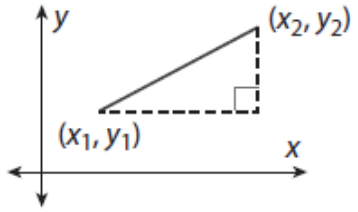
Algebra Review

The Distance Formula

The distance between two points (x_1, y_1) and (x_2, y_2) on the coordinate plane is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.



$a^2 + b^2 = c^2$

Ex. Find the distance between $A(2,5)$ and $B(1,-3)$.

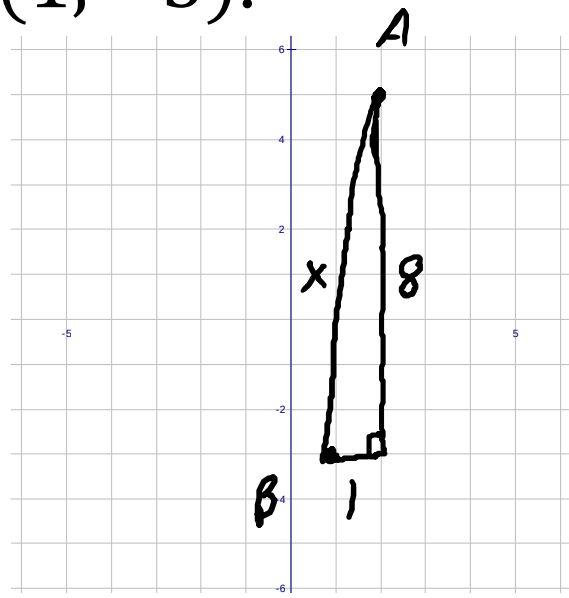
$a^2 + b^2 = c^2$

$1^2 + 8^2 = x^2$

$1 + 64 = x^2$

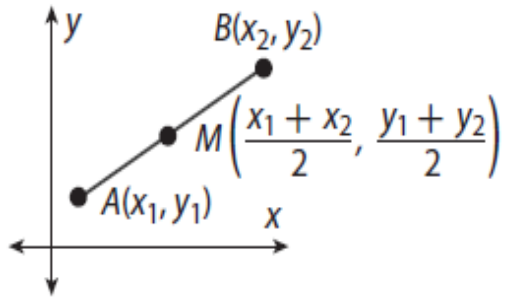
$\sqrt{65} = \sqrt{x^2}$

$x = \sqrt{65}$



The Midpoint Formula

The midpoint M of $\overline{AB}$ with endpoints $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.



average

Ex. Find the midpoint between $A(\overset{x}{2}, \overset{y}{5})$ and $B(\overset{x}{1}, \overset{y}{-3})$.

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

$\frac{5+-3}{2} = \frac{2}{2} = 1$

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

Thm. The slope between (x_1, y_1) and (x_2, y_2) is

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Subtract y's on the top

Subtract x's in same order on the bottom

Ex. Find the slope between $A(2,5)$ and $B(1,-3)$.

$\overset{x}{2}\ \overset{y}{5}$ $\qquad$ $\overset{x}{1}\ \overset{y}{-3}$

$$\frac{-3-5}{1-2} = \frac{-8}{-1} = 8$$

Ex. Find distance, midpoint, and slope for $A(5,-2)$ and $B(-6,4)$.

