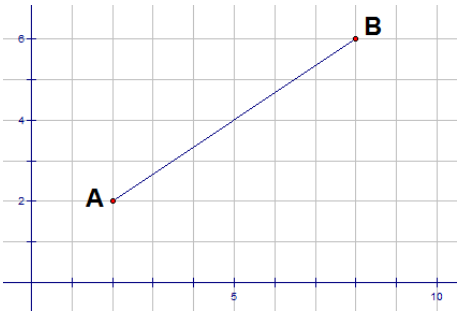
0B: Midpoint Formula

Notes

When working in the Cartesian Coordinate System, it is often necessary to find the coordinates of the midpoint of a line segment.

Find the coordinates of the midpoint of $\overline{AB}$ to the right.
Explain how you know that this is the midpoint (without using the formula).



The Midpoint Formula:

If the endpoints of a line segment are $A(x_1, y_1)$ and $B(x_2, y_2)$, then the midpoint of $\overline{AB}$ is

$$M\left(\quad,\quad\right) \text{ or } M\left(\quad,\quad\right)$$

Assignment

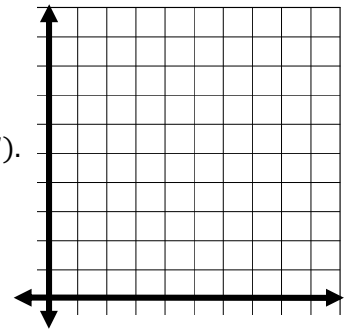
1. Find the Coordinates of the midpoint of $\overline{AB}$ with $A(-4,5)$ and $B(3,6)$

2. Find the coordinates of the midpoint of $\overline{PQ}$ with $P\left(\frac{2}{3},\frac{1}{2}\right)$ and $Q\left(-\frac{1}{2},\frac{2}{3}\right)$

3. $M(3,5)$ is the midpoint of $\overline{RS}$. If one endpoint is $R(-7,2)$, find the coordinates of S.

4. The length of the line segment between $D(3,4)$ and $E(-2,y)$ is 13. Find the coordinates of the midpoint of $\overline{DE}$.

5. Consider the right triangle with vertices $M(3,2)$, $J(3,6)$, and $K(5,2)$.



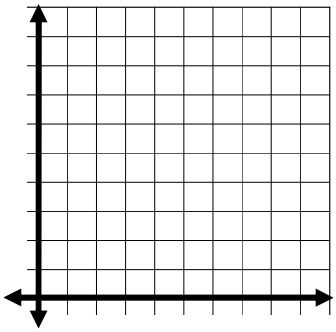
   a. Plot the triangle.
   b. Find the coordinates of the midpoint of the hypotenuse (call this C).

   c. Find the distance from this point C to each of the vertices.

$$CM = \qquad , CJ = \qquad , CK =$$

   d. What does this prove about the midpoint of the hypotenuse?

6. Consider the triangle with vertices $A(4,1)$, $B(8,5)$, $C(2,7)$.



   a. Plot the triangle

   b. Find the length of each side.

$$AB = \qquad , BC = \qquad ,AC =$$

   c. What type of triangle is ABC?

   d. Find the coordinates of the midpoint, M, for the base $\overline{AB}$.

   e. Find the area of ΔABC.
   (You will need to use the distance formula one more time to find the height $\overline{CM}$).