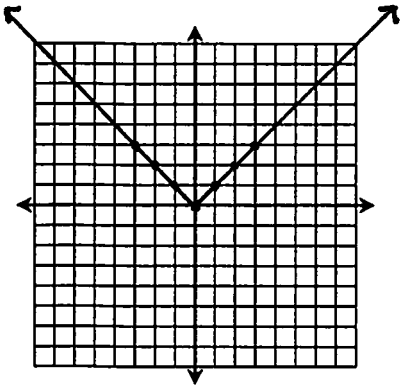
Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

ABSOLUTE VALUE Functions

- The **absolute value function** is written as $f(x) = |x|$
- Complete the table below to graph the function. Give the domain and range.

x	$\|x\|$
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3



$D = \{\mathbb{R}\}$

$R = \{y \mid y \geq 0\}$

- The **graph** looks like a V; The **turning point** is called the vertex.

GRAPHING by Table

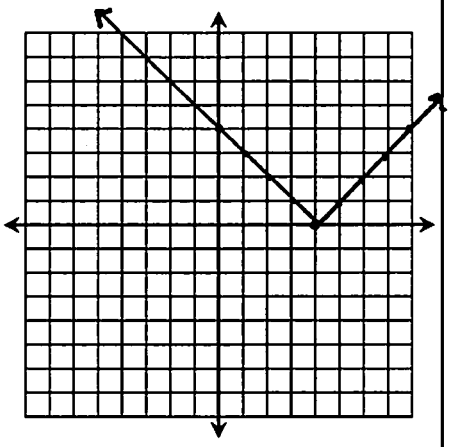
To create a table of values, it's best to place the vertex in the middle, then include values on both sides.

①	Find the ***x*-value of the vertex.** Set the expression from the inside of the absolute value bars equal to 0 and solve.
②	**PLACE THIS VALUE IN THE MIDDLE ROW OF YOUR TABLE.** Number up and down, then complete the table.
③	**GRAPH!**

Directions: Graph each function. Give the domain and range.

1. $f(x) = |x - 4|$

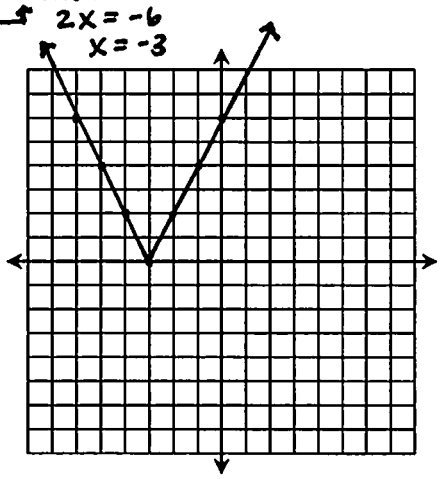
x	$f(x)$
1	3
2	2
3	1
4	0
5	1
6	2
7	3



$D = \{\mathbb{R}\}$ $R = \{y \mid y \geq 0\}$

2. $f(x) = |2x + 6|$ $2x + 6 = 0$, $2x = -6$, $x = -3$

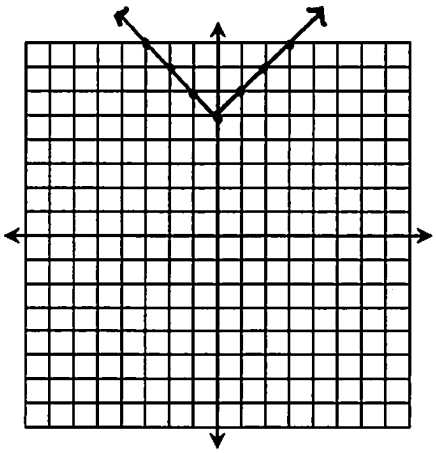
x	$f(x)$
-6	6
-5	4
-4	2
-3	0
-2	2
-1	4
0	6