x y

x y

$a^2+b^2=c^2$

$6^2+11^2=x^2$

$36+121=x^2$

$\sqrt{157}=\sqrt{x^2}$

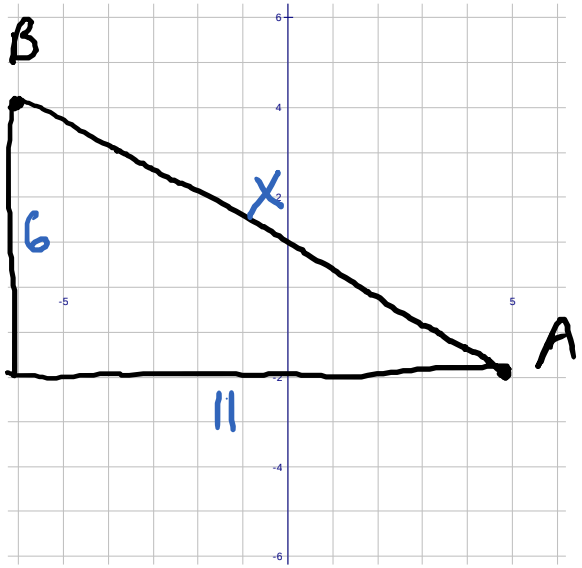
$x=\sqrt{157}$

$\frac{5+-6}{2}=-\frac{1}{2}$

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

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

$\frac{-2-4}{5-(-6)}=\frac{-6}{11}$



Ex. Find distance, midpoint, and slope for $P(3,4)$ and $Q(-5,-1)$.

Ex. Find distance, midpoint, and slope for $V(-2,1)$ and $W(6,-3)$.

Ex. Find distance, midpoint, and slope for $P(3,4)$ and $Q(-5,-1)$.

x y

x y

$a^2+b^2=c^2$

$5^2+8^2=x^2$

$25+64=x^2$

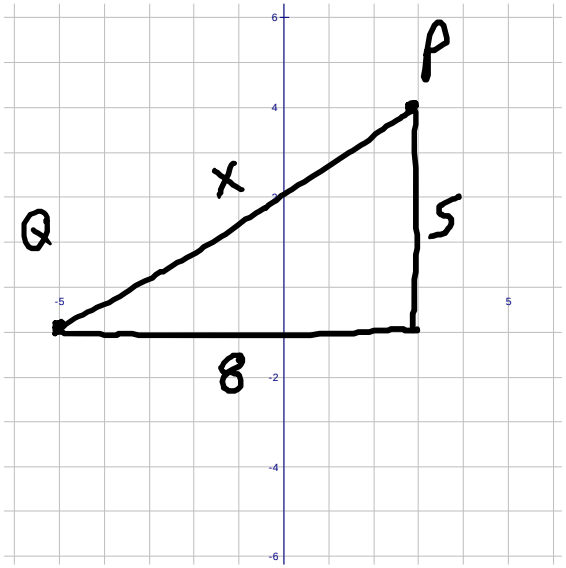
$89=x^2$

$\sqrt{89}=x$

$\frac{3+-5}{2}=\frac{-2}{2}=-1$

$\frac{4+-1}{2}=\frac{3}{2}$

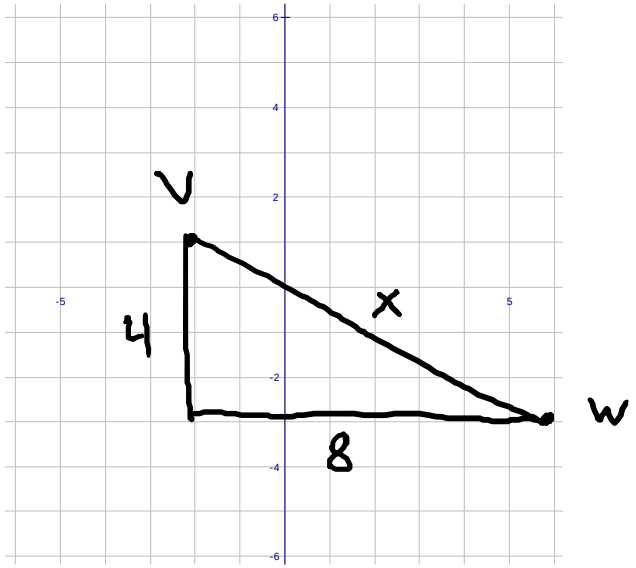
$\left(-1,\frac{3}{2}\right)$



$\frac{4-(-1)}{3-(-5)}=\frac{5}{8}$

Ex. Find distance, midpoint, and slope for $V(\overset{x}{-2},\overset{y}{1})$ and $W(6,-3)$.

$\overset{x}{}\quad\overset{y}{}$



$a^2+b^2=c^2$

$4^2+8^2=x^2$

$16+64=x^2$

$80=x^2$

$x=\sqrt{80}$

$\frac{-2+6}{2}=\frac{4}{2}=2$

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

$(2,-1)$

$\frac{1-(-3)}{-2-6}=\frac{4}{-8}=-\frac{1}{2}$