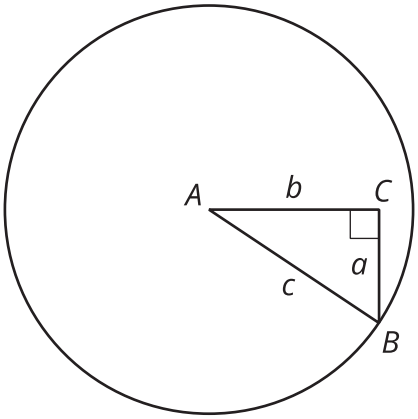
Unit 6, Lesson 2

# Revisiting Right Triangles

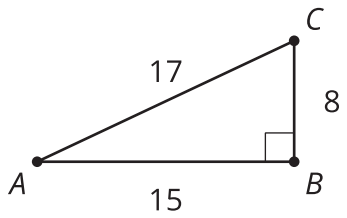
Let's recall and use some things we know about right triangles.

## 2.1 A Right Triangle



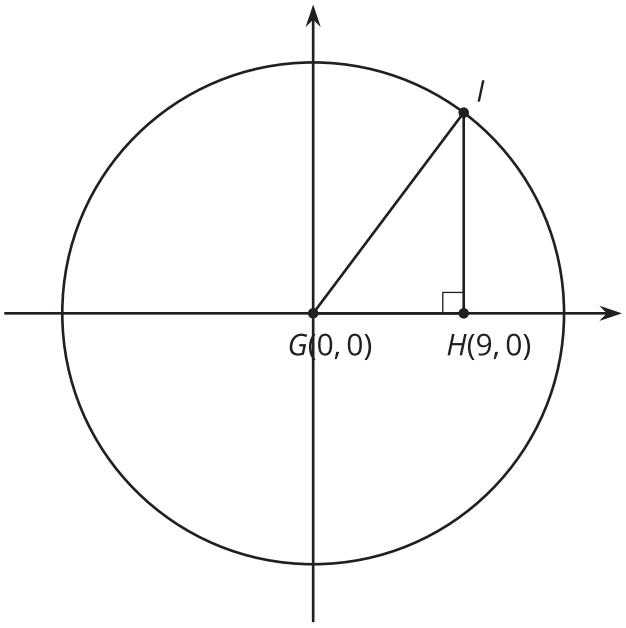
# 2.2 Recalling Right Triangle Trigonometry

1. Find $\cos(A)$, $\sin(A)$, and $\tan(A)$ for triangle $ABC$.



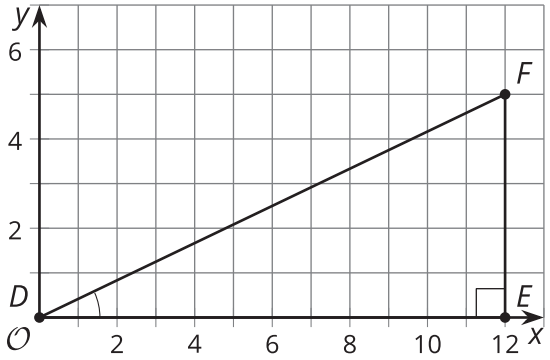

2. Sketch a triangle $DEF$ where $\sin(D) = \cos(D)$ and $E$ is a right angle. What is the value of $\tan(D)$ for this triangle? Explain how you know.

3. If the coordinates of point $I$ are $(9, 12)$, what is the value of $\cos(G)$, $\sin(G)$, and $\tan(G)$ for triangle $GHI$? Explain or show your reasoning.

