Trigonometry

I think it may be time. We've looked at angles, we've spun an object. It's time for: *soh cah toa*. Yes, *soh cah toa*. This seemingly nonsensical word is actually the foundation for a lot of computer graphics work. A basic understanding of trigonometry is essential if you want to calculate an angle, figure out the distance between points, work with circles, arcs, or lines. And *soh cah toa* is a mnemonic device (albeit a somewhat absurd one) for what the trigonometric functions sine, cosine, and tangent mean.

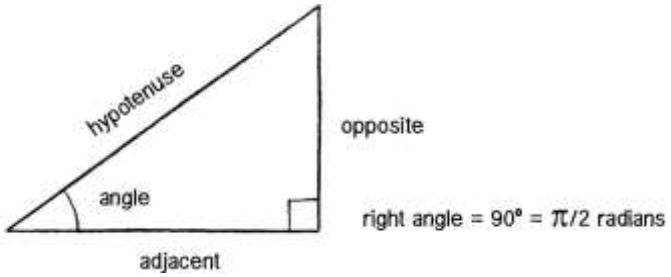

Diagram of a triangle

- ***soh***: sine = opposite / hypotenuse
- ***cah***: cosine = adjacent / hypotenuse
- ***toa***: tangent = opposite / adjacent

  Take a look at the above diagram again. There's no need to memorize it, but make sure you feel comfortable with it. Draw it again yourself. Now let's draw it a slightly different way:

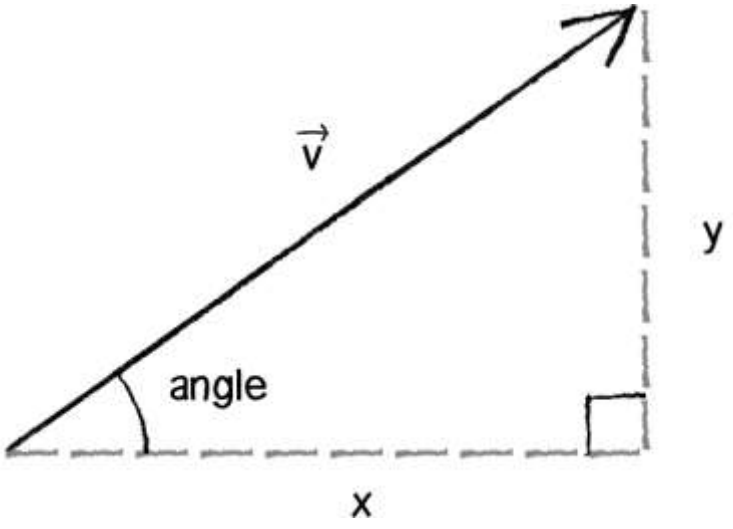

Diagram of triangle using vectors

See how we create a right triangle out of a vector? The vector arrow itself is the hypotenuse and the components of the vector (x and y) are the sides of the triangle. The angle is an additional means for specifying the vector's direction (or "heading").

Because the trigonometric functions allow us to establish a relationship between the components of a vector and its direction + magnitude, they will prove very useful throughout this course. We'll begin by looking at an example that requires the tangent function.