6}{\sin 35}$$

$$x = 10.46 \text{ ft}$$

Tonight's Assignment:

Page 491 #3, 6-10, 15

Page 498 #7, 8, 17-20, 27-30

Planning Ahead:

Unit 9 Quiz will be...

Tuesday 3/3 Wednesday 3/4

Today's I Can Statements:

TR- 5: I can determine the sine, cosine, and tangent ratios.