

SIMILARITY & RIGHT TRIANGLE TRIGONOMETRY - 6.6

6.6 Yard Work in Segments

*A Solidify Understanding Task*

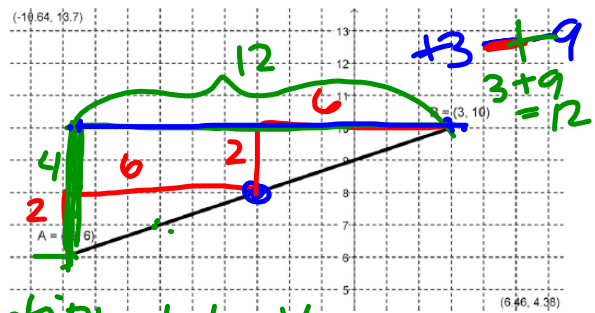
Malik's family has purchased a new house with an unfinished yard. They drew the following map of the back yard:



Start 6.6 lesson

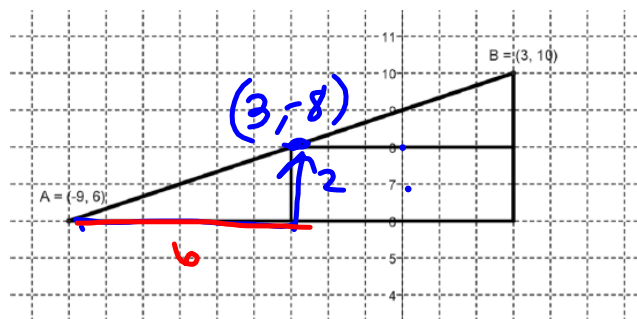
Malik and his family are using the map to set up gardens and patios for the yard. They plan to lay out the yard with stakes and strings so they know where to plant grass, flowers, or vegetables. They want to begin with a vegetable garden that will be parallel to the fence shown at the top of the map above.

1. They set the first stake at (-9, 6) and the stake at the end of the garden at (3, 10). They want to mark the middle of the garden with another stake. Where should the stake that is the **midpoint of the segment** between the two end stakes be located? Using a diagram, describe your strategy for finding this point.



find change in y direction, take 1/2  
 in x direction, take 1/2.  
 $\Delta y$   
 $\Delta x = x_2 - x_1$

Malik figured out the midpoint by saying, "It makes sense to me that the midpoint is going to be halfway over and halfway up, so I drew a right triangle and cut the horizontal side in half and the vertical side in half like this:"



Malik continued, "That put me right at  $(-3, 8)$ . The only thing that seems funny about that to me is that I know the base of the big triangle was 12 and the height of the triangle was 4, so I thought the midpoint might be  $(6, 2)$ ."

2. Explain to Malik why the logic that made him think the midpoint was  $(6, 2)$  is almost right, and how to extend his thinking to use the coordinates of the endpoints to get the midpoint of  $(-3, 8)$ .

$(6, 2)$   
 move 6 in x direction      move 2 in the y direction.  
 which makes the actual @  $(-3, 8)$ .



Sapana continued, "Once I labeled the triangles, I wrote equations by making the bases equal and the heights equal."

4. Does Sapana's strategy work? Show why or why not.

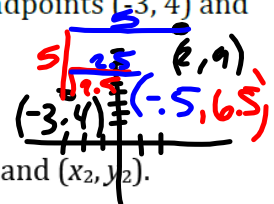
$$\begin{array}{r} x + 9 = 3 - x \\ x + x - 9 - 9 + x \\ \hline 2x = -6 \\ x = -3 \end{array}$$

$$\begin{array}{r} y - 4 = 10 - y \\ y + y + 4 + 6 + y \\ \hline 2y = 16 \\ y = 8 \end{array}$$

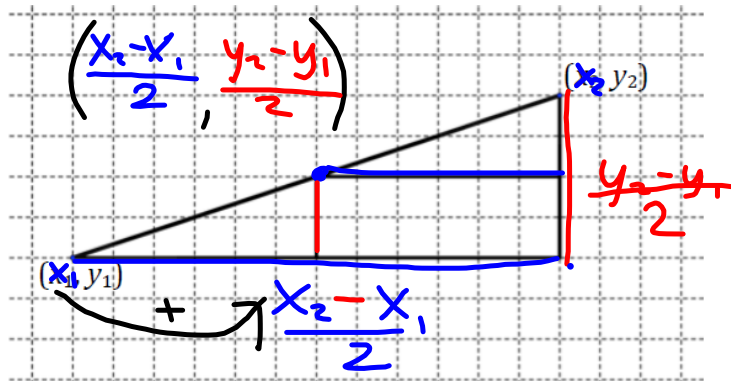
5. Choose a strategy and use it to find the midpoint of the segment with endpoints  $(-3, 4)$  and  $(2, 9)$ .

$$\begin{array}{r} x + 3 = 2 - x \\ x + x - 3 - 3 + x \\ \hline 2x = -1 \\ x = -0.5 \end{array}$$

$$\begin{array}{r} y - 4 = 9 - y \\ y + y + 4 + 4 + y \\ \hline 2y = 13 \\ y = 6.5 \end{array}$$

