The Midpoint Formula

You may calculate the midpoint, $M$, of the line segment joining any two points $(x_1, y_1)$ and $(x_2, y_2)$ in the xy-plane by using this formula:

$$M : \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

In this formula, the x-value of the midpoint is the average of the x-values of the two points and the y-value of the midpoint is the average of their y-values. On an xy-coordinate graph, the midpoint is the point halfway between the two points. It is a point and therefore should have parentheses written before and after the two coordinates.

Example:

*Find the midpoint of the line segment joining the points $(-3, 8)$ and $(2, -4)$.*

We need to assign values to the variables in the formula. We will use $(-3, 8)$ for the point $(x_1, y_1)$. That is, $x_1 = -3$ and $y_1 = 8$. Similarly, $x_2 = 2$ and $y_2 = -4$. Thus, the midpoint is

$$M : \left( \frac{-3 + 2}{2}, \frac{8 + (-4)}{2} \right) = \left( \frac{-1}{2}, \frac{4}{2} \right) = \left( \frac{-1}{2}, 2 \right)$$

In addition to the problems assigned from your Personal Academic Notebook for lesson EII.E, for each of the following pairs of points, find the midpoint of the line segment joining the points.

1. $(7, 6)$ and $(3, 8)$

2. $(-3, 9)$ and $(-5, 3)$

3. $(4, -1)$ and $(-1, 6)$

4. $(-3.4, 8.1)$ and $(2.9, -8.7)$

5. $(8, 19)$ and $(8, -9)$
EXERCISE SET EII.E
MATD 0390

ANSWERS:

1.  ( 5, 7 )

2.  ( −4, 6 )

3.  ( \frac{3}{2}, \frac{5}{2} ), \text{ or } ( 1.5, 2.5 )

4.  ( −0.25, −0.3 )

5.  ( 8, 5 )