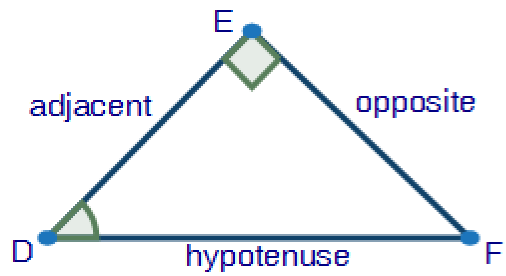
5.02 Solving Right Triangles

Pieces of a Right Triangle Video [Click Here]



A right triangle has two ______________ and a _______________________________. However, if you look at the triangle from a specific angle, you can classify the legs according to their position.

Take a look at ΔDEF from ∠D.

Side DF is the _________________ because it is across from the right angle.

Side EF is the ______________________ leg because it is directly opposite from ∠D.

Side DE is the _________________ leg because it is next to ∠D.

If you focus on a different angle, the names of the _____________ will change.

Take a look at ΔDEF from ∠F.

$\overline{DE}$:___________________

$\overline{EF}$:___________________

$\overline{DF}$:___________________

Trigonometric Functions Video [Click Here]

The **trigonometric functions** are functions of an angle. They are used to relate the ______________________ of a right triangle to the lengths of the _____________________ of a right triangle.

Here are the three basic trigonometric functions shown as ratios:
***Always label the triangle with the hypotenuse, the opposite and adjacent sides to help you set up the ratio!**

Sine	Cosine	Tangent
$sin\ \theta = \frac{opposite}{hypotenuse}$	$cos\ \theta = \frac{adjacent}{hypotenuse}$	$tan\ \theta = \frac{opposite}{adjacent}$
$sin\ B =$ ____________	$cos\ B =$ ____________	$tan\ B =$ ____________

Similar Triangles and Trigonometric Functions Video [Click Here]

In the image, two ________________ triangles are shown with angle Θ marked by point C. The symbol Θ is the greek symbol for ____________.

Let's set up the trigonometric ratios of Θ:

Small Triangle:

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

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

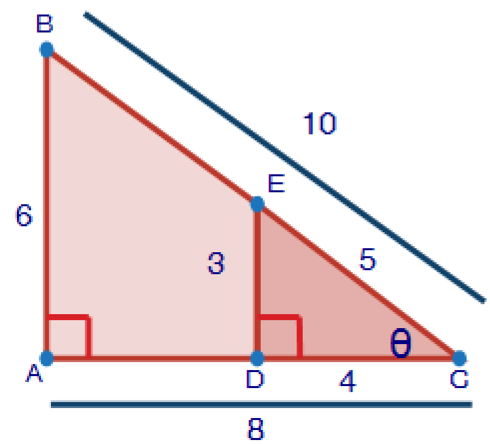
$tan\ \theta = \frac{opp}{adj} = \_\_\_\_$

Large Triangle:

$sin\ \theta = \frac{opp}{hyp} = \frac{6}{10} = \_\_\_\_$

$cos\ \theta = \frac{adj}{hyp} = \frac{8}{10} = \_\_\_\_$

$tan\ \theta = \frac{opp}{adj} = \frac{6}{8} = \_\_\_\_$



The trigonometric ratios for ____________________ triangles are the same!

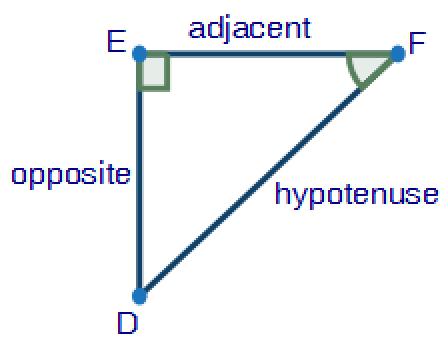
Trigonometric Functions (SOH-CAH-TOA) Video [Click Here]

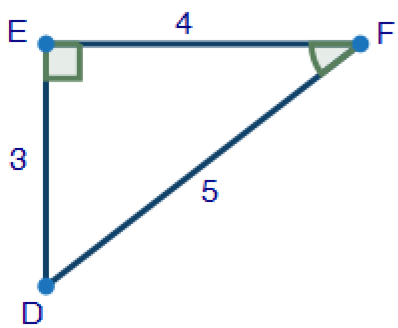
There are many ways to remember the trigonometric functions and one way is SOH-CAH-TOA.

