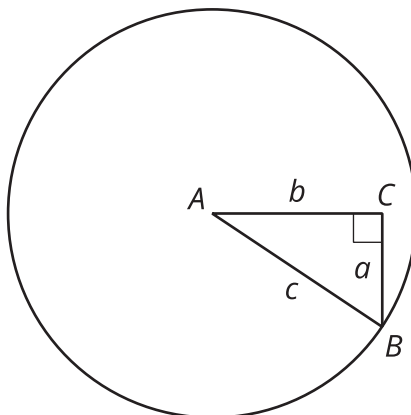


## Lesson 2: Revisiting Right Triangles

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

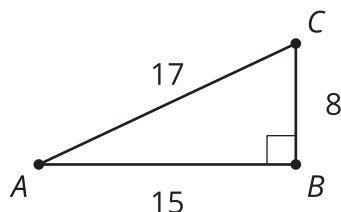
### 2.1: Notice and Wonder: A Right Triangle

What do you notice? What do you wonder?



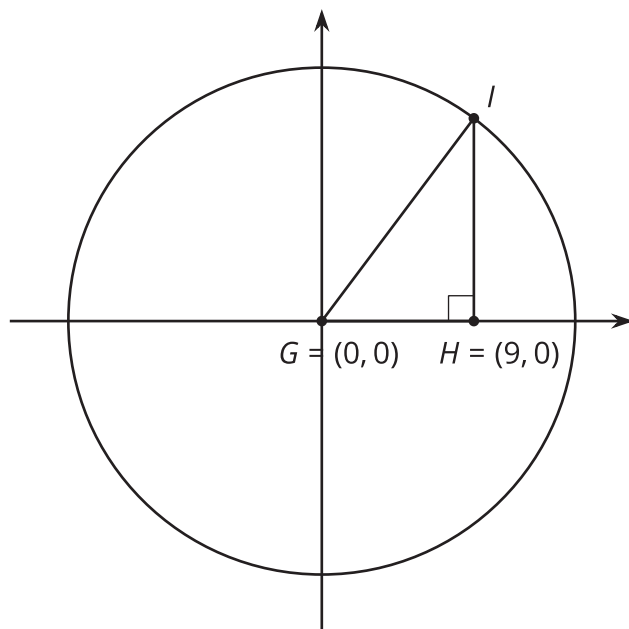
## 2.2: Recalling Right Triangle Trigonometry

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



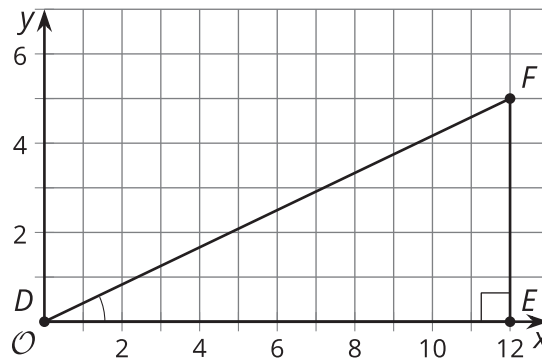
2. Sketch a triangle  $DEF$  where  $\sin(D) = \cos(D)$  and  $E$  is a right angle. What is the value of  $\tan(D)$  for this triangle? Explain how you know.

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.

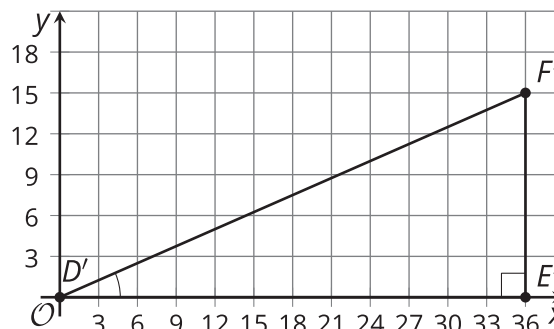


## 2.3: Shrinking Triangles

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



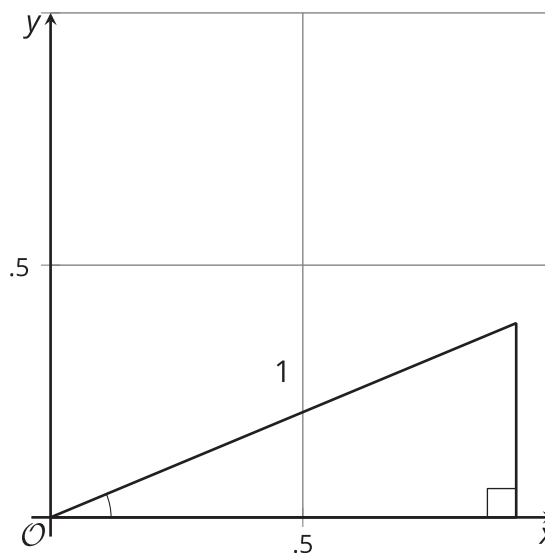
2. Here is a triangle similar to triangle  $DEF$ .



- 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  $DEF$ .



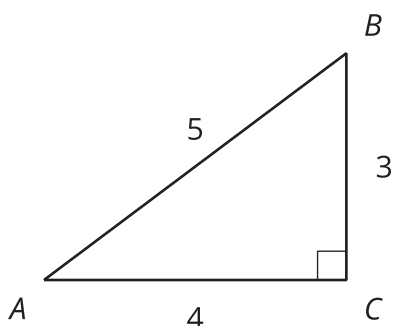
- Label the triangle  $D''E''F''$ .
- What is the scale factor from triangle  $DEF$  to triangle  $D''E''F''$ ?
- What are the coordinates of  $F''$ ? Explain how you know.
- What are  $\cos(D'')$ ,  $\sin(D'')$ , and  $\tan(D'')$ ?

**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.

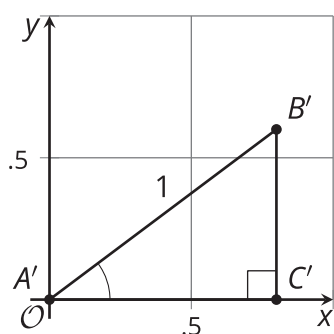
## Lesson 2 Summary

In an earlier course, we studied ratios of side lengths in right triangles.



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—that is  $\cos(A) = \frac{4}{5}$ . The sine of angle  $A$  is the ratio of the length of the side opposite angle  $A$  to the length of the hypotenuse—that is  $\sin(A) = \frac{3}{5}$ . 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  $A$ —that is  $\tan(A) = \frac{3}{4}$ .

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, angle  $A$  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  $(\frac{4}{5}, \frac{3}{5})$  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  $(\cos(A'), \sin(A'))$ .