Trig Ratios

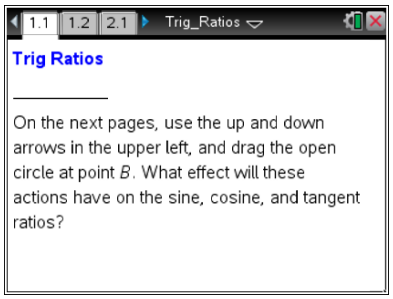
Student Activity

Name _____

Class _____

Open the TI-Nspire document *Trig_Ratios.tns.*

If the measure of one acute angle in a right triangle is fixed but the side lengths are allowed to vary, what will happen to the ratios of the sides?



Move to page 1.2.

1. Use the up and down arrows in the upper left.
   a. What measures shown on $\triangle ABC$ stay the same?

   b. What measures shown on $\triangle ABC$ are changing?

2. a. Observe all the triangles you see as you select the up and down arrows. Are all of the triangles similar? Explain your thinking.

   b. What do you observe about the ratio $BC : AB$ as you select the up and down arrows?

3. Drag the open circle at point *B*.
   a. What measures shown on $\triangle ABC$ stay the same?

   b. What measures shown on $\triangle ABC$ are changing?

   c. What is the measure of $\measuredangle A$? Explain how you found this measure.

4. a. Observe all the triangles you see as you drag the open circle at *B.* Are all of the triangles similar? Explain your thinking.

   b. What do you observe about the ratio $BC : AB$ as you drag the open circle at *B?*

5. When will the ratio $BC : AB$ be constant even though $\overline{AC}$, $\overline{BC}$, and $\overline{AB}$ change?

6. The side of a right triangle opposite the right angle is called the hypotenuse. The leg that has point *B* as one of its endpoints is called the side adjacent to $\measuredangle B$, and the other leg is called the side opposite $\measuredangle B$.

   The ratio $BC : AB$ is called the cosine of angle *B* and is written as cos *B*.

   a. Describe cos *B* as a ratio, using the terms *measure of hypotenuse, measure of adjacent leg,* and/or *measure of opposite leg.*

   b. Express cos *A* as a ratio using the side lengths *AC, AB,* and/or *BC* of the triangle on page 1.2.

Move to page 2.1.

7. Use the up and down arrows and drag the open circle at point *B*. When is the ratio *AC : AB* constant even though $\overline{AC}$, $\overline{BC}$, and $\overline{AB}$ change?

8. The ratio *AC : AB* is called the sine of angle *B* and is written as sin *B*.

   a. Describe sin *B* using the terms *measure of hypotenuse, measure of adjacent leg,* and/or *measure of opposite leg.*

   b. Express sin *A* as a ratio using the side lengths *AC, AB,* and/or *BC* of the triangle on page 2.1.

Move to page 3.1.

9. Use the up and down arrows and drag the open circle at point *B*. When is the ratio *AC : CB* constant even though $\overline{AC}$, $\overline{BC}$, and $\overline{AB}$ change?

10. The ratio *AC : CB* is called the tangent of angle *B* and is written as tan *B.*

    a. Describe tan *B* using the terms *measure of hypotenuse, measure of adjacent leg,* and/or *measure of opposite leg.*

    b. Express tan *A* as a ratio using the side lengths *AC, AB*, and/or *BC* of the triangle on page 3.1.

11. What is the connection between similarity of right triangles and the sine, cosine, and tangent ratios?

Extension:

Move back to page 2.1.

On this page, you found that sin *B* = *AC* : *AB*.

1. a. Write an expression for cos *A*.
   b. What is the relationship between angles *A* and *B*?

Move back to page 1.2.

On this page, you found that cos *B* = *BC* : *AB*.

2. a. Write an expression for sin *A*.
   b. What is the relationship between angles *A* and *B*?

3. In right triangle *ABC* with right angle *C* and sin *A* = 5/13, what is cos *B*?