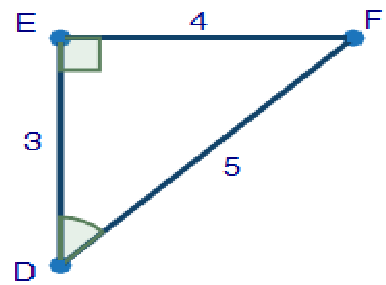
S O H

C A H

T O A







Let's take a look at right triangle DEF from the perspective of ∠F.

$sin\ F\ = \frac{opp}{hyp} = \_\_\_\_\_$

$cos\ F\ = \frac{adj}{hyp} = \_\_\_\_\_$

$tan\ F\ = \frac{opp}{adj} = \_\_\_\_\_$

Be very careful, though! If you focused on ∠D instead of ∠F, the values for sine, cosine, and tangent would be different.

$sin\ D\ = \frac{opp}{hyp} = \_\_\_\_\_$

$cos\ D\ = \frac{adj}{hyp} = \_\_\_\_\_$

$tan\ D\ = \frac{opp}{adj} = \_\_\_\_\_$

Tangent and Slope Video [Click Here]

First look at tangent of angle A.

$tan\ A\ = \frac{opposite}{adjacent} = \_\_\_\_\_.$

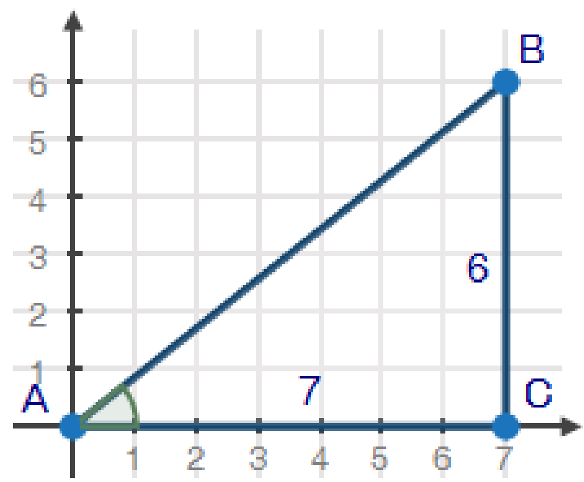
Now slope, to find the _____________ of a line, you could use the formula:

$m\ = \frac{rise}{run} = \_\_\_\_$

Now put it all together and you get:

$tan\ A\ = \frac{opposite}{adjacent} = \_\_\_\_\_ = \frac{rise}{run} = slope\ AB$

$tan\ A\ = slope\ AB$

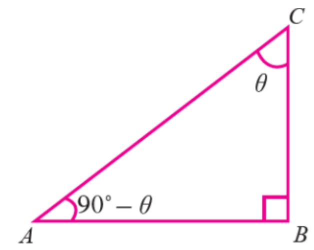


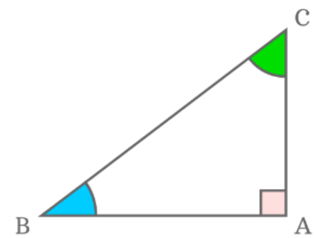
Complementary Angles in Right Triangles Video [Click Here]

Review: All the angles in a triangle add up to ______°.

Two angles are __________________________ if their sums are 90°.

In a right triangle, the two angles that are ______the right angle will always add up to ________, therefore they are always _________________.





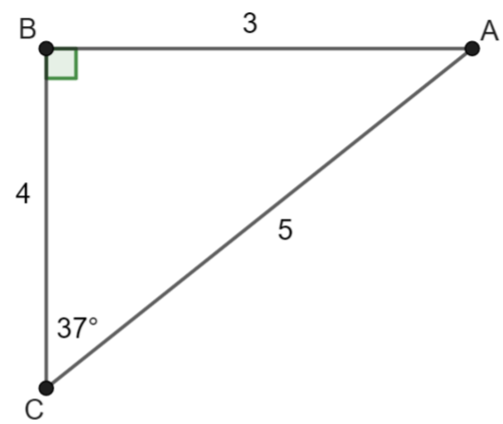
Special Relationships between Sine & Cosite Video [Click Here]

There is a special relationship that occurs between sine and cosine in a right triangle.

Let's look at the sine and cosine of these angles.

	∠C = 37	∠A = ____°
sin θ		
cos θ		

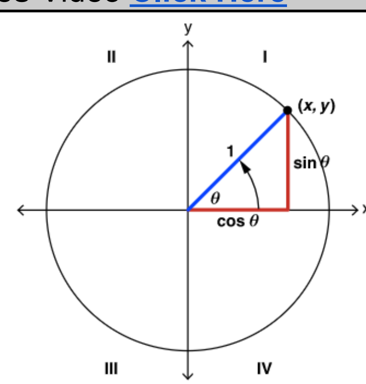
The sine and cosine of ___________________ angles will always be ________________.



