Questions on 6.6 HW? Quiz today...make sure you can solve and set up proportions based on similar figures!

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For each set of numbers find the mean (average). Explain how the mean of the set compares to the values in the set.

$(6+12+10+8)/4$

1.   6, 12, 10, 8

$\dfrac{6+12+10+8}{4} = \dfrac{36}{4} = 9$

2.   2, 7, 12

3.   -13, 21

4.   3, -9, 15

5.   43, 52

6.   38, 64, 100

Find the value that is exactly half way between the two given values. Explain how you find this value.

7.   5, 13

$\dfrac{5+13}{2} = \dfrac{18}{2} = 9$

8.   26, 42

9.   57, 77

10.   -34, -22

11.   -45, 3

12.   -12, 18

Set

Topic: Midpoints of segments and proportionality of sides in embedded similar triangles

Find the coordinates of the midpoint of each line segment below. If multiple line segments are given then give the midpoints of all segments.

13.   14.
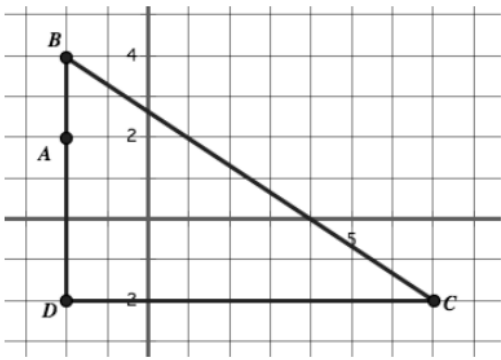
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midpoint formula : $M = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

17. A line segment between (2, 3) and (10, 15)

18. A line segment between (-2, 7) and (3, -8)

$M = \left(\dfrac{2+10}{2}, \dfrac{3+15}{2} \right) = \left(6, 9 \right)$
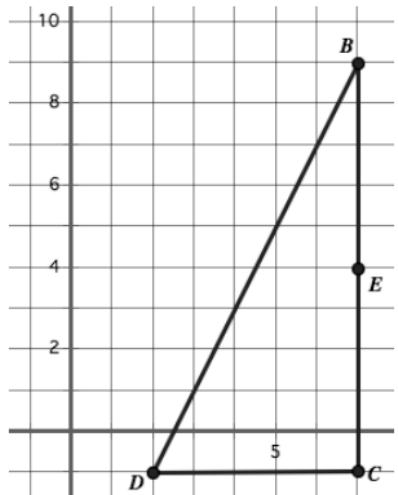
Use proportional relationships to find the desired values.

19.

If a line is drawn parallel to $\overline{BC}$ and through point A. At what coordinate will the intersection of this parallel line be with $\overline{DC}$?

20.

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3

19.

If a line is drawn parallel to $\overline{BC}$ and through point A. At what coordinate will the intersection of this parallel line be with $\overline{DC}$?

$(4, -2)$

20.

If a line is drawn parallel to $\overline{BD}$ and through point E. At what coordinate will the intersection of this parallel line be with $\overline{DC}$?

Write a proportion for each of the diagrams below and solve for the missing value.

25.

$$\frac{8}{5} = \frac{12}{x}$$

$$5 \cdot 12 = 8x$$

$$\frac{15}{2} = \frac{30}{4} = \frac{60}{8} = \frac{8x}{8}$$

$$7.5$$

5

8

12

$x = 7.5$

4

3

8

y

$$\frac{8}{12} = \frac{5}{x}$$

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6.7 Pythagoras by Proportions
A Practice Understanding Task

There are many different proofs of the Pythagorean Theorem. Here is one based on similar triangles. $a^2 + b^2 = c^2$

Step 1: Cut a 4 × 6 index card along one of its diagonals to form two congruent right triangles.

Step 2: In each right triangle, draw an altitude from the right angle vertex to the hypotenuse.

Step 3: Label each triangle as shown in the following diagram. Flip each triangle over and label the matching sides and angles with the same names on the back as on the front.
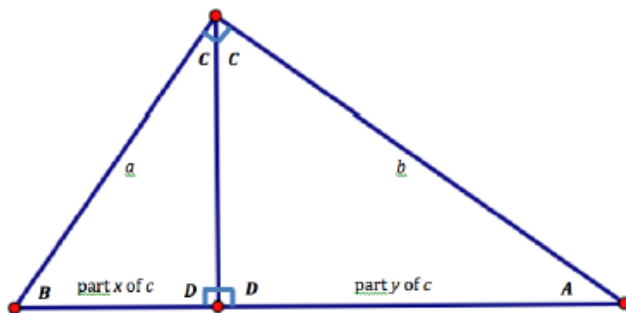
Step 4: Cut one of the right triangles along the altitude to form two smaller right triangles.

