7.2 Converse of the Pythagorean Theorem

MATERIALS • graphing calculator or computer

QUESTION **How can you use the side lengths in a triangle to classify the triangle by its angle measures?**

You can use geometry drawing software to construct and measure triangles.

EXPLORE **Construct a triangle**

STEP 1 *Draw a triangle* Draw any $\triangle ABC$ with the largest angle at C. Measure $\angle C$, $\overline{AB}$, $\overline{AC}$, and $\overline{CB}$.

STEP 2 *Calculate* Use your measurements to calculate AB^2, AC^2, CB^2, and $(AC^2 + CB^2)$.

STEP 3 *Complete a table* Copy the table below and record your results in the first row. Then move point A to different locations and record the values for each triangle in your table. Make sure $\overline{AB}$ is always the longest side of the triangle. Include triangles that are acute, right, and obtuse.
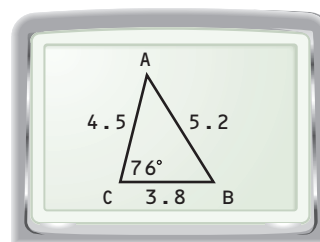
$m\angle C$	AB	AB^2	AC	CB	$AC^2 + CB^2$
76°	5.2	27.04	4.5	3.8	34.69
?	?	?	?	?	?
?	?	?	?	?	?

DRAW CONCLUSIONS **Use your observations to complete these exercises**

1. The Pythagorean Theorem states that "In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs." Write the Pythagorean Theorem in if-then form. Then write its converse.

2. Is the converse of the Pythagorean Theorem true? *Explain*.

3. Make a conjecture about the relationship between the measure of the largest angle in a triangle and the squares of the side lengths.

Copy and complete the statement.

4. If $AB^2 > AC^2 + CB^2$, then the triangle is a(n) _?_ triangle.

5. If $AB^2 < AC^2 + CB^2$, then the triangle is a(n) _?_ triangle.

6. If $AB^2 = AC^2 + CB^2$, then the triangle is a(n) _?_ triangle.