

# Midpoint Formula

## Agenda

Warm-Up

HW Check

Notes

HW: Practice  
(1 page)



17 school  
days  
left!!

## Warm-Up (Tuesday)

1. Find the average of 1045 and 24.

$$\frac{1045+24}{2} = 534.5$$

Solve for x.

2.  $3(x - 6) + 2 = 7(1 + x) + 2x$

$$3x - 18 + 2 = 7 + 7x + 2x$$

$$3x - 16 = 7 + 9x$$

$$-16 = 7 + 6x \rightarrow -23 = 6x$$

You must have your calculator  
ready to turn in on Friday

# Midpoint Formula

1.  $13 = \sqrt{169}$

2.  $\sqrt{50}$  or 7.07

3.  $\sqrt{a^2 + b^2}$

4.  $\sqrt{(-1-a)^2 + (5-b)^2}$

6.  $\sqrt{18}$  or 4.24

$\sqrt{18}$  or 4.24

6

7. 85.9 ft

Practice – Distance Formula

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

Find the distance between the given points.

1. (-2, -4) and (3, 8)

2.  $x_1, y_1, x_2, y_2$   
(5, 0) and (0, -5)

$$d = \sqrt{(0-5)^2 + (-5-0)^2}$$

$$= \sqrt{(-5)^2 + (-5)^2} = \sqrt{25+25} = \sqrt{50}$$

3. (a, b) and (0, 0)

$$x_1, y_1, x_2, y_2$$

$$\sqrt{(0-a)^2 + (0-b)^2} \leftarrow$$

$$\sqrt{(-a)^2 + (-b)^2} = \sqrt{a^2 + b^2}$$

4.  $x_1, y_1, x_2, y_2$   
(a, b) and (-1, 5)
- $$\sqrt{(-1-a)^2 + (5-b)^2}$$

Use the grid to the right to answer questions 5-8.

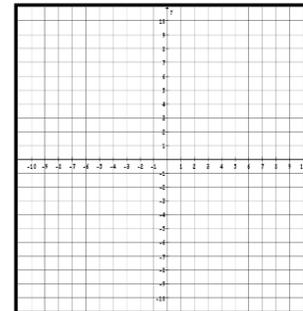
5. Plot the points A (-2, 1), B (1, -2), C (4, 1), and D (1, 4)

6. Find AD, CD, and AC.

AD = \_\_\_\_\_

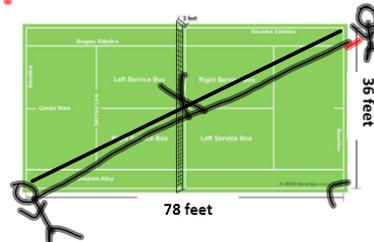
CD = \_\_\_\_\_

AC = \_\_\_\_\_

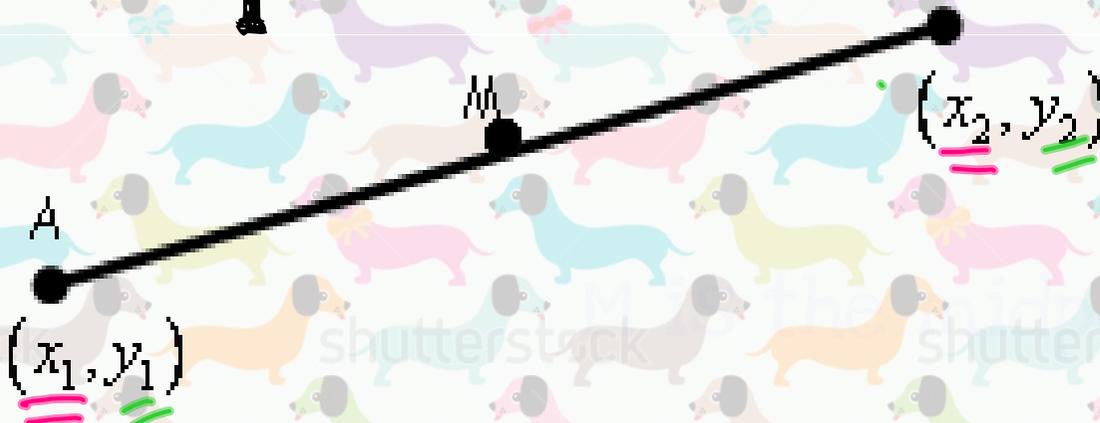


7. A doubles tennis court is a rectangle 36 feet wide and 78 feet long. If two players are standing in diagonally opposite corners, about how far apart are they to the nearest tenth of a foot?

$$78^2 + 36^2 = c^2$$



# Midpoint Formula



To find the midpoint of two points...

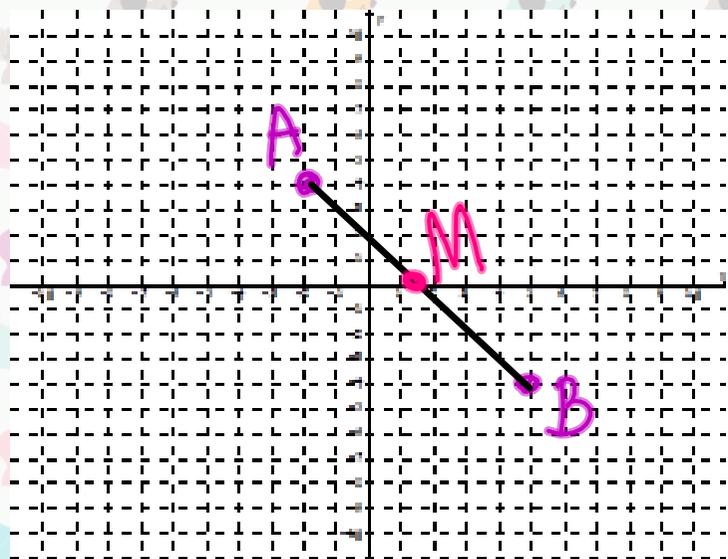
(taking average)