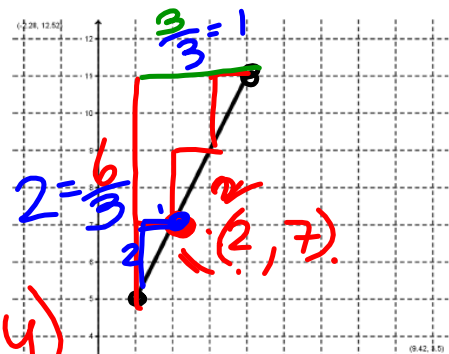


6. Use either strategy to find the midpoint of the segment between  $(x_1, y_1)$  and  $(x_2, y_2)$ .



The next area in the garden to be marked is for a flower garden. Malik's parents have the idea that part of the garden should contain a big rose bush and the rest of the garden will have smaller flowers like petunias. They want the section with the other flowers to be twice as long as the section with the rose bush. The stake on the endpoints of this garden will be at  $(1, 5)$  and  $(4, 11)$ . Malik's dad says, "We'll need a stake that marks the end of the rose garden."

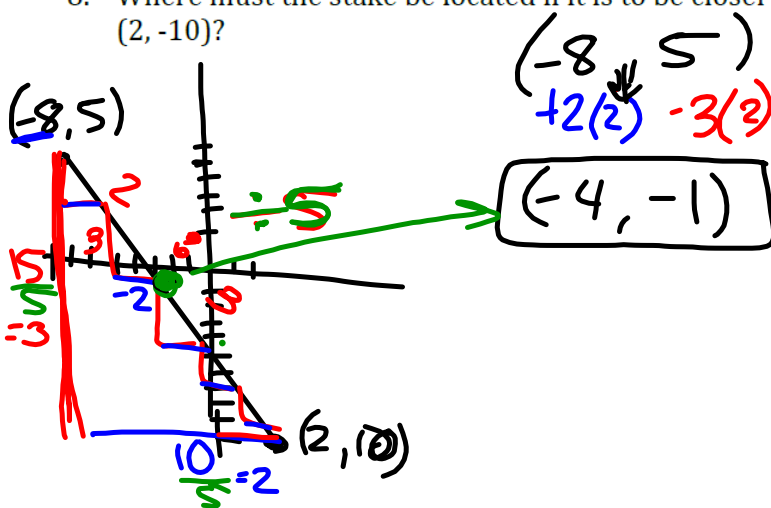
7. Help Malik and Sapana figure out where the stake will be located if the rose bush will be closer to the stake at  $(1, 5)$  than the stake at  $(4, 11)$ .



find change in height ( $\Delta y$ )  
 change in x-direction ( $\Delta x$ )  
 then split 3 ways

There's only one more set of stakes to put in. This time the endpoint stakes are at  $(-8, 5)$  and  $(2, -10)$ . Another stake needs to be placed that partitions this segment into two parts so that the ratio of the lengths is 2:3.

8. Where must the stake be located if it is to be closer to the stake at  $(-8, 5)$  than to the stake at  $(2, -10)$ ?



SECONDARY MATH II // MODULE 6  
SIMILARITY & RIGHT TRIANGLE TRIGONOMETRY - 6.6

6.6

READY, SET, GO!

Name

Period

Date

**READY**

Topic: Averages, measures of center, arithmetic mean

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

1. 6, 12, 10, 8

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

8. 26, 42

9. 57, 77

10. -34, -22

11. -45, 3

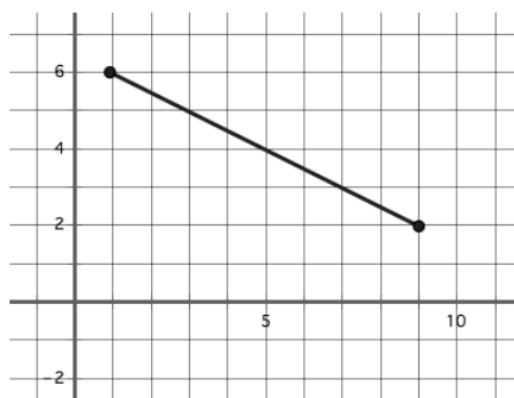
12. -12, 18

**SET**

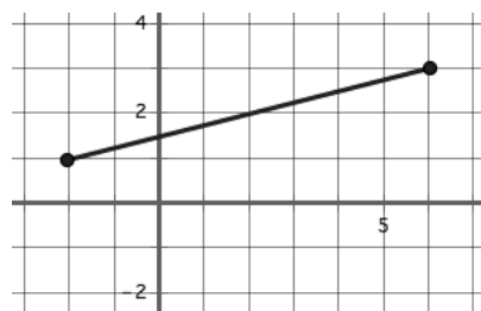
Topic: Midpoints of segments and proportionality of sides in embedded similar triangles

**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.

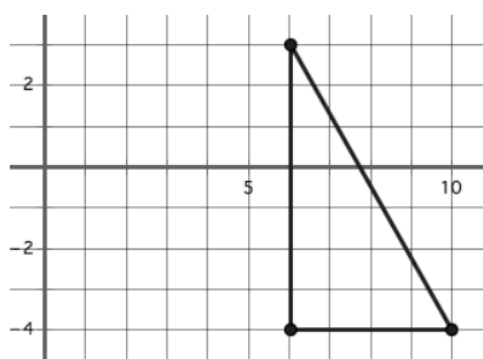


14.

