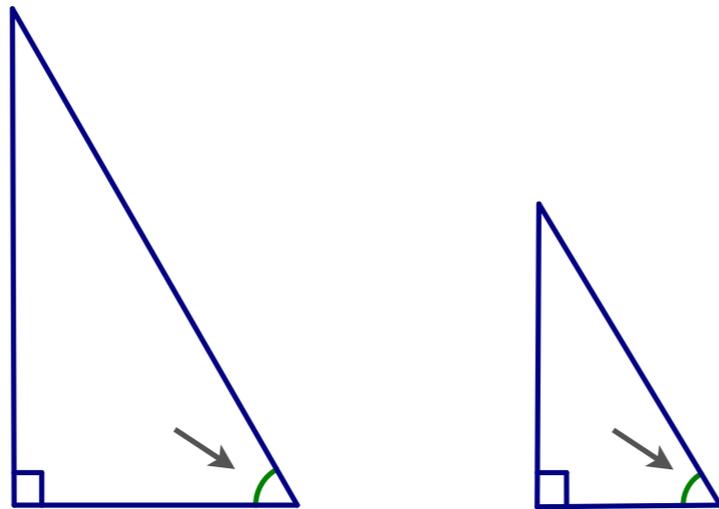


Defining Trigonometric Ratios (5.8.1)

May 19th, 2020

*Since all right triangles already have one pair of corresponding angles that are the same, it only takes one more pair of congruent angles to make the triangles similar by AA.

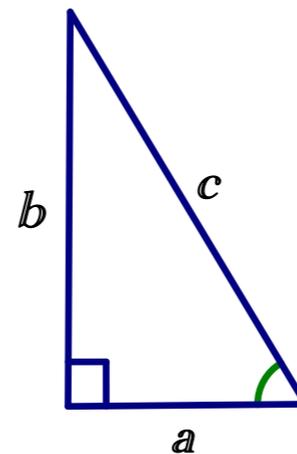
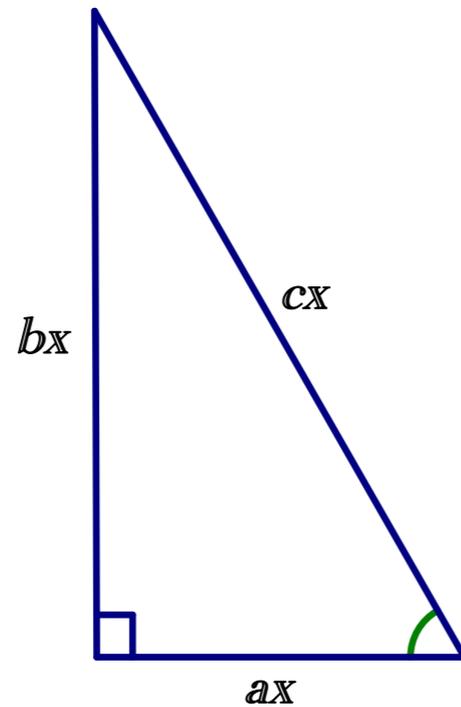


*Since similar triangles have proportional sides, this means that all similar right triangles must have the same side ratios.

$$\frac{bx}{ax} = \frac{b}{a}$$

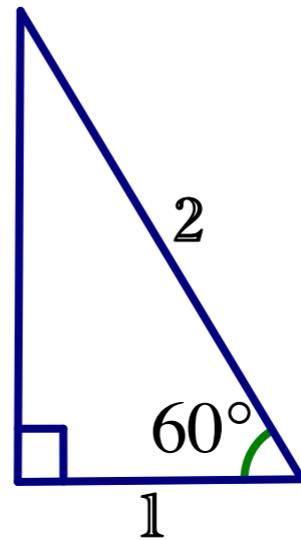
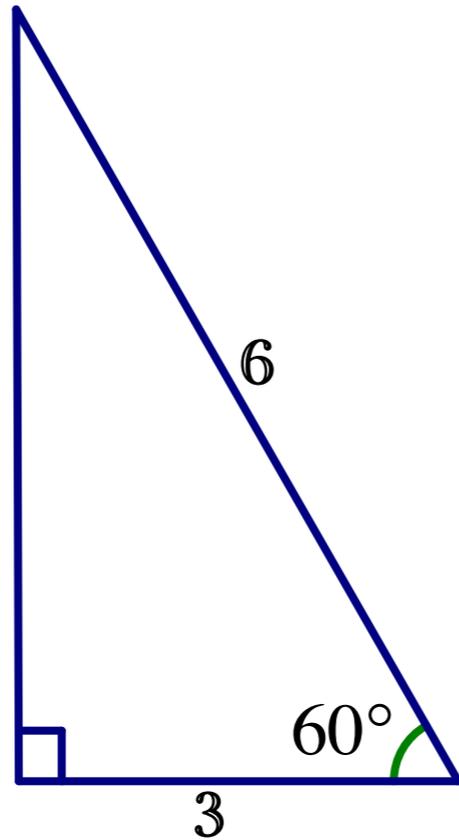
$$\frac{cx}{bx} = \frac{c}{b}$$

