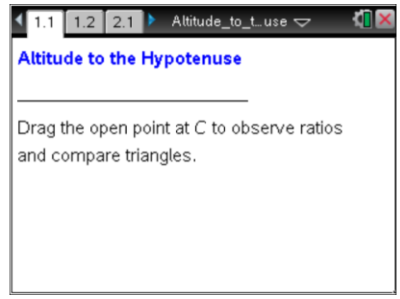
# Altitude to the Hypotenuse

**Student Activity**

**Name** ______________

**Class** ______________

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




In a right triangle, the length of the altitude to the hypotenuse has a special relationship with the lengths of the two segments formed when this altitude intersects the hypotenuse.

**Move to page 1.2.**

1. Examine the angle markings of the sketch.

   a. What kind of triangles are $\Delta ACB$, $\Delta ADC$, and $\Delta BDC$? Explain how you know.

   b. Name all of the altitudes of $\Delta ACB$ that are shown in this sketch. Justify your answers.

   c. Which one of the altitudes of $\Delta ACB$ shown is the altitude to the hypotenuse?

2. Drag the open circle at point *C*.

   a. What stays the same as you drag point *C?*

   b. What changes as you drag point *C*?

Name ______________

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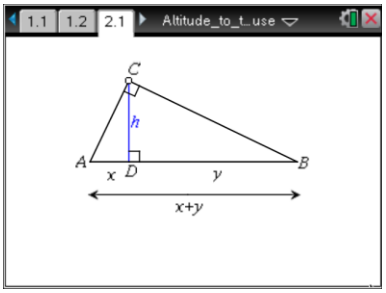
**Move to page 2.1.**




3. Examine the sketch. What variable represents the measure of each of the following?

   Shorter leg of $\Delta ADC$ ______________

   Longer leg of $\Delta ADC$ ______________

   Shorter leg of $\Delta BDC$ ______________

   Longer leg of $\Delta BDC$ ______________

4. Drag the open circle at point *C*. What happens?

5. Drag the open circle at point *C* until $\overline{AD}$ is on top of $\overline{CD}$ and $\overline{CD}$ is on top of $\overline{BD}$.

   a. Write a similarity statement for the two smaller right triangles and explain why these triangles are similar.

   b. How does the fact that the two small triangles are similar justify the fact that ratios $\frac{x}{h}$ and $\frac{h}{y}$ are always equal?

6. Use algebra to solve the equation $\frac{x}{h} = \frac{h}{y}$ for *h*.

7. Drag the open circle at the original point *C* until the thick copy of $\overline{AD}$ is equal to $\overline{CD}$.

   What is the relationship between *x, y,* and *h* now?