

Teacher Notes

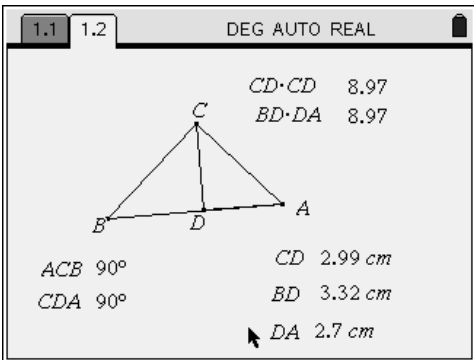
G.G.47 Investigate, justify, and apply theorems about mean proportionality:

- the altitude to the hypotenuse of a right triangle is the mean proportional between the two segments along the hypotenuse

Lesson Launcher Objectives:

- 1) Location of the hypotenuse of a right triangle.
- 2) Identifying an altitude upon the hypotenuse.
- 3) Naming the segments of the hypotenuse
- 4) Rewriting the equality of two products as a proportion.
- 5) Learning the definition of a mean proportional
- 6) Discovering that the altitude upon the hypotenuse is the mean proportional between the segments of the hypotenuse.

Procedure:

<p>The student opens .tns document ALTHP1M</p>  <p>CD · CD 8.97 BD · DA 8.97</p> <p>ACB 90° CDA 90°</p> <p>CD 2.99 cm BD 3.32 cm DA 2.7 cm</p>	<p>The student explores the figure by moving vertices A and C</p>
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- 1) As you selected, grabbed and moved points A and C
 - A) What changed? The measures of segments CD, BD and DA. The values of $CD \cdot CD$, $BD \cdot DA$
 - B) What remained the same? The measures of the two right angles. $CD \cdot CD$ and $BD \cdot DA$ were always the same
- 2) What kind of triangle is $\triangle ABC$? right
- 3) Name the hypotenuse of $\triangle ABC$. 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) Which of the following statements seems to be true? **B) $CD \cdot CD = BD \cdot DA$**
- A) $CD \cdot CD > BD \cdot DA$
 - B) $CD \cdot CD = BD \cdot DA$
 - C) $CD \cdot CD < BD \cdot DA$
- 7) The answer to question 5 allows us to rewrite the expression as a proportion. Fill in the missing extremes: $\frac{?}{CD} = \frac{CD}{?}$ **BD, DA**
- 8) The answer to question 5 allows us to rewrite the expression as a proportion. Fill in the missing means: $\frac{BD}{?} = \frac{?}{DA}$ **CD, CD**
- 9) 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:
- CD is the **mean proportional** between **BD** and **DA**
- 10) Using your answers to questions 3 and 4 generalize the answer to question 8.

If the altitude is drawn upon the hypotenuse of a right triangle then the **altitude** is the mean proportional between the **segments of the hypotenuse**.