$$\frac{cx}{ax} = \frac{c}{a}$$



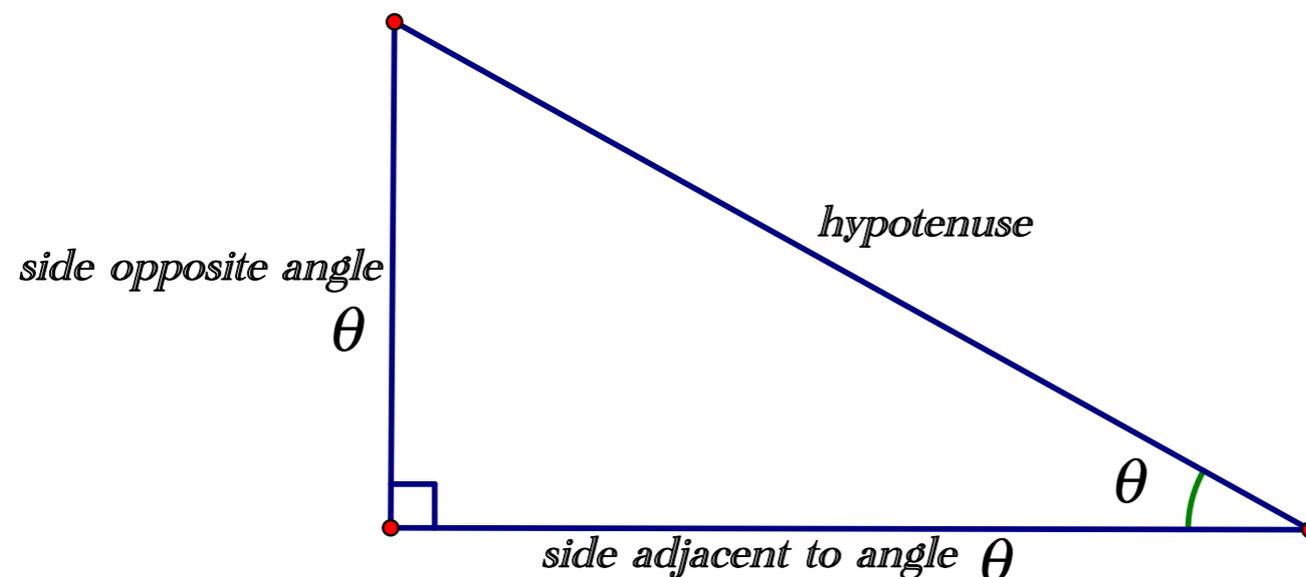
*So given a particular side ratio in a triangle, we should be able to determine the acute angle measures of that triangle (given that all similar triangles have the same angle measures).

$$\frac{6}{3} = \frac{2}{1} = 2$$



Trigonometric Ratios

The trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) represent the ratios of certain sides of right triangles from the perspective of one of its acute angles. The sides used in each ratio are identified by their position from the angle of perspective, i.e., the side opposite the angle, the side adjacent to the angle, and the hypotenuse of the triangle.



SOH CAH TOA (for trig ratios)

Trigonometric Functions

-sine of angle θ :

$$\sin \theta = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

-cosine of angle θ :

$$\cos \theta = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

-tangent of angle θ :

$$\tan \theta = \frac{\textit{opposite}}{\textit{adjacent}}$$

Reciprocal Trigonometric Functions

-cosecant of angle θ :

$$\csc \theta = \frac{\textit{hypotenuse}}{\textit{opposite}}$$

-secant of angle θ :

$$\sec \theta = \frac{\textit{hypotenuse}}{\textit{adjacent}}$$

-cotangent of angle θ :

