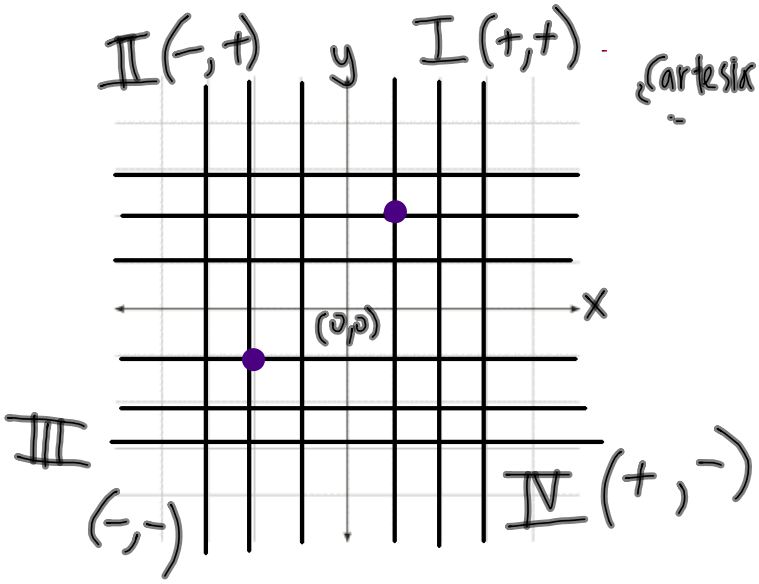
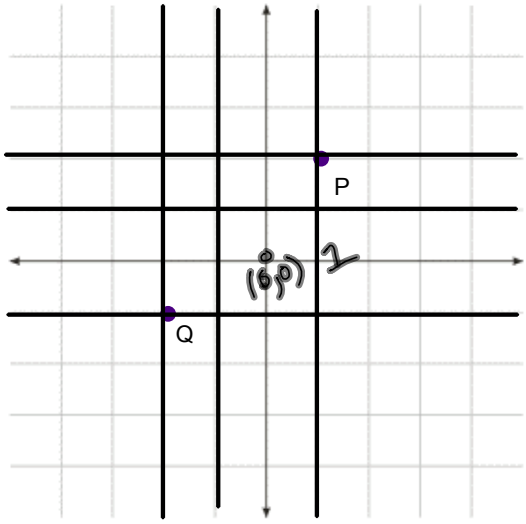
What can you tell me about these two points?

What more do we need to be able to use these points?



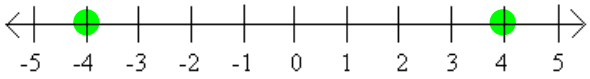

Let's label!




How do we determine what P and Q are?

P(1,2) coordinate pair

Q(−2,−1)




How far away from 0 is -4? 4

What about 4? 4

$|-3| = 3 = -(-3)$ $|5| = 5$

The distance between 0 and 4 and 0 and -4 is equal: this is called the MAGNITUDE

This is the ABSOLUTE VALUE of a number, |4|=4 and |-4|=4

if a>0 then |a|= a

if a<0 then |a| = -a

if a=0 then |a|= 0

## Properties of Absolute Value

$|ab| = |a||b|$

$\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$

|(7)(6)|= |42| =42

|7||6|= 7·6 = 42

|(-4)(3)|= |-12| = |12

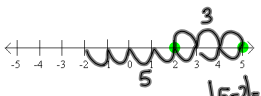
|-4||3|= 4·3 = 12

|(16)/(4)|=

|16|/|4|=

|(27)/(-3)|=

|27|/|-3|=




If I want to find the distance between 5 and 2 what would I do?

$|5-2|=3$

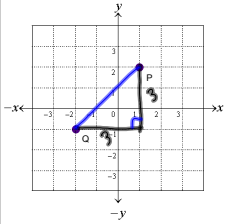
Does the same work for 3 and -2?

$3-(-2)=5$

$-2-3=-5$


$d=|a-b|$

How can we find the distance between P and Q?




$P(1,2)\ Q(-2,-1)$

$|2-(-1)|=3$

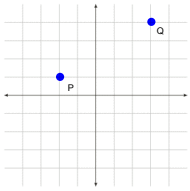
$|1-(-2)|=3$

$3^2+3^2=d^2$

$18=d^2$

$\sqrt{18}=d$

$3\sqrt{2}=d$




General Case

$P(x_1,y_1)\ Q(x_2,y_2)$

$|y_1-y_2|\ |x_1-x_2|$

$(|y_1-y_2|)^2+(|x_1-x_2|)^2$

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

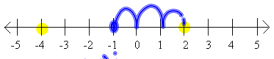
$\frac{1+6}{2}\ \frac{5+2}{2}$

$3.5, 3.5$

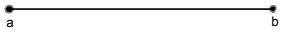
Distance Formula: distance between points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is

Find the distance between (1,5) and (6,2)

## Find the Midpoint

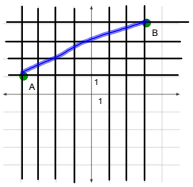



$\frac{|2-(-4)|}{2} = 3$ $\frac{2+-4}{2}$




If I have a segment with endpoints a and b how do I find the midpoint?

How do I find the midpoint of A and B on a coordinate plane?




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

General Case