

## Notes 1.8 – The Coordinate Plane

### 1. Distance Formula

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

$(5, 2)$        $(-4, -1)$   
 $x_1, y_1$        $x_2, y_2$

$$d = \sqrt{(-4 - 5)^2 + (-1 - 2)^2}$$

$$= \sqrt{(-9)^2 + (-3)^2} = \sqrt{81 + 9} = \sqrt{90}$$

$$= 9.5$$

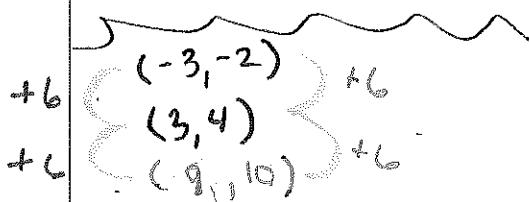
### 2. Midpoint of a segment

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

$Q(3, 5)$  ,  $S(7, -9)$   
 $x_1, y_1$        $x_2, y_2$

$$\left( \frac{3+7}{2}, \frac{5+(-9)}{2} \right)$$

$$(5, -2)$$



$$(9, 10)$$

$x_2, y_2$

### 1. Use to find the distance between 2 points on the coordinate plane.

Formula:

Example: Find the distance between  $T(5, 2)$  and  $R(-4, -1)$  to the nearest tenth.

$$\begin{array}{c} 90 \\ \swarrow \quad \searrow \\ 3 \sqrt{10} \end{array}$$

Example:  $\begin{array}{c} 3 \\ \swarrow \quad \searrow \\ 3.3 \quad 5.2 \end{array}$

### 2. The average or mean of the coordinates of the endpoints.

Formula:

Example: QS has endpoints Q(3, 5) and S(7, -9). Find the coordinates of its midpoint M.

Example: The midpoint of AB is M(3, 4). One endpoint is A(-3, -2). Find the coordinate of the other endpoint B.

$$(3, 4) = \left( \frac{-3 + x_2}{2}, \frac{-2 + y_2}{2} \right)$$

$$\frac{3}{1} = \frac{-3 + x_2}{2}$$

$$6 = -3 + x_2$$

$$9 = x_2$$

$$\frac{4}{1} = \frac{-2 + y_2}{2}$$

$$8 = -2 + y_2$$

$$10 = y_2$$