Name _____ Period _____

8.1A *Graphs of Absolute Value Functions*

#1 – 6: Using a graphing utility, determine whether the graph of each equation opens up or down. Identify the vertex and the axis of symmetry.

1. $y = |x+2| - 6$

Opens: up

Axis of symmetry: $x = -2$

Vertex: $(-2, -6)$

2. $y = -|x-3| + 4$

Opens: down

Axis of symmetry: $x = 3$

Vertex: $(3, 4)$

3. $y = 2|x-5| - 4$

Opens: up

Axis of symmetry: $x = 5$

Vertex: $(5, -4)$

4. $y = -2|x-2| - 5$

Opens: down

Axis of symmetry: $x = 2$

Vertex: $(2, -5)$

5. $y = -\frac{1}{2}|-3x+1| - 4$

Opens: down

Axis of symmetry: $x = \frac{1}{3}$

Vertex: $(\frac{1}{3}, -4)$

6. $y = \frac{1}{4}|x-2| + 4$

Opens: up

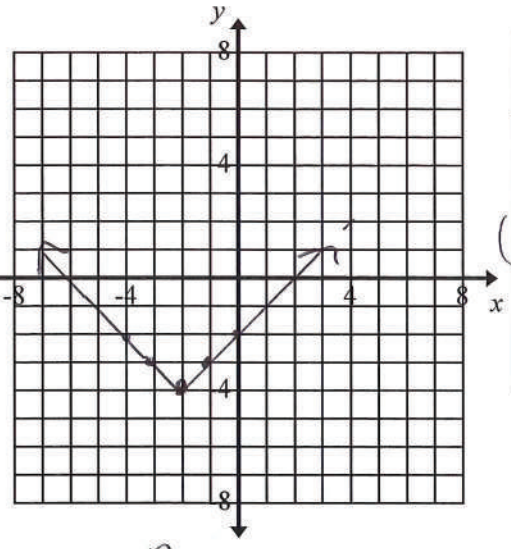
Axis of symmetry: $x = 2$

Vertex: $(2, 4)$

#7 – 12: Graph the absolute value function AND identify the domain and range.

7. $y = |x+2| - 4$

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

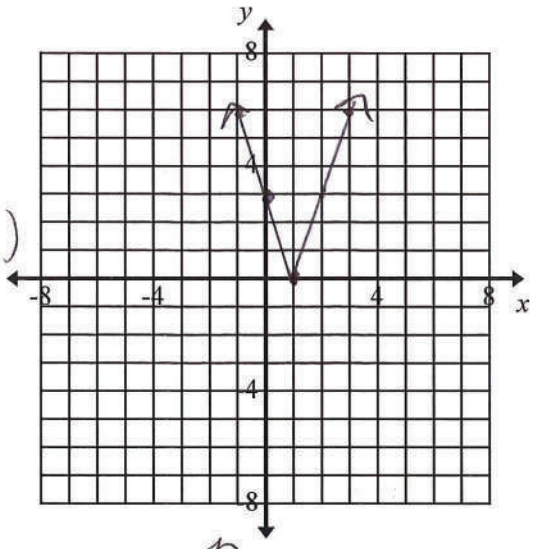


Domain: $\mathbb{R}$

Range: $y \geq -4$

8. $y = 3|x-1|$

x	y
-1	6
0	3
(1	0)
2	3
3	6



Domain: $\mathbb{R}$

Range: $y \geq 0$

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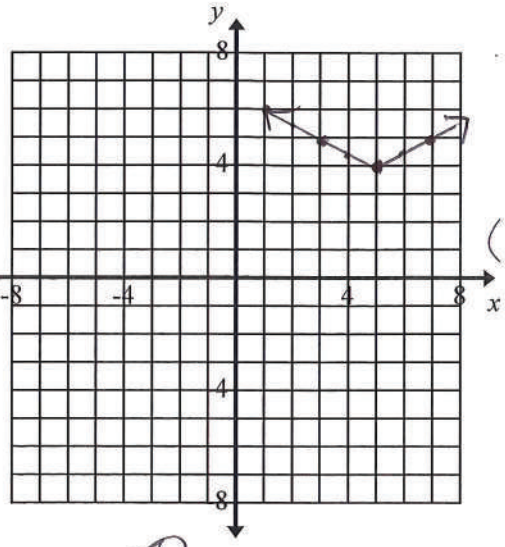
8.1A *Graphs of Absolute Value Functions*