$D = \{\mathbb{R}\}$ $R = \{y \mid y \geq 0\}$

3. $f(x) = |x| + 5$

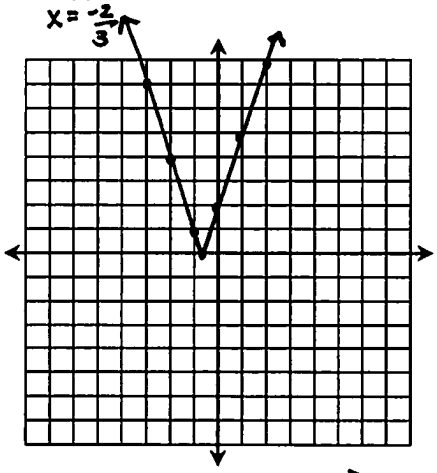
x	$f(x)$
-3	8
-2	7
-1	6
0	5
1	6
2	7
3	8



$D =$ {ℝ} $R =$ {y | y ≥ 5}

4. $f(x) = |3x + 2|$ 3x+2=0, 3x=-2, x=-2/3

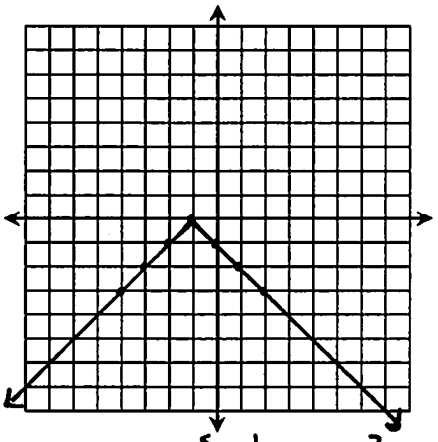
x	$f(x)$
-3	7
-2	4
-1	1
-2/3	0
0	2
1	5
2	8



$D =$ {ℝ} $R =$ {y | y ≥ 0}

5. $f(x) = -|x + 1|$ x+1=0, x=-1

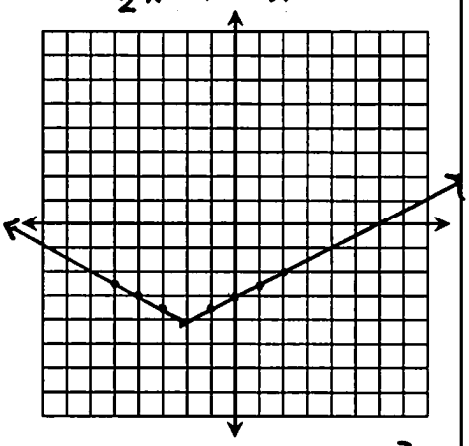
x	$f(x)$
-4	-3
-3	-2
-2	-1
-1	0
0	-1
1	-2
2	-3



$D =$ {ℝ} $R =$ {y | y ≤ 0}

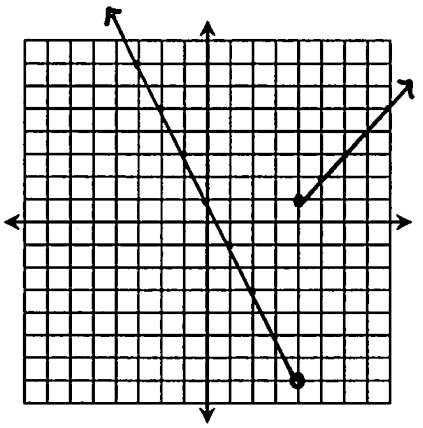
6. $f(x) = \left|\frac{1}{2}x + 1\right| - 4$ $\frac{1}{2}x+1=0$, $\frac{1}{2}x=-1$, $x=-2$

x	$f(x)$
-5	-2.5
-4	-3
-3	-3.5
-2	-4
-1	-3.5
0	-3
1	-2.5



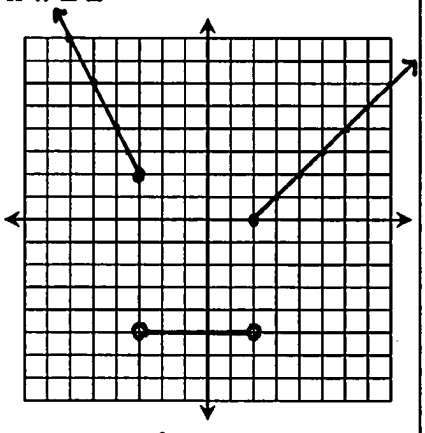
$D =$ {ℝ} $R =$ {y | y ≥ -4}

7. $f(x) = \begin{cases} -2x + 1 & \text{if } x < 4 \\ |x - 3| & \text{if } x \geq 4 \end{cases}$



$D =$ {ℝ} $R =$ {y | y > -7}

8. $f(x) = \begin{cases} |2x| - 4 & \text{if } x \leq -3 \\ -5 & \text{if } -3 < x < 2 \\ x - 2 & \text{if } x \geq 2 \end{cases}$



