Mr. Baroody's Web Page
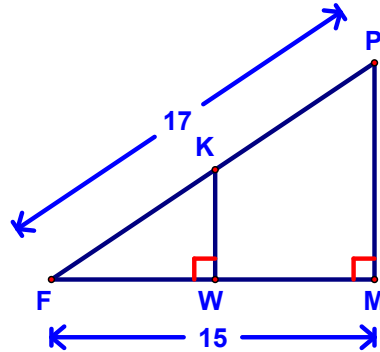
Lesson 9.9 - Introduction to Trigonometry

Here's the warmup!

$\overline{KW} \perp \overline{FM}$
PF = 17
FM = 15

Find $\dfrac{KW}{FW}$

Today, we're going to start to look at the ratios that exist in all right triangles - the study of these and how to use them is called Trigonometry. Let's begin by looking at a right triangle which has one 30° angle.
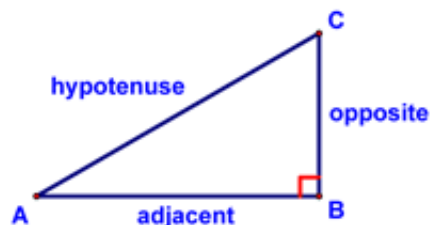
With that triangle (shown below), notice that we can calculate three ratios - the first being the ratio of the side opposite the angle to the hypotenuse. Also note that these ratios are the same for *any right triangle with a 30° angle, no matter how big the sides are!*

m∠CAB = 30°

$$\frac{m \ opposite}{m \ hypotenuse} = 0.50$$

$$\frac{m \ adjacent}{m \ hypotenuse} = 0.87$$

$$\frac{m \ opposite}{m \ adjacent} = 0.58$$

These ratios are called the sine, cosine, and tangent of the given angle. Since these are commonly used functions, most calculators have them available as buttons. Sketchpad is no different - below, I show that these are the same as the ratios we calculated:

m∠CAB = 30°
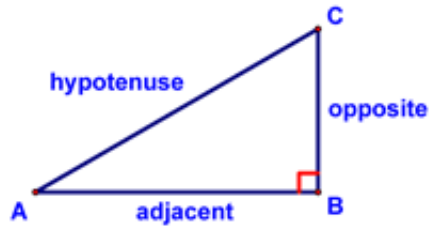
$$\frac{\text{m opposite}}{\text{m hypotenuse}} = 0.50 \qquad \sin(\text{m}\angle\text{CAB}) = 0.50$$

$$\frac{\text{m adjacent}}{\text{m hypotenuse}} = 0.87 \qquad \cos(\text{m}\angle\text{CAB}) = 0.87$$

$$\frac{\text{m opposite}}{\text{m adjacent}} = 0.58 \qquad \tan(\text{m}\angle\text{CAB}) = 0.58$$

Note that these ratios change based on the measure of the angle. The table below shows some values for these ratios with different angle measurements:

m∠CAB = 30°

$$\frac{\text{m opposite}}{\text{m hypotenuse}} = 0.50 \qquad \sin(\text{m}\angle\text{CAB}) = 0.50$$

$$\frac{\text{m adjacent}}{\text{m hypotenuse}} = 0.87 \qquad \cos(\text{m}\angle\text{CAB}) = 0.87$$

$$\frac{\text{m opposite}}{\text{m adjacent}} = 0.58 \qquad \tan(\text{m}\angle\text{CAB}) = 0.58$$

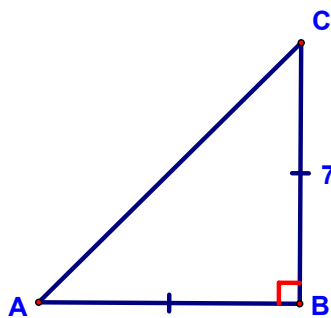| m∠CAB	sin(m∠CAB)	cos(m∠CAB)	tan(m∠CAB)
0.00°	0.00	1.00	0.00
9.90°	0.17	0.99	0.17
20.20°	0.35	0.94	0.37
29.92°	0.50	0.87	0.58
40.02°	0.64	0.77	0.84
50.04°	0.77	0.64	1.19
59.99°	0.87	0.50	1.73
69.99°	0.94	0.34	2.75
80.00°	0.98	0.17	5.67
89.79°	1.00	0.00	275.11
30°	0.50	0.87	0.58
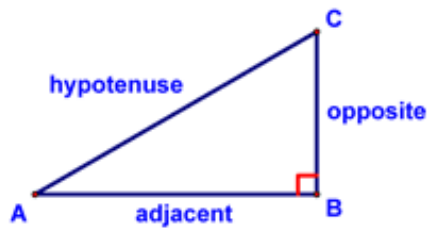
A great way of remembering these ratios is called **SOHCAHTOA**. Sine = Opposite/Hypotenuse, Cosine = Adjacent/Hypotenuse, and Tangent = Opposite/Adjacent. Remember that!!

Let's see if you can use that to solve the following example, leaving your answers in fractional form:
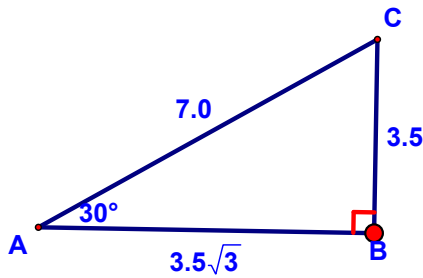
Find sin, cos, and tan for ∠A and ∠C in the triangle shown.

Now, try it again with the following example:

Find sin, cos, and tan for ∠A and ∠C in the triangle shown.