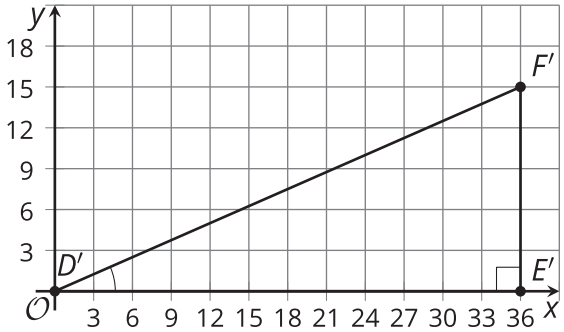


# 2.3 Shrinking Triangles

1. What are $\cos(D)$, $\sin(D)$, and $\tan(D)$? Explain how you know.



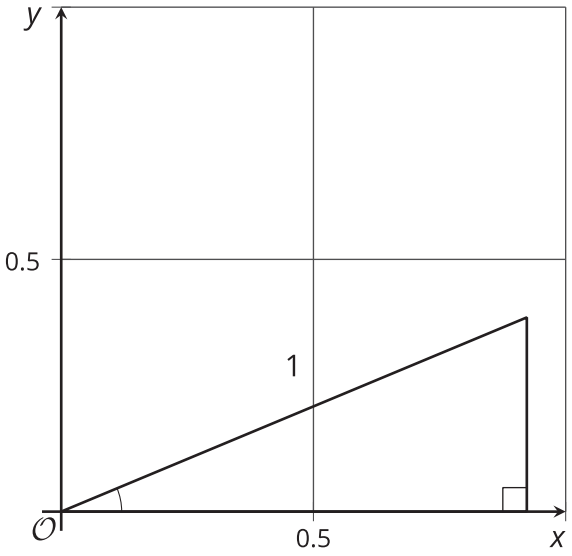

2. Here is a triangle similar to triangle $DEF$.




   a. What is the scale factor from triangle $DEF$ to triangle $D'E'F'$? Explain how you know.

   b. What are $\cos(D')$, $\sin(D')$, and $\tan(D')$?

3. Here is another triangle similar to triangle $DEF$.




a. Label the triangle $D''E''F''$.

b. What is the scale factor from triangle $DEF$ to triangle $D''E''F''$?

c. What are the coordinates of $F''$? Explain how you know.

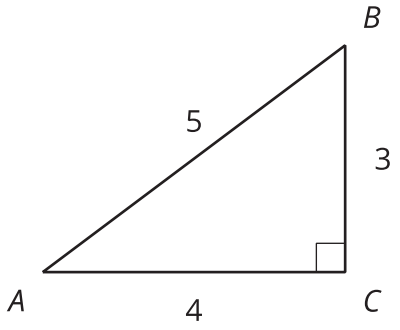
d. What are $\cos(D'')$, $\sin(D'')$, and $\tan(D'')$?

## Are you ready for more?

Angles $C$ and $C'$ in triangles $ABC$ and $A'B'C'$ are right angles. If $\sin(A) = \sin(A')$, is that sufficient to show that $\triangle ABC$ is similar to $\triangle A'B'C'$? Explain your reasoning.

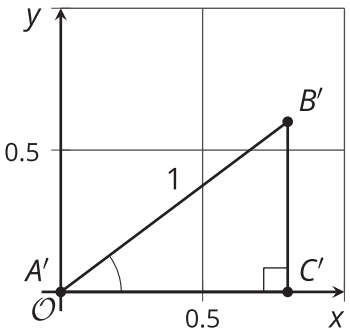
## Lesson 2 Summary

Recall that the ratios of side lengths in similar right triangles are equivalent.




In this triangle, the cosine of angle $A$ is the ratio of the length of the side adjacent to angle $A$ to the length of the hypotenuse, or $\cos(A) = \frac{4}{5}$. The sine of angle $A$ is the ratio of the length of the side opposite angle $A$ to the length of the hypotenuse, or $\sin(A) = \frac{3}{5}$. The tangent of angle $A$ is the ratio of the length of the side opposite angle $A$ to the length of the side adjacent to angle $A$, or $\tan(A) = \frac{3}{4}$.

Now consider triangle $A'B'C'$, which is similar to triangle $ABC$ with a hypotenuse of length 1 unit. Here is a picture of triangle $A'B'C'$ on a coordinate grid:




Since the two triangles are similar, angles $A$ and $A'$ are congruent. So how do the values of cosine, sine, and tangent of these angles compare to the angles in triangle $ABC$? It turns out that since all three values are ratios of side lengths, $\cos(A) = \cos(A')$, $\sin(A) = \sin(A')$, and $\tan(A) = \tan(A')$.

Notice that the coordinates of $B'$ are $\left(\frac{4}{5}, \frac{3}{5}\right)$ because segment $A'C'$ has length $\frac{4}{5}$ and segment $B'C'$ has length $\frac{3}{5}$. In other words, the coordinates of $B'$ are $(\cos(A'), \sin(A'))$.