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

$(x, y)$

# Midpoint Formula

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



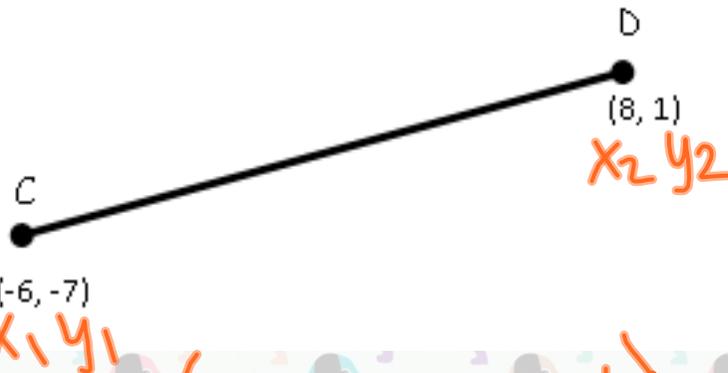
**Example 1:** Find the midpoint of AB if the coordinate of A is (-2, 4) and the coordinate of B is (5, -4).

$$\begin{aligned} & (-2, 4) \quad (5, -4) \\ & x_1 \quad y_1 \quad x_2 \quad y_2 \\ M &= \left( \frac{-2+5}{2}, \frac{4+(-4)}{2} \right) \\ &= \left( \frac{3}{2}, \frac{0}{2} \right) \\ &= \boxed{(1.5, 0)} \end{aligned}$$

# Midpoint Formula

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

**Example 2:** Find the midpoint of  $\overline{CD}$



$$M = \left( \frac{-6 + 8}{2}, \frac{-7 + 1}{2} \right)$$

$$= \left( \frac{2}{2}, \frac{-6}{2} \right) = (1, -3)$$

**Example 3:** Find the midpoint of a segment whose endpoints are  $(a, b)$  and  $(a, 3b)$ .

$$M = \left( \frac{a + a}{2}, \frac{b + 3b}{2} \right)$$

$$= \left( \frac{2a}{2}, \frac{4b}{2} \right)$$

$$= (a, 2b)$$

# Midpoint Formula

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

Solve 2 equations

**Example 4.** M is the midpoint of  $\overline{XY}$ . M(-4, 7) and X(3, -2), find the coordinates of Y.

$(-4, 7) = \left( \frac{3+x}{2}, \frac{-2+y}{2} \right)$   
 $-4 = \frac{3+x}{2} \cdot 2$   
 $-8 = 3+x$   
 $-11 = x$   
 $7 = \frac{-2+y}{2} \cdot 2$   
 $14 = -2+y$   
 $16 = y$   
 $Y(-11, 16)$

## Example 5

M is the midpoint of  $\overline{XY}$ . M(3, 1) and X(-1, 6), find the coordinates of Y.

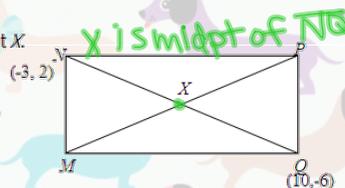
$(3, 1) = \left( \frac{-1+x}{2}, \frac{6+y}{2} \right)$   
 $2 \cdot 3 = \frac{-1+x}{2} \cdot 2$   
 $6 = -1+x$   
 $7 = x$   
 $2 \cdot 1 = \frac{6+y}{2} \cdot 2$   
 $2 = 6+y$   
 $-4 = y$   
 $Y(7, -4)$

## Application:

Rectangle  $MNPQ$  has diagonals that intersect at point X.

Which of the following represents the point X?

- A.  $\left( \frac{7}{2}, -2 \right)$
- B.  $\left( \frac{13}{2}, 4 \right)$
- C.  $\left( -\frac{13}{2}, -4 \right)$
- D.  $\left( -\frac{7}{2}, 2 \right)$



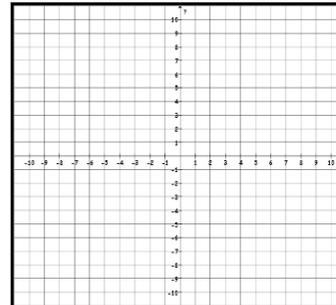
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Algebra I \_\_\_\_\_ Getting Ready for Geometry \_\_\_\_\_  
**Practice – Midpoint Formula**  
 Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

Determine the coordinates of the midpoint of the segment with the given endpoints.

1. (-3, 2) and (7, 10)
2. (-7, 4) and (9, -4)
3. (a, b) and (0,0)
4. (a, b) and (-1, 5)

5. Plot the points  $A(0, 6)$ ,  $B(6, 2)$ ,  $C(4, -4)$ , and  $D(-4, 2)$
6. Find  $W$ , the midpoint of  $\overline{AB}$  \_\_\_\_\_  
 Find  $X$ , the midpoint of  $\overline{BC}$  \_\_\_\_\_  
 Find  $Y$ , the midpoint of  $\overline{CD}$  \_\_\_\_\_  
 Find  $Z$ , the midpoint of  $\overline{AD}$  \_\_\_\_\_



7. Rectangle  $MNPQ$  has diagonals that intersect at point  $X$ .

Which of the following represents the point  $X$ ?

- A.  $\left(\frac{7}{2}, -2\right)$       B.  $\left(\frac{13}{2}, 4\right)$   
 C.  $\left(-\frac{13}{2}, -4\right)$       D.  $\left(-\frac{7}{2}, 2\right)$