$D =$ {ℝ} $R =$ {y | y = -5 ∪ y ≥ 0}

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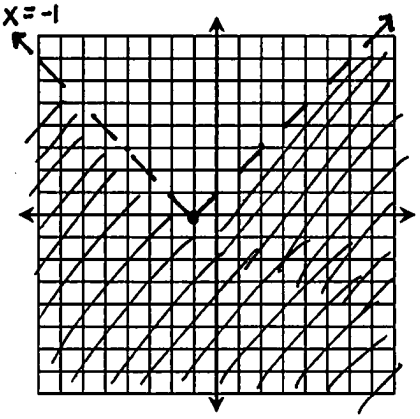
Main Ideas/Questions	Notes/Examples	
GRAPHING ABSOLUTE VALUE inequalities	①	Create a **TABLE OF VALUES.** Recall that the vertex should be in the middle row.
	②	**GRAPH!** Use a dashed line for < and > symbols and a solid line for ≤ and ≥ symbols.
	③	**SHADE!** Assuming y is to the left, shade above the line for > or ≥ symbols and below the line for < or ≤ symbols.

Directions: Graph each inequality.

1. $y < |x+1|$

x	y
-4	3
-3	2
-2	1
-1	0
0	1
1	2
2	3

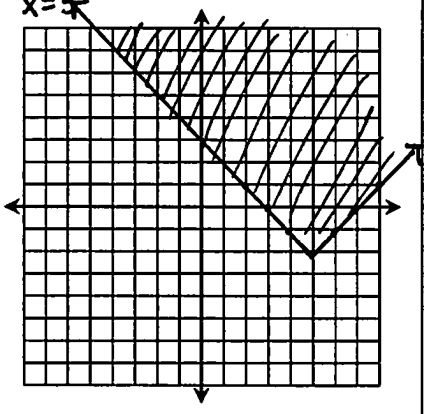
$x+1=0$
$x=-1$



2. $y \geq |x-5|-2$

x	y
2	1
3	0
4	-1
5	-2
6	-1
7	0
8	1

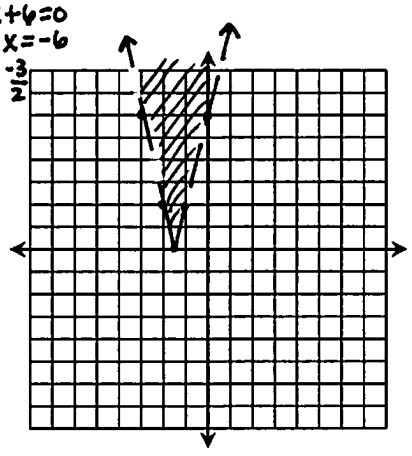
$x-5=0$
$x=5$



3. $y > |4x+6|$

x	y
-4	10
-3	6
-2	2
$-3/2$	0
-1	2
0	6
1	10

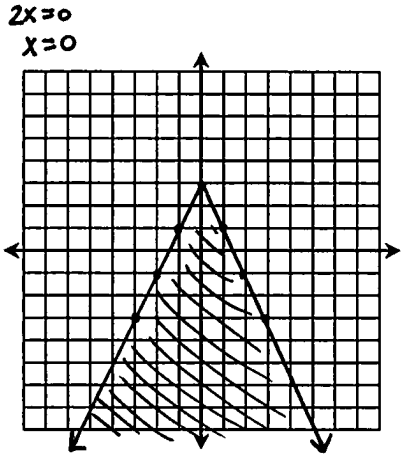
$4x+6=0$
$4x=-6$
$x=\frac{-3}{2}$



4. $y \leq -|2x|+3$

x	y
-3	-3
-2	-1
-1	1
0	3
1	1
2	-1
3	-3

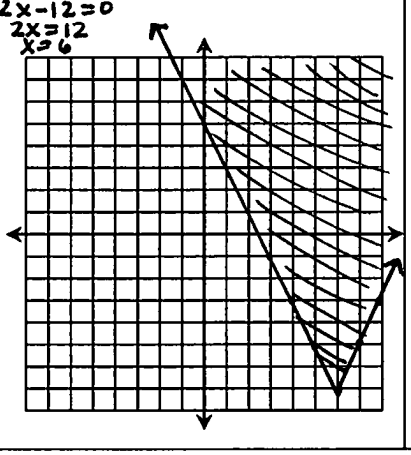
$2x=0$
$x=0$



5. $y \geq |2x-12|-7$

x	y
3	-1
4	-3
5	-5
6	-7
7	-5
8	-3
9	-1

$2x-12=0$
$2x=12$
$x=6$



6. $y < -|3x+9|+4$

x	y
-6	-5
-5	-2
-4	1
-3	4
-2	1
-1	-2
0	-5

$3x+9=0$
$3x=-9$
$x=-3$