$$\cot \theta = \frac{\textit{adjacent}}{\textit{opposite}}$$

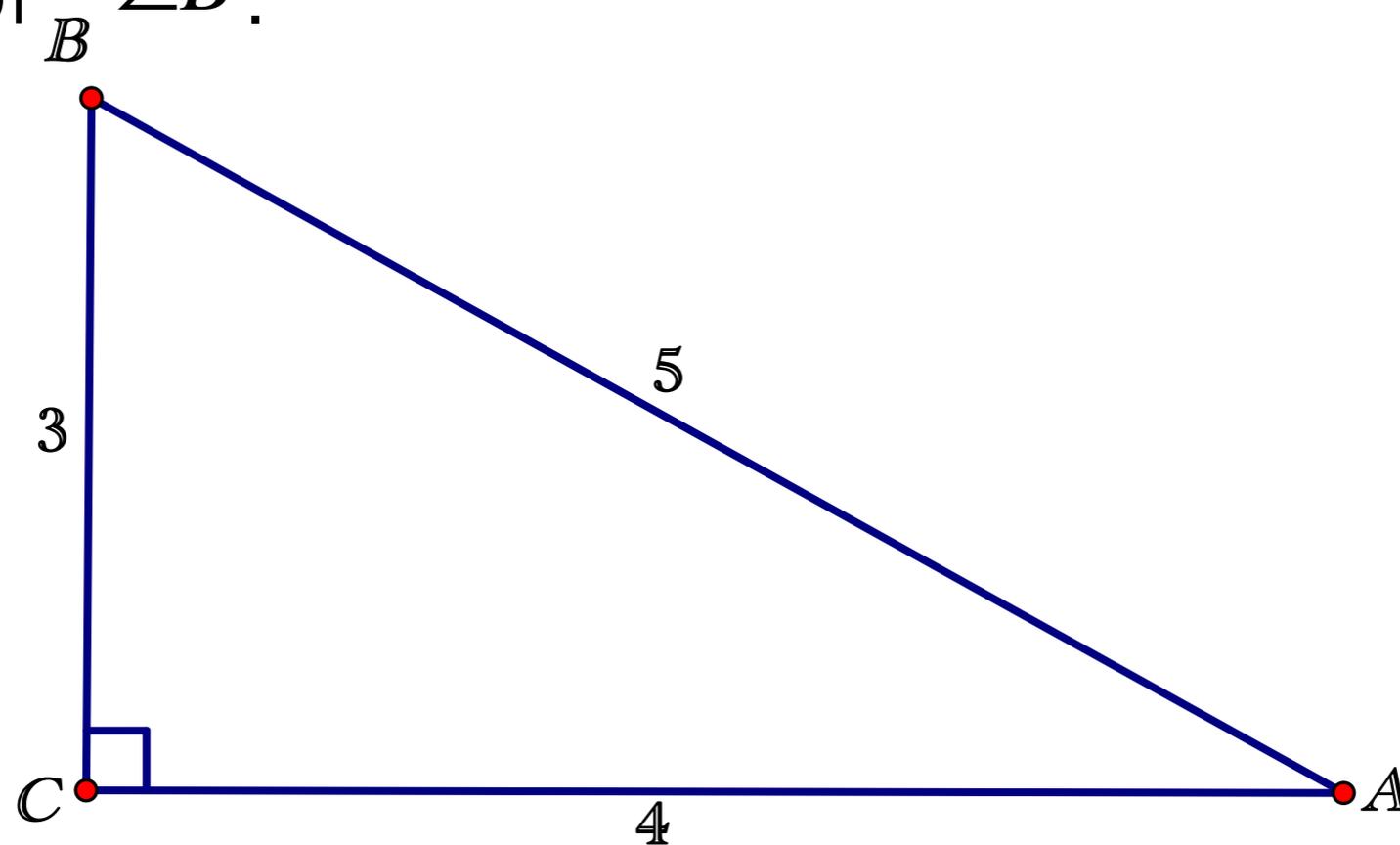
Ex 1: For the given triangle, set up and calculate each of the following.

(a) The trigonometric ratios for the sine, cosine and tangent of $\angle A$.

(b) The trigonometric ratios for the cosecant, secant, and cotangent of $\angle A$.

(c) The trigonometric ratios for the sine, cosine and tangent of $\angle B$.

(d) The trigonometric ratios for the cosecant, secant, and cotangent of $\angle B$.



Let's say we knew that $m\angle B \approx 53.13^\circ$. Calculate

$$\sin 53.13^\circ$$

$$\cos 53.13^\circ$$

$$\tan 53.13^\circ$$

*How do these answers compare to the corresponding trigonometric ratios of $\angle B$ you found in part C?

Ex. 2: Ms. Manzano-Tackett is 5'4" tall and casts a shadow that is 7' long. Her daughter, Kaylee, is 2.5' tall. How long will Kaylee's shadow be if she is standing right next to Ms. Manzano-Tackett? What is the tangent of the angle of elevation from the furthest end of each of their shadows to the tops of their heads? Do you think we can use that information to find the measure of the angle of elevation?