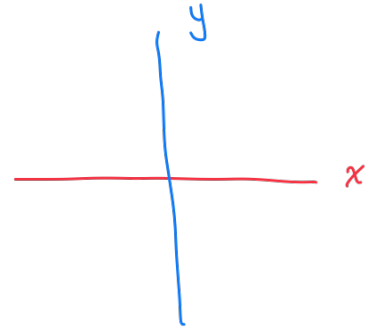


## Chapter 2.1 Notes Distance and Midpoint formulas

X-axis = the horizontal line (one going side to side)

Y-axis = the vertical line (one going up and down)

( $x$ ,  $y$ ) = or ordered pair



Distance formula :  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

ex.)  $x_1$   $y_1$   $x_2$   $y_2$   
 $(1, 2)$  ,  $(3, 4)$

Mid-point formula:  $\text{mid-point} = \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$

1. Find the distance between the given points P1 and P2.

$P_1 = (0, 0)$   $P_2 = (1, 2)$   
 $x_1$   $y_1$   $x_2$   $y_2$

distance  
formula

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$d = \sqrt{(1 - 0)^2 + (2 - 0)^2}$

$d = \sqrt{(1)^2 + (2)^2}$

$d = \sqrt{5}$

- \* First write down the ordered pair for  $P_1$  and place  $x_1$  and  $y_1$  over the top of them.
- \* Then write down the ordered pair for  $P_2$  and place  $x_2$  and  $y_2$  over the top of them.
- \* Now we use the distance formula.
- \* Replace the x's and y's with the numbers from your ordered pairs.
- \* Now you can type this into your calculator to get the answer.

2. Find the distance between the given points.

$$P_1 = (-1, 5) \quad P_2 = (1, 6)$$

$$\begin{matrix} x_1 & y_1 \\ (-1, & 5) \end{matrix} \quad \begin{matrix} x_2 & y_2 \\ (1, & 6) \end{matrix}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

distance formula

$$d = \sqrt{(1 - -1)^2 + (6 - 5)^2}$$

Type in calculator

$$d = \boxed{\sqrt{5}}$$

- \* First write down the ordered pair for  $P_1$  and place  $x_1$  and  $y_1$  over the top of them.
- \* Then write down the ordered pair for  $P_2$  and place  $x_2$  and  $y_2$  over the top of them.
- \* Now we use the distance formula.
- \* Replace the x's and y's with the numbers from your ordered pairs.
- \* Now you can type this into your calculator to get the answer.

3. Find the distance between the points  $P_1$  and  $P_2$ .

$$\begin{matrix} P_1 = (3, -4) \\ x_1 & y_1 \end{matrix} \quad \begin{matrix} P_2 = (5, 2) \\ x_2 & y_2 \end{matrix}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

distance formula

$$d = \sqrt{(5 - 3)^2 + (2 - -4)^2}$$

Type into calculator

$$d = \boxed{2\sqrt{10}}$$

- \* First write down the ordered pair for  $P_1$  and place  $x_1$  and  $y_1$  over the top of them.
- \* Then write down the ordered pair for  $P_2$  and place  $x_2$  and  $y_2$  over the top of them.
- \* Now we use the distance formula.
- \* Replace the x's and y's with the numbers from your ordered pairs.
- \* Now you can type this into your calculator to get the answer.

4. Find the distance between the points P1 and P2.

$$P_1 = (-3, 5) \quad P_2 = (6, 0)$$

$$\begin{matrix} x_1 & y_1 & & x_2 & y_2 \\ (-3, & 5) & & (6, & 0) \end{matrix}$$

distance  
formula

$$\rightarrow d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(6 - -3)^2 + (0 - 5)^2}$$

← Type into  
calculator

$$d = \sqrt{106}$$

- \* First write down the ordered pair for P<sub>1</sub> and place X<sub>1</sub> and Y<sub>1</sub> over the top of them.
- \* Then write down the ordered pair for P<sub>2</sub> and place X<sub>2</sub> and Y<sub>2</sub> over the top of them.
- \* Now we use the distance formula.
- \* Replace the x's and y's with the numbers from your ordered pairs.
- \* Now you can type this into your calculator to get the answer.