Step 5: Arrange the three triangles in a way that convinces you that all three right triangles are similar. You may need to reflect and/or rotate one or more triangles to form this arrangement.

Step 6: Write proportionality statements to represent relationships between the labeled sides of the triangles.

Step 7: Solve one of your proportions for *x* and the other proportion for *y*. (If you have not written proportions that involve *x* and *y*, study your set of triangles until you can do so.)
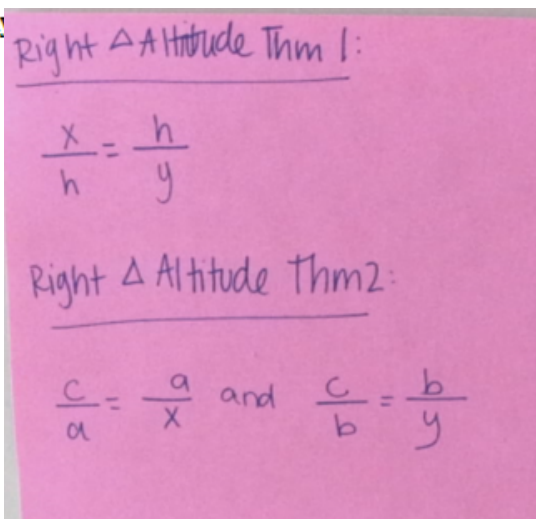
Step 8: Work with the equations you wrote in step 7 until you can show algebraically that $a^2 + b^2 = c^2$. (Remember, $x + y = c$.)

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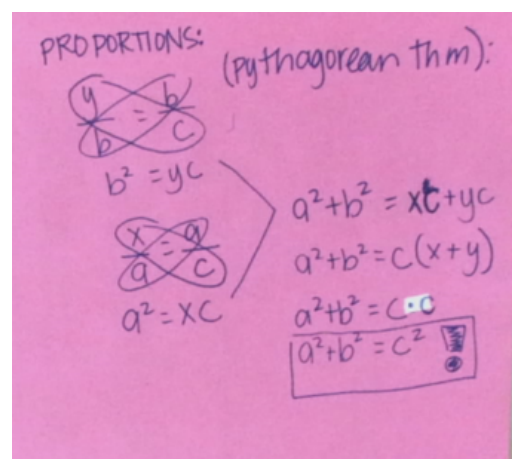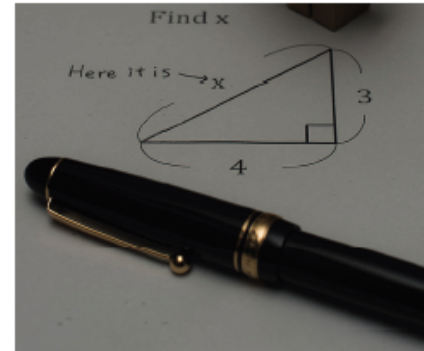
Use your set of triangles to help you prove the following two theorems algebraically. For this work, you will want to label the length of the altitude of the original right triangle h. The appropriate legs of the smaller right triangles should also be labeled h.

Right Triangle Altitude Theorem 1: If an altitude is drawn to the hypotenuse of a right triangle, the length of the altitude is the geometric mean between the lengths of the two segments formed on the hypotenuse.

Right Triangle Altitude Theorem 2: If an altitude is drawn to the hypotenuse of a right triangle, the length of each leg of the right triangle is the geometric mean between the length of the hypotenuse and the segment on the hypotenuse adjacent to the leg.

Right △Altitude Thm 1:

$$\frac{x}{h} = \frac{h}{y}$$

Right △ Altitude Thm2:

$$\frac{c}{a} = \frac{a}{x} \quad \text{and} \quad \frac{c}{b} = \frac{b}{y}$$

Use your set of triangles to help you find the values of x and y in the following diagram.
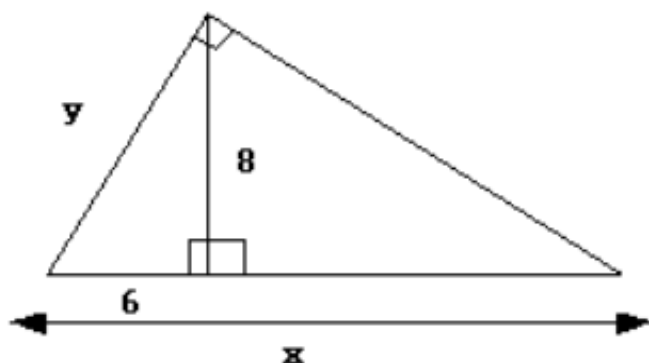
Homework

Finish 6.7 "Ready, Set, Go"

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