Math 155 - Trigonometry Review

Definition: Trigonometry is the study of triangles.

Recall: 1. A triangle is a shape with 3 angles and 3 sides.

2. The measures of the 3 angles add up to 180°

3. **Definition:** Two triangles are called *similar* to each other if one can be scaled (enlarged or reduced) to get the other.

4. Two triangles are similar if they have the same 3 angles.

Note: If triangles share 2 angles, the 3^{rd} must be the same because they add up to 180

Definition: A triangle with a 90° angle is called a *right triangle*

Observation: If two right triangles share a second angle then, by our above Note, they must have the same third angle. Thus, the two triangles are similar.

Conclusion: All right triangles with second angle α are similar.

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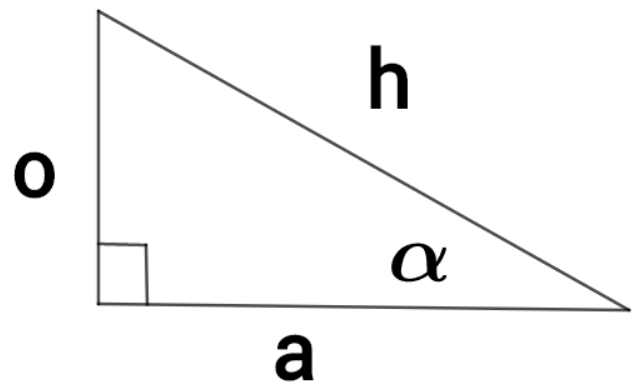
In General: For a right triangle with angle α, the ratio of $\frac{\textit{opposite}}{\textit{hypotenuse}}$ is the same. In particular, the amount the triangle is scaled larger or smaller does not change that ratio.

Definition: The ratio of $\frac{\textit{opposite}}{\textit{hypotenuse}}$ is called the $\sin(\alpha)$. i.e.

$$\sin(\alpha) = \frac{\textit{opp}}{\textit{hypo}}$$

$$\cos(\alpha) = \frac{\textit{adj}}{\textit{hyp}}$$

$$\tan(\alpha) = \frac{\textit{opp}}{\textit{adja}}$$



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Notice that sine, cosine, and tangent are known for all right triangles with a given angle, and depend only on the angle.

Because of this, these values can be found with our calculators depending on just the angle.

If we know the sine (or cosine, or tangent) of an angle then can we find the angle itself?

To get α we use, what is called *inverse* sine (or cosine or tangent)

In General: If we know the sine of an angle: $\sin(\alpha) = x$ then we can find the angle α using the inverse sine: $\sin^{-1}(x) = \alpha$