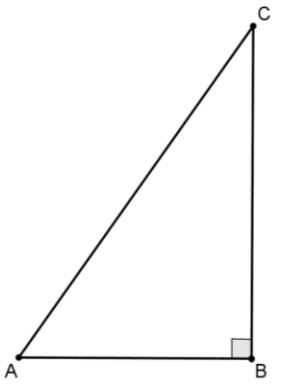
1. Label the sides of the triangle.



   a. Which angle is the right angle? Which side is the hypotenuse? How did you decide?

   b. For ∠A, which side is

      i. Opposite?
      ii. Adjacent?
      iii. Hypotenuse?

      How did you decide?

   c. For ∠C, which side is

      i. Opposite?
      ii. Adjacent?
      iii. Hypotenuse?

      How did you decide?

   d. $\sin(A) = \frac{?}{?}$ $\cos(A) = \frac{?}{?}$ $\tan(A) = \frac{?}{?}$

   e. $\sin(C) = \frac{?}{?}$ $\cos(C) = \frac{?}{?}$ $\tan(C) = \frac{?}{?}$

Make a hypothesis:

   f. What do you notice about the trigonometric ratios for ∠A and ∠C? Do you think it will always hold true? Why or why not?

Gather Data and Analyze Patterns

2. Open Geogebra and the file "Trig_Demo.ggb."
    a. For ∠A, which side is:
        i. Opposite?
        ii. Adjacent?
        iii. Hypotenuse?
    b. For ∠C, which side is:
        i. Opposite?
        ii. Adjacent?
        iii. Hypotenuse?
    c. Is the hypotenuse for ∠A the same as for ∠C? Why or why not?

3. Move the slider a1 to an angle measure of your choice.
4. Keeping m∠A constant, move either Point A or B around to get three different sets of measurements.
    a. Record your data in the chart.

m∠A	**m∠C**	**AB**	**BC**	**AC**	$\frac{\mathbf{AB}}{\mathbf{BC}}$	$\frac{\mathbf{AB}}{\mathbf{AC}}$	$\frac{\mathbf{BC}}{\mathbf{AC}}$

    b. What happens to the lengths of the triangle sides as either Points A or B move?

    c. As either Points A or B move, what happens to the ratios $\frac{AB}{BC}$? $\frac{AB}{AC}$? $\frac{BC}{AC}$?

    d. What do you think will (i) stay the same and (ii)be different if you change the angle measures? Explain your rationale.

e. Move the slider to a different angle measure, then keep m∠A constant on the new measure. Record the measures in the table below.

m∠A	**m∠C**	**AB**	**BC**	**AC**	$\frac{\mathbf{AB}}{\mathbf{BC}}$	$\frac{\mathbf{AB}}{\mathbf{AC}}$	$\frac{\mathbf{BC}}{\mathbf{AC}}$

f. Did your hypothesis from part d hold true for your new angle measure? Why or why not? Revise your hypothesis as needed.

g. The table in Part h organizes the same information slightly differently than the charts we've used in Parts a and e. What are the similarities and differences? Explain your reasoning.

h. Record data for at least 5 more trials. Be sure to hold m∠A constant or vary its value as needed to test your hypothesis.

m∠A	m∠C	m∠A+ m∠C	Sin(A)	Cos(A)	Tan(A)	Sin(C)	Cos(C)	Tan(C)

Reflection

5. Did your hypothesis hold true? Why or why not?

6. What conclusions can you draw about the trigonometric ratios for a particular angle?

7. Why do you think trigonometric ratios are helpful?