

Review Pg. 164#13a

U3L4 – 2.7 Finding the Midpoint of a Line Segment

Students will, through investigation, determine a method for finding the coordinates of the midpoint of a line segment given the coordinates of the endpoints of the segment.

Complete the following investigation:

1. On graph paper, as accurately as you can, plot and label each pair of end points from the table below. Join each pair of end points to form a line segment. Use different colours if you have them.

Coordinates of First End Point	Coordinates of Second End Point	Coordinates of Midpoint
(2,4)	(8,10)	
(-7,-1)	(5,3)	
(-10,0)	(0,10)	
(-3,6)	(9,-2)	

2. Using your ruler to measure, find and label the midpoint of each line segment in the table above. Enter the coordinates of the midpoint in the third column of the table.
3. Examine the entries in your table and compare the coordinates of the midpoints to the coordinates of the end points. How could you obtain the coordinates of the midpoint of a line segment using the coordinates of its end points? Hint: Look at the x-coordinates and y-coordinates separately and determine what you could do with the x-coordinates of the end points to get the x-coordinate of the midpoint, then do the same with the y-coordinates.

4. Use the method you just described in #3 above to find the midpoint of the line segment that joins $P(4,5)$ and $Q(8,1)$. To check your method, draw the line segment PQ and mark the midpoint by measuring with a ruler. If the results do not match, go back to #3 and try to find a better method.
5. Draw and label a new grid on graph paper. Choose two random points and label them $A(x_1, y_1)$ and $B(x_2, y_2)$.
 - a) Draw the triangle that could be used to find the length of AB on your diagram.
 - b) Mark the position of the midpoint of AB on your diagram (use your ruler if you need to).
 - c) Mark the point on the base of the triangle directly below the midpoint. What expression represents its x-coordinate?
 - d) Mark the point on the altitude of the triangle that is level with the midpoint. What expression represents its y-coordinate?
 - e) Explain how the coordinates of these two points verifies the formula you developed in #3 for the coordinates of the midpoint of a line segment.

In general then, an expression to determine the coordinates of the midpoint of the line segment joining any two points $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by:

Note: All of the examples we did didn't include decimal coordinates. Will our expression for the midpoint work to find the midpoint of a line segment with endpoints that are rational numbers (ie. fractions or decimals)?

*Read the first two bullets of the Key Ideas on pg. 171.

Ex.Pg. 173 – 175 #1,2alt,3 – 5,7,8,12