Class Discussion: Right Triangle Trig

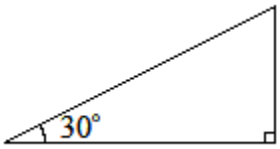
The theme of the "adventure in trigonometry" that we've taken so far is **periodic functions**:

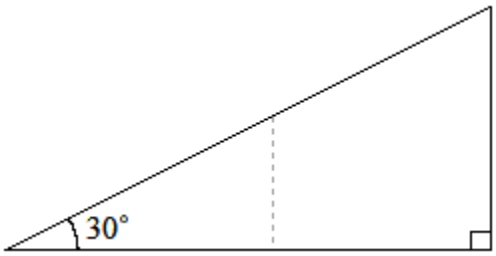
We studied the simplest of periodic behaviors (rotation around a circle), and we generated the (periodic) sine and cosine functions; then we solved equations involving these periodic functions and we found *infinitely* many solutions *because* of the periodic nature of these functions. Even though we've been studying "**trigonometry**" – a term that means, approximately, "**measuring triangles**" – we haven't studied triangles! We've studied rotation around a circle in order to generate periodic functions.

A fascinating feature of trigonometry (and many branches of mathematics) is that there is more than one way to approach it. We're starting the second half of our class with a different approach to trigonometry: right triangles.

Instead of any consideration about rotation around a circle or periodicity, a different approach to trigonometry relies on the **similarity** of all right triangles that have a common angle (besides the right angle).

All right triangles with a common angle are **similar**, and the **geometry** of similar figures tells us that, for any two right triangles with a common angle, the ratio of lengths of corresponding sides is the same. So, for these "30 degree right triangles" the ratio of the side "opposite" the angle and the hypotenuse is, necessarily, the same.

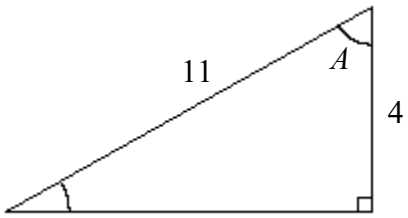




Let's investigate the history of trigonometry through the etymology of the word "sine" by starting with this Wikipedia page: https://en.wikipedia.org/wiki/Sine_and_cosine.

	term	reason
now	sine	Because of sinus.
before	sinus	
before-er	jiab ⇑ jb ⇑ jiba	
before-er-er-er	jya / jiva	In India, approximately 2000 years ago, a function was defined with input "arc-length of circle" and output "chord-length." This was associated to the string on a bow (from a bow-and-arrow), so the Sanskrit word "jya" was used."
before-est	?	?

EXAMPLE: Find the six trig values for the angle A in the triangle below.



EXAMPLE: Solve the triangle below by finding the values of missing sides/angles; approximations are appropriate but be sure to denote them correctly; provide angle measures in degrees.