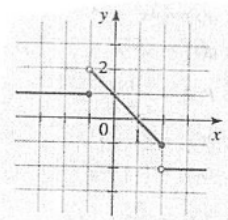
Name:_____ Date:_____

PC: Algebraic Definition of Absolute Value

Do Now:

1. Write an equation, in standard form, that is perpendicular to the line $5x-2y=2$ and that passes through the point (-2,-6).

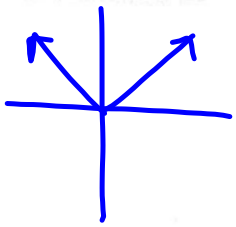
2. Write equations for the piecewise function whose graph is show:



Algebraic definition of Absolute Value:

For any real number x,

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

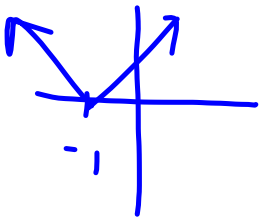


Use the algebraic definition of absolute value to rewrite each expression and then sketch the graph on a separate piece of graph paper.

1. $|x+1| =$

$x+1=0$
$x=-1$

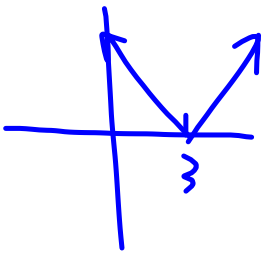
$$f(x) = \begin{cases} x+1, & x \geq -1 \\ -(x+1), & x < -1 \\ \text{or} & \\ -x-1 & \end{cases}$$



2. $|x-3| =$

$x-3=0$
$x=3$

$$f(x) = \begin{cases} x-3, & x \geq 3 \\ -(x-3), & x < 3 \end{cases}$$



3. $|5-x|=$ $|x-5|$ $f(x)=\begin{cases} x-5, & x\geq 5 \\ -(x-5), & x<5 \end{cases}$

4. $|3x-2|=$ $f(x)=\begin{cases} 3x-2, & x\geq \frac{2}{3} \\ -(3x-2), & x<\frac{2}{3} \end{cases}$

$3x-2=0$
$3x=2$
$x=\frac{2}{3}$

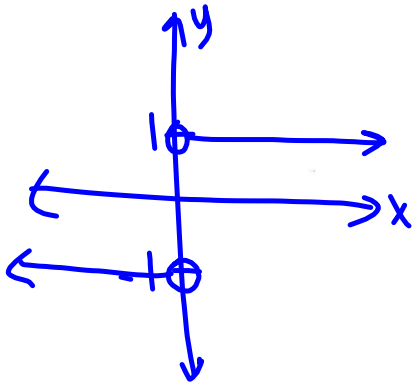
5. $|2x-1|=$

6. $\left|\frac{1}{2}x+4\right|=$

7. $|3-2x|=$

8. $\frac{x}{|x|}=$

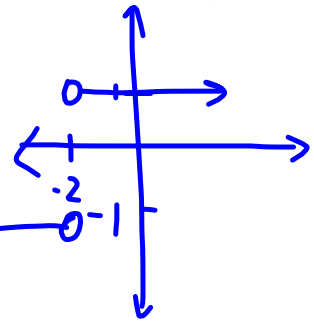
$$f(x)=\begin{cases}1 & , x>0\\ -1 & , x<0\end{cases}$$



9. $\frac{|x|}{x}=$

10. $\frac{|x+2|}{x+2}=$

$$f(x)=\begin{cases}1 & , x>-2\\ -1 & , x<-2\end{cases}$$



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

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

12. $\frac{|2x|}{2x} =$

13. $|x| + x =$

$$f(x) = \begin{cases} x + x, & x \geq 0 \\ -x + x, & x < 0 \end{cases}$$

$$f(x) = \begin{cases} 2x, & x \geq 0 \\ 0, & x < 0 \end{cases}$$

14. $|x| - x =$