#7 – 12 (continued): Graph the absolute value function AND identify the domain and range.

9. $y = \frac{1}{2}|x-5|+4$

x	y
3	5
4	4.5
5	4
6	4.5
7	5

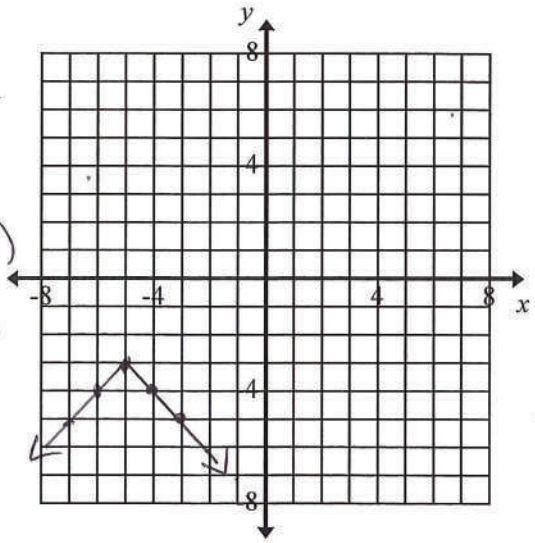


Domain: $\mathbb{R}$

Range: $y \geq 4$

10. $y = -|x+5|-3$

x	y
-7	-5
-6	-4
-5	-3
-4	-4
-3	-5

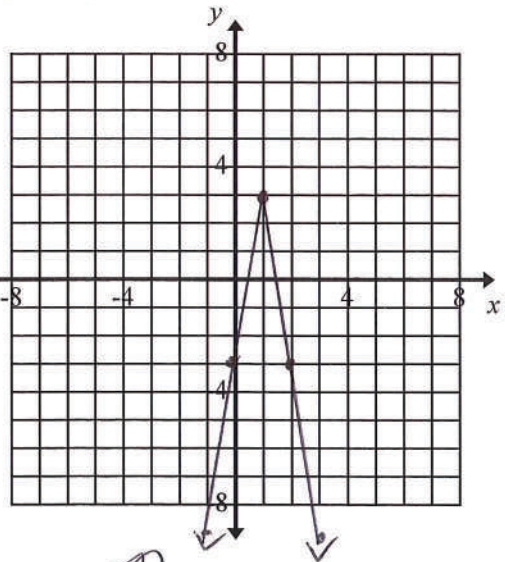


Domain: $\mathbb{R}$

Range: $y \leq -3$

11. $y = -2|3x-3|+3$

x	y
1	-9
0	-3
1	3
2	-3
3	-9

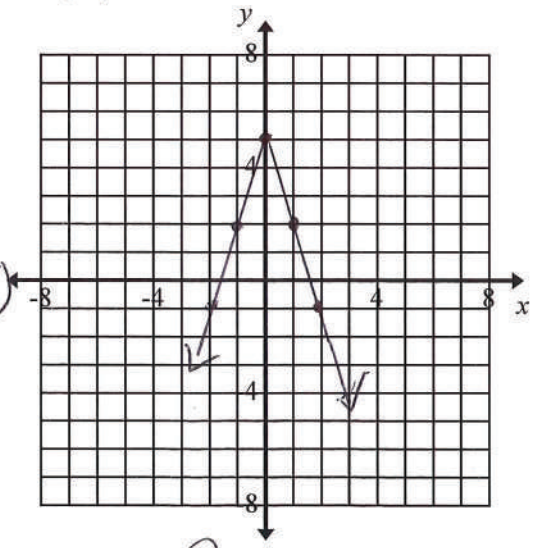


Domain: $\mathbb{R}$

Range: $y \leq 3$

12. $y = 5-|3x|$

x	y
-2	-1
-1	2
0	5
1	2
2	-1



Domain: $\mathbb{R}$

Range: $y \leq 5$

13. Without graphing the equation $y = 2|x-4|+3$, answer the following:

What is the domain of the graph of the equation? $\mathbb{R}$

What is the range of the graph of the equation? $y \geq 3$

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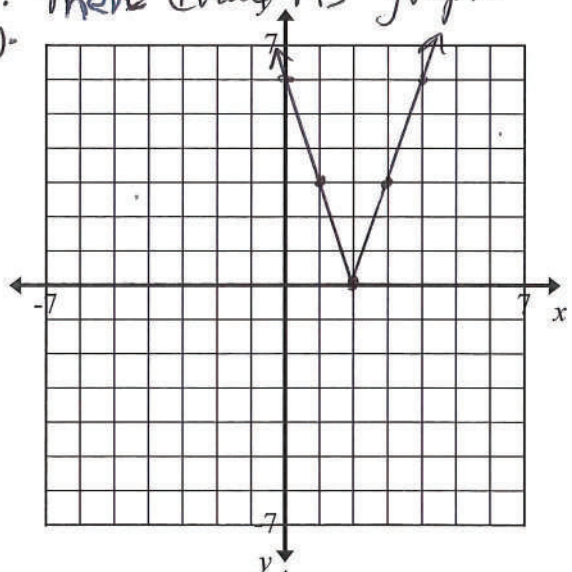
8.1A *Graphs of Absolute Value Functions*

