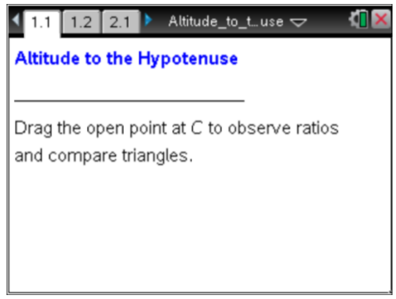
Altitude to the Hypotenuse
Student Activity

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.



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Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

1. Examine the angle markings of the sketch.

   a. What kind of triangles are Δ*ACB*, Δ*ADC,* and Δ*BDC*? Explain how you know.

   b. Name all of the altitudes of Δ*ACB* that are shown in this sketch. Justify your answers.

   c. Which one of the altitudes of Δ*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*?

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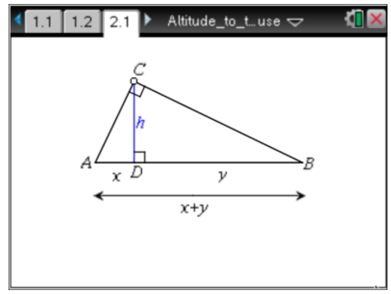

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3. Examine the sketch. What variable represents the measure of each of the following?

   Shorter leg of ΔADC ________________

   Longer leg of ΔADC ________________

   Shorter leg of ΔBDC ________________

   Longer leg of ΔBDC ________________

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?