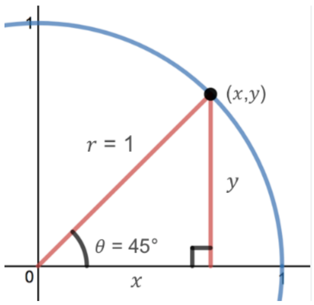
Trig Functions, The Unit Circle, and Special Right Triangles Video [Click Here]

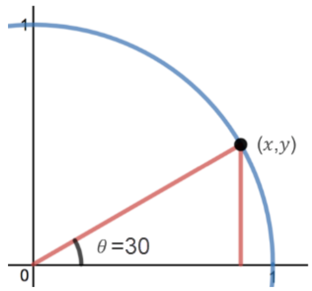
We can use our special right triangles to help us find values on the coordinate plane.

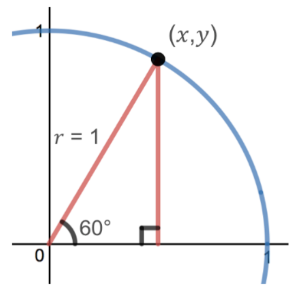
The Unit Circle is a Circle with the center at the _____________ and a radius of ______.



Example Video [Click Here]
We can use the properties of special right triangles to determine ___________ _____________ of the trigonometric functions. *Note the calculator can help you with decimal answers, but not the exact values.







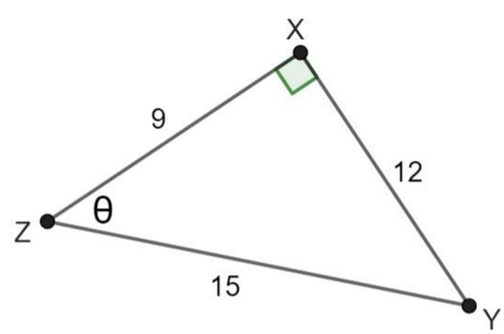
$cos\ 45° =$__________ $cos\ 30° =$__________ $cos\ 60° =$__________

$sin\ 45° =$__________ $sin\ 30° =$__________ $sin\ 60° =$__________

Angle Θ	**0**	**30°**	**45°**	**60°**	**90°**
cos Θ	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
sin Θ	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1

Practice

Question 1 Video [Click Here]
Set up the three trigonometric ratios for the triangle for angle θ.



Question 2 Video [Click Here]

Fill in the blank below.

$If\ the\ sin\ 30° = \frac{1}{2},\ then\ cos\_\_\_\_\_° = \_\_\_\_\_\_\_.$

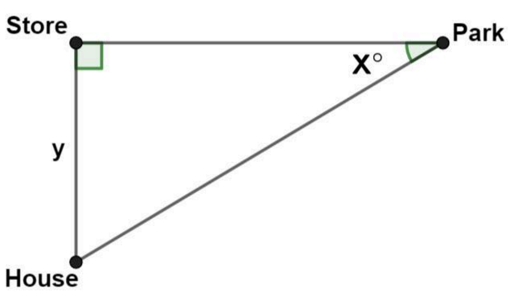
Question 3 Video [Click Here]

If 0° < x ≤ 90° and sin(8x)° = cos(4x + 6)°, what is the value of x?

Question 4 Video [Click Here]

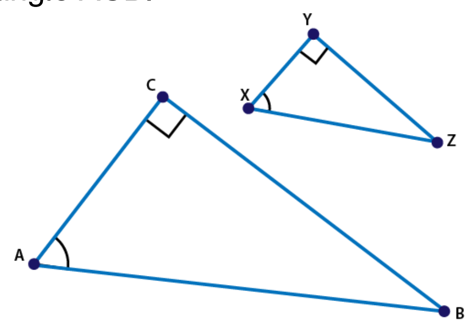
A house forms a right triangle with the grocery store and the park. A jogger knows the angle x and the distance y between the grocery store and the house.

Write an equation to find the distance(z) from the Store to the Park.



Question 5 Video [Click Here]

Triangle XYZ is dilated by a scale factor of 2 to get triangle ACB.



A) If $sin\ x = 8/10.6$, what are the lengths of CB and AB?

B) Explain the special relationship between the trigonometric ratios of triangles XYZ and ACB.

Question 6 Video [Click Here]
Find the value of sin x° and cos y°. What relationship do the ratios of sin x° and cos y° share?