#14 – 15: Identify several significant features (vertex location, opening, domain, range, steepness, etc.) of ~~the graph of the equation, then match the function and the graph (draw a line from the equation to the correct graph):~~ the absolute valve function. Then draw its graph without a graphing utility.

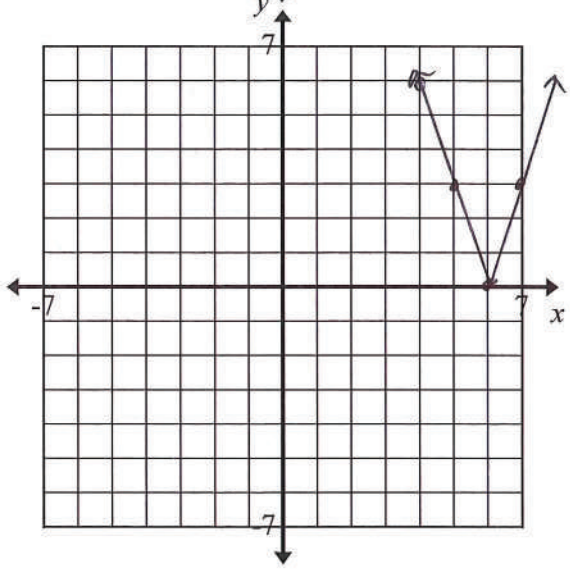
14. $y = |3x - 6|$

- vertex (2, 0)
- opens up
- domain all $\mathbb{R}$
- range $y \geq 0$
- fairly steep with slope of 3 on one side



15. $y = 3|x - 6|$

- vertex 6, 0
- opens up
- domain all $\mathbb{R}$
- range $y \geq 0$
- fairly steep with a slope of 3 on one side.



16. What do you notice that is the same between the **equations** of problems 14 and 15?

Same Domain and range, opening up, same steepness (slope 3)

17. What do you notice that is different between the **equations** of problems 14 and 15?

There are 2 different expressions inside the absolute valve.
Second equation has a coefficient of 3 outside the absolute valve.