5. Find the midpoint of the line segment joining the points P1 and P2.

$$P_1 = (-1, 2) \quad P_2 = (6, 0)$$

$$\begin{matrix} x_1 & y_1 & & x_2 & y_2 \\ (-1, & 2) & & (6, & 0) \end{matrix}$$

formula

$$\rightarrow \text{midpoint} = \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$$

$$\text{midpoint} = \frac{-1 + 6}{2}, \frac{2 + 0}{2}$$

$$\left( \frac{5}{2}, 1 \right)$$

- \* Here we are looking for the midpoint.
- \* First write down the ordered pair for P<sub>1</sub> , and place X<sub>1</sub> and Y<sub>1</sub> over the top of them.
- \* Then write down ordered pair for P<sub>2</sub> , and place X<sub>2</sub> and Y<sub>2</sub> over the top of them.
- \* Next, you will use the midpoint formula.
- \* Replace each letter with the number that goes with it.
- \* Then use your calculator to work each one.

\* Tip: Do not add combine these two together. They are separated by a comma to make an ordered pair.

6. Find the midpoint of the line segment joint points P1 and P2.

$$P_1 = (4, -6) \quad P_2 = (6, 8)$$

$$\begin{matrix} x_1 & y_1 \\ (4, & -6) \end{matrix} \quad \begin{matrix} x_2 & y_2 \\ (6, & 8) \end{matrix}$$

formula  $\rightarrow$  midpoint =  $\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$

$$\text{midpoint} = \frac{4+6}{2}, \frac{-6+8}{2}$$

$$\text{midpoint} = (5, 1)$$

- \* Here we are looking for the midpoint.
- \* First write down the ordered pair for  $P_1$ , and place  $X_1$  and  $Y_1$  over the top of them.
- \* Then write down ordered pair for  $P_2$ , and place  $X_2$  and  $Y_2$  over the top of them.
- \* Next, you will use the midpoint formula.
- \* Replace each letter with the number that goes with it.
- \* Then use your calculator to work each one.

7. Find the midpoint of the line segment joining the points P1 and P2.

$$P_1 = (2, -5) \quad P_2 = (6, 9)$$

$$\begin{matrix} x_1 & y_1 \\ (2, & -5) \end{matrix} \quad \begin{matrix} x_2 & y_2 \\ (6, & 9) \end{matrix}$$

midpoint =  $\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$  formula

$$\text{midpoint} = \frac{2+6}{2}, \frac{-5+9}{2}$$

$$\text{midpoint} = (4, 2)$$

- \* Here we are looking for the midpoint.
- \* First write down the ordered pair for  $P_1$ , and place  $X_1$  and  $Y_1$  over the top of them.
- \* Then write down ordered pair for  $P_2$ , and place  $X_2$  and  $Y_2$  over the top of them.
- \* Next, you will use the midpoint formula.
- \* Replace each letter with the number that goes with it.
- \* Then use your calculator to work each one.

8. Find the midpoint of the line segment joint the points P1 and P2.

$$P_1 = (d, n) \quad P_2 = (0, 0)$$

$$\begin{matrix} x_1 & y_1 \\ (d, & n) \end{matrix} \quad \begin{matrix} x_2 & y_2 \\ (0, & 0) \end{matrix}$$

formula  $\rightarrow$  midpoint =  $\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$

$$\text{midpoint} = \frac{d+0}{2}, \frac{n+0}{2}$$

$$\left( \frac{d}{2}, \frac{n}{2} \right)$$

- \* Here we are looking for the midpoint.
- \* First write down the ordered pair for  $P_1$ , and place  $X_1$  and  $Y_1$  over the top of them.
- \* Then write down ordered pair for  $P_2$ , and place  $X_2$  and  $Y_2$  over the top of them.
- \* Next, you will use the midpoint formula.
- \* Replace each letter with the number that goes with it.
- \* Then use your calculator to work each one.