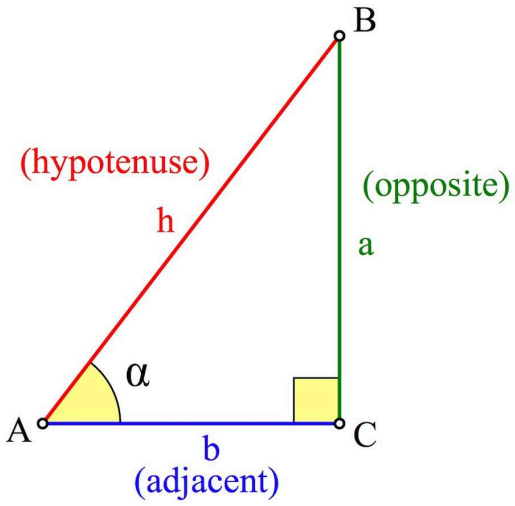
Lesson 4: Trigonometry: Finding Angle Measures



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Benchmark(s):
9.3.4.1 Understand how the properties of similar right triangles allow the trigonometric ratios to be defined, and determine the sine, cosine and tangent of an acute angle in a right triangle.
9.3.4.2 Apply the trigonometric ratios sine, cosine and tangent to solve problems, such as determining lengths and areas in right triangles and in figures that can be decomposed into right triangles. Know how to use calculators, tables or other technology to evaluate trigonometric ratios.
9.3.4.3 Use calculators, tables or other technologies in connection with the trigonometric ratios to find angle measures in right triangles in various contexts.

Essential Question(s):
How do the trigonometric ratios help us find unknown values?

Learning Target(s):
I can identify the opposite side, adjacent side, and hypotenuse given a reference angle in a right triangle.
I can set up and solve a trigonometric equation to find a missing side length.

Vocabulary/Theorems:
Hypotenuse--The longest side of a right triangle; always across from the right angle
Opposite--Across from
Adjacent--Next to

What's Your Angle?

In our last section, we looked at how we use trigonometry to find unknown side lengths in a right triangle, given a side and an angle (other than the right angle). The awesome thing about trig is it's abilities don't stop there! We can also use trigonometry to find unknown angles if we're given two side lengths on any right triangle. How? Read on to find out.

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In the previous concept we used the trigonometric functions sine, cosine and tangent to find the ratio of particular sides in a right triangle given an angle. In this concept we will use the inverses of these functions, $\sin^{-1}$, $\cos^{-1}$ and $\tan^{-1}$, to find the angle measure when the ratio of the side lengths is known. When we type $\sin 30^\circ$ into our calculator, the calculator goes to a table and finds the trig ratio associated with 30°, which is $\frac{1}{2}$. When we use an inverse function we tell the calculator to look up the ratio and give us the angle measure. For example: $\sin^{-1}\left(\frac{1}{2}\right) = 30^\circ$. On your calculator you would press 2^{ND}SIN to get $\text{SIN}^{-1}($ and then type in $\frac{1}{2}$, close the parenthesis and press ENTER. Your calculator screen should read $\text{SIN}^{-1}\left(\frac{1}{2}\right)$ when you press ENTER.