18. How do the differences influence the *x*-coordinate of the vertex?

Setting 2 unequal expressions inside the absolute value equal to zero and solving gives 2 different x-coordinates for the vertex.

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8.1A *Graphs of Absolute Value Functions*

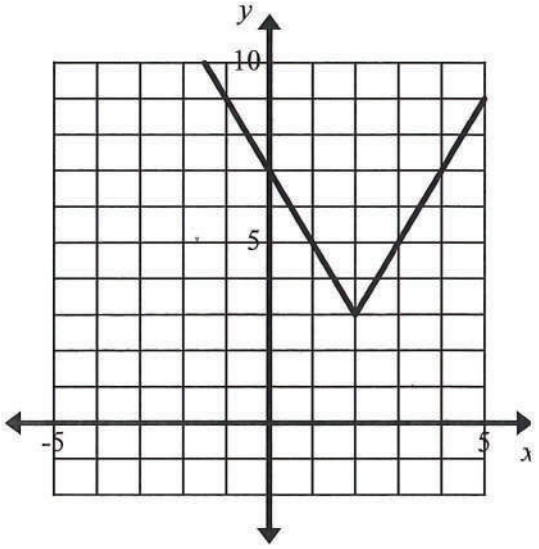
19. Which of the following equation(s) is/are graphed to the right?

[A] $y = |2x - 1| + 3$

[B] $y = 2|x - 2| + 3$

[C] $y = |2x - 2| + 3$

[D] $y = 2|x - 3| + 3$



20. Which pair of linear equations, along with restrictions, represents the equation: $y = |x + 4| - 5$?

vertex (-4, -5)
slope 1

[A] $y = x - 1$ for $x \geq -4$
$y = -x - 1$ for $x < -4$

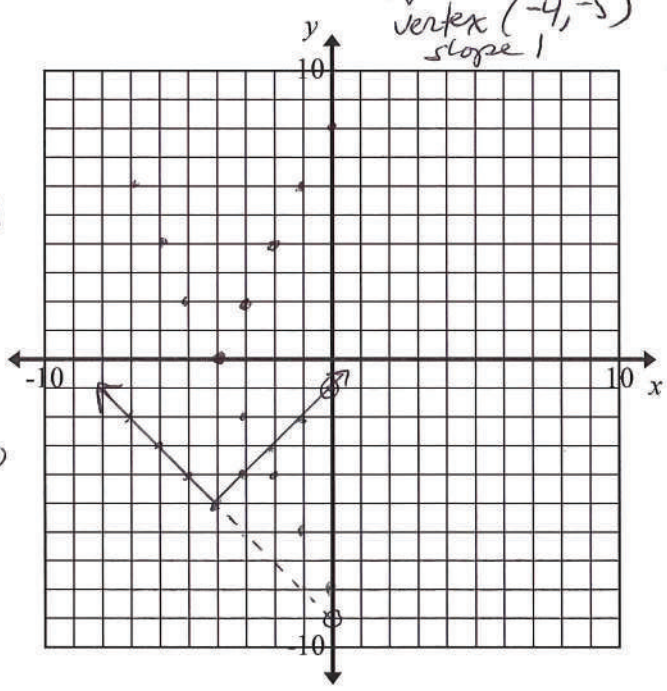
[B] $y = -x - 9$ for $x \geq -4$
$y = x - 1$ for $x < -4$

[C] $y = -x - 1$ for $x \geq -4$
$y = x - 1$ for $x < -4$

[D] $y = x - 1$ for $x \geq -4$
$y = -x - 9$ for $x < -4$

#21

#20



21. What two linear equations, along with restrictions, duplicates the graph of $y = |2x + 8|$?

vertex (-4, 0)
slope 2
$y = 2|x+4|$

$y = 2x + 8$ for $x \geq -4$

$y = -2x - 8$ for $x < -4$

Section 8.1A