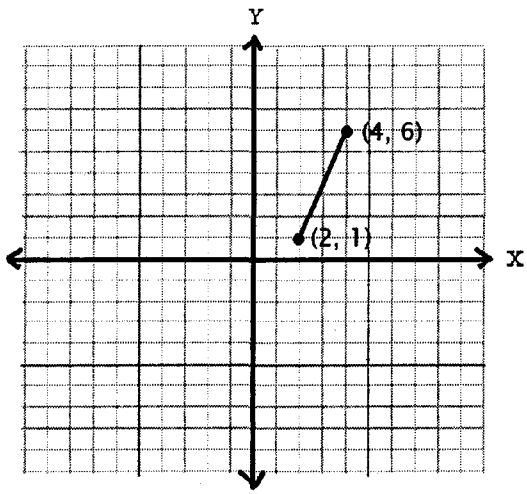


Example 1: What is the distance between the points $(2, 1)$ and $(4, 6)$?

Use the DISTANCE FORMULA (it's based on the Pythagorean Theorem).

$$c^2 = a^2 + b^2$$
$$(Distance)^2 = (change\ of\ \boldsymbol{x})^2 + (change\ of\ \boldsymbol{y})^2$$

So...

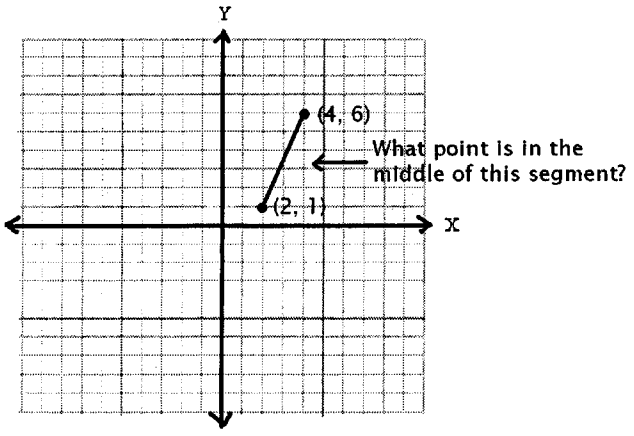
$$\boxed{Distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}}$$

To find the distance between $(2, 1)$ and $(4, 6)$...

$$D = \sqrt{(4-2)^2 + (6-1)^2}$$
$$D = \sqrt{(2)^2 + (5)^2}$$
$$D = \sqrt{4 + 25}$$
$$\boldsymbol{D = \sqrt{29}}$$

Example 2: What is the distance between the points $(-1, -4)$ and $(7, 2)$?

$$D = \sqrt{(-1-7)^2 + (-4-2)^2}$$
$$D = \sqrt{(-8)^2 + (-6)^2}$$
$$D = \sqrt{64 + 36}$$
$$D = \sqrt{100}$$
$$\boldsymbol{D = 10}$$



Example 3: What are the coordinates of the midpoint of the segment joining the points $(2, 1)$ and $(4, 6)$?

It must be halfway between the ***x*** values and halfway between the ***y*** values.

The midpoint $M(x_m, y_m)$ between the two points (x_1, y_1) and (x_2, y_2) is

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

To find the midpoint of the segment joining the points $(2, 1)$ and $(4, 6)$...

$$\left(\frac{2+4}{2}, \frac{1+6}{2}\right)$$

$$\left(\frac{6}{2}, \frac{7}{2}\right)$$

$$\mathbf{\left(3, 3\frac{1}{2}\right)}$$

Example 4: M is the midpoint of $\overline{AB}$. Given the coordinates $A(4, -9)$ and $M(7, -2)$, what are the coordinates of B? [Notice that you know one endpoint and the midpoint – you are finding the other endpoint]

$$7 = \frac{4 + x_B}{2}$$
$$14 = 4 + x_B$$
$$\mathbf{10} = \quad \mathbf{x_B}$$

and

$$-2 = \frac{-9 + y_B}{2}$$
$$-4 = -9 + y_B$$
$$\mathbf{5} = \quad \mathbf{y_B}$$

The coordinates of B are **(10, 5)**.