Teacher Notes

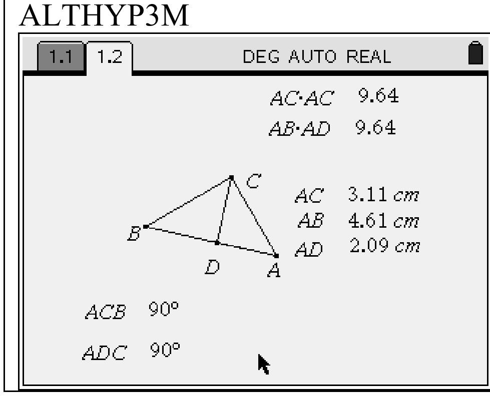
G.G.47 Investigate, justify, and apply theorems about mean proportionality:

- the altitude to the hypotenuse of a right triangle divides the hypotenuse so that either leg of the right triangle is the mean proportional between the hypotenuse and segment of the hypotenuse adjacent to that leg

Lesson Launcher Objectives:

1) **Location of the hypotenuse of a right triangle.**
2) **Identifying an altitude upon the hypotenuse.**
3) **Naming the legs of the right triangle.**
4) **Naming the segments of the hypotenuse.**
5) **Rewriting the equality of two products as a proportion.**
6) **Learning the definition of a mean proportional.**
7) **Discovering that when the altitude is drawn upon the hypotenuse each leg is the mean proportional between the hypotenuse and the segment of the hypotenuse adjacent to the leg.**

Procedure:

<table>
<tr>
<td>The student opens .tns document ALTHYP3M


</td>
<td>The student explores the figure by moving vertices A and C.</td>
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1) As you selected, grabbed and moved points A and C
   A) What changed? The measures of segments AC, AB and AD. The values of AC*AC, AB*AD
   B) What remained the same? The measures of the two right angles. AC*AC and AB*AD were always the same
2) What kind of triangle is ΔABC? right
3) Name the hypotenuse of ΔABC. BA

4) $\overline{CD}$ **must** be a(an) C) altitude

   A) median

   B) angle bisector

   C) altitude

   D) perpendicular bisector

5) Name the segments of the hypotenuse. BD, DA

6) Name the legs of ΔABC. BC, AC

7) Which segment of the hypotenuse is adjacent to leg AC? AD

8) Which of the following statements seems to be true? B) AC*AC = AB*AD
   A) AC*AC > AB*AD
   B) AC*AC = AB*AD
   C) AC*AC < AB*AD

9) The answer to question 7 allows us to rewrite the expression as a proportion. Fill in the missing extremes: $\frac{?}{AC} = \frac{AC}{?}$ AB, AD

10) The answer to question 7 allows us to rewrite the expression as a proportion. Fill in the missing means: $\frac{AB}{?} = \frac{?}{AD}$ AC, AC

11) When the means of a proportion are the same that value is called the **mean proportional**. Example: $\frac{a}{x} = \frac{x}{b}$ In this proportion x is the **mean proportional** between a and b. Using this example as a guide and your answers to questions 6 and 7 fill in the blanks of the following statement:

    AC is the **mean proportional** between AB and AD

12) Using your answers to questions 3 through 6 generalize the answer to question 8.

If the altitude is drawn upon the hypotenuse of a right triangle then a leg is the mean proportional between the whole hypotenuse and the segment of the hypotenuse adjacent to that leg.