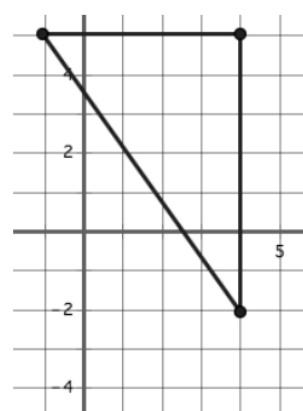




15.



16.

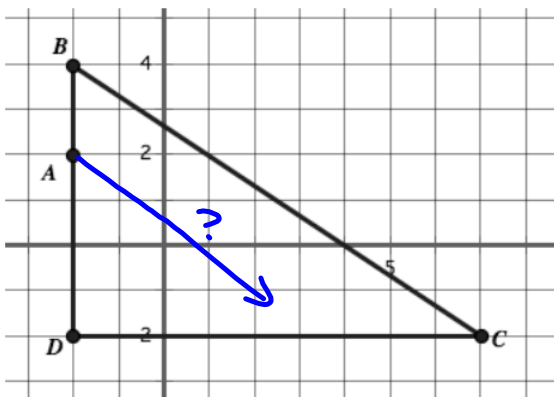


17. A line segment between (2, 3) and (10, 15)

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

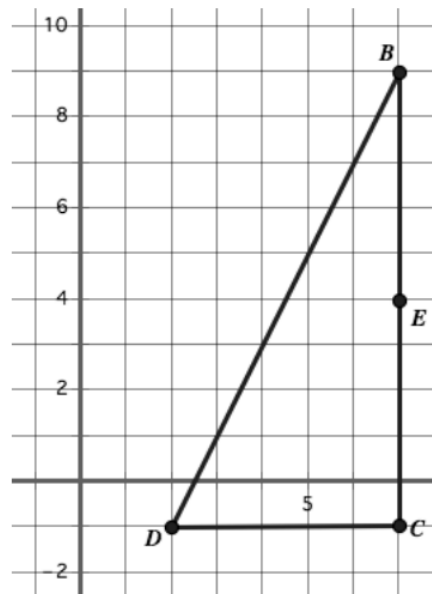
Use proportional relationships to find the desired values.

19.



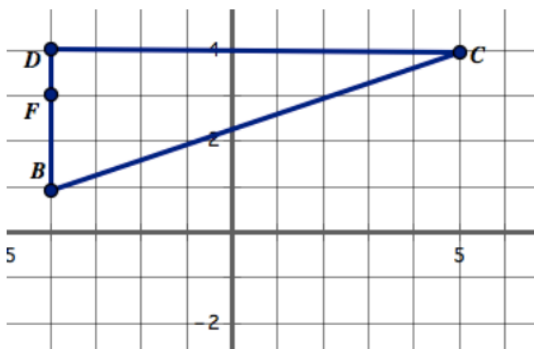
If a line is drawn parallel to  $\overline{BC}$  and through point  $A$ . At what coordinate will the intersection of this parallel line be with  $\overline{DC}$ ?

20.



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  $\overline{DC}$ ?

21.



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

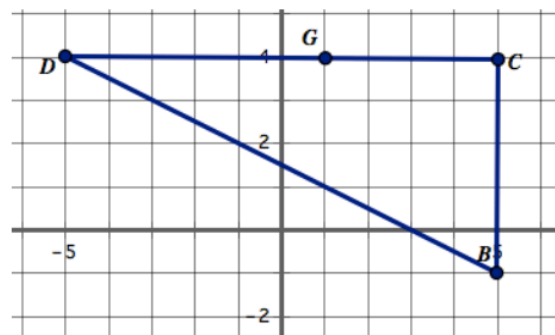
23. When a line is drawn parallel to one side of a triangle so that it intersects the other two sides of the triangle, how do the measures of the parts of the two intersected sides compare? Explain.



*They are proportional.*

24. Problems 19-22 provided right triangles. Could a determination of the coordinates be made if they were not right triangles? Why or why not?

22.



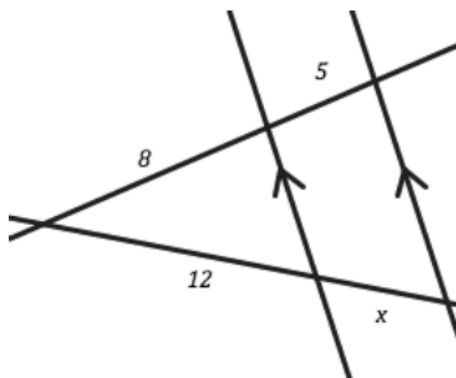
If a line is drawn parallel to  $\overline{BD}$  and through point G. At what coordinate will the intersection of this parallel line be with  $\overline{BC}$ ?

**GO**

Topic: Proportionality with parallel lines.

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

25.



26.

