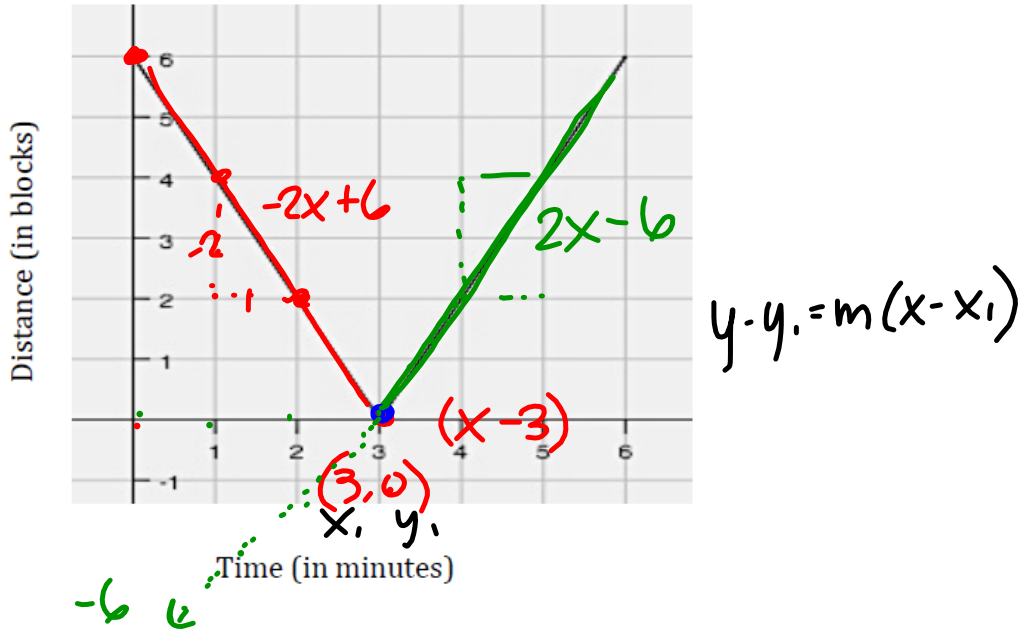
4.3 More Features, More Functions

Part I

Michelle likes riding her bike to and from her favorite lake on Wednesdays. She created the following graph to represent the distance she is away from the lake while biking.



1. Interpret the graph by writing three observations about Michelle's bike ride.

2. Write a piecewise function for this situation, with each linear function being in point-slope form using the point (3,0). What do you notice?

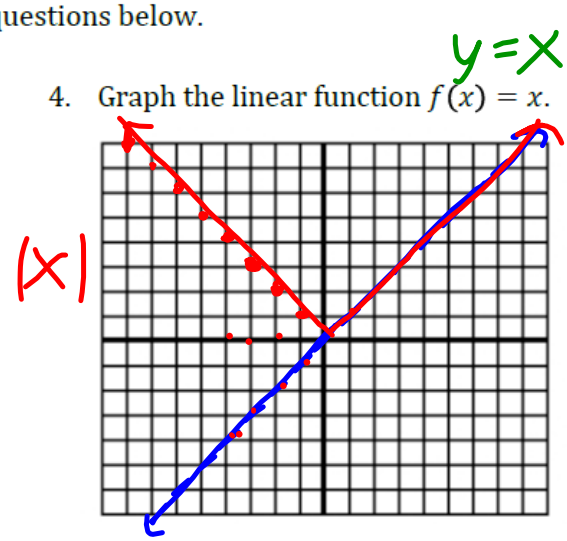
$y - 0 = -2(x-3)$ $\quad y - 0 = 2(x-3)$

$y = -2x+6$ ✓ $\quad y = 2x-6$ ✓

3. This particular piecewise function is called a linear absolute value function. What are the traits you are noticing about linear absolute value functions?

In this part of the task, you will solidify your understanding of piecewise and use your knowledge of transformations to make sense of absolute value functions. Follow the directions and answer the questions below.

4. Graph the linear function $f(x) = x$.



8. Complete the table of values from [-4, 4] for $f(x)$ and $g(x)$ using your answer in questions 3 and 4.

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

5. On the same set of axes, graph $g(x) = |f(x)|$.

6. Explain what happens graphically from $f(x)$ *to* $g(x)$.

7. Write the piecewise function for $g(x)$. Explain your process for creating this piecewise function and how it connects to your answer in question 3.

Part III

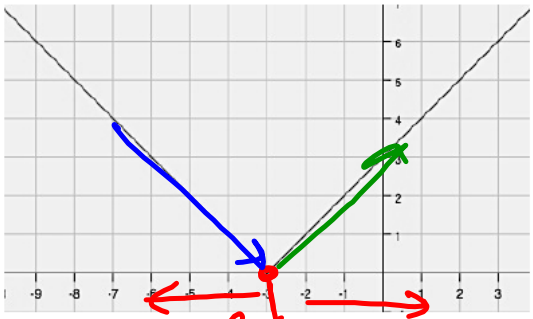
9. The graph below is another example of an absolute value function. The equation of this function can be written two ways:

as an absolute value function $f(x) = |x + 3|$

or as a piecewise:

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

left + 3

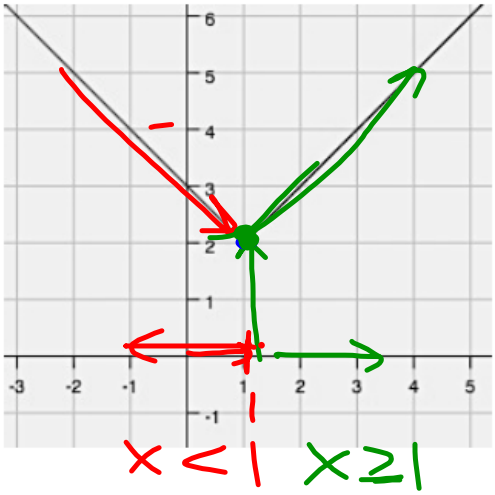


How do these two equations relate to each other?

opposite slope

ow are graphs and equations of more linear absolute value functions. Write the piecewise ction for each. See if you can create a strategy for writing these equations.

10.

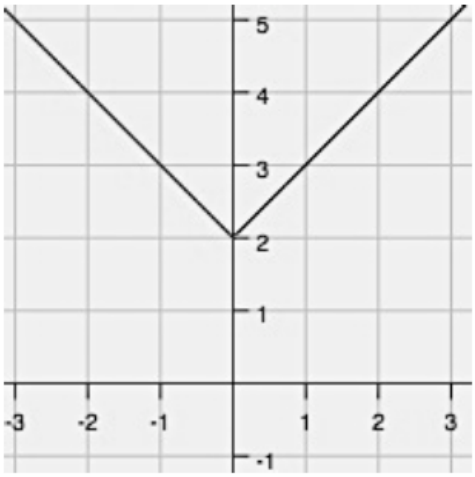


right 1 up 2

Abolute value: $f(x) = |x - 1| + 2$

Piecewise: $f(x) = \begin{cases} -(x-1)+2 & x < 1 \\ (x-1)+2 & x \geq 1 \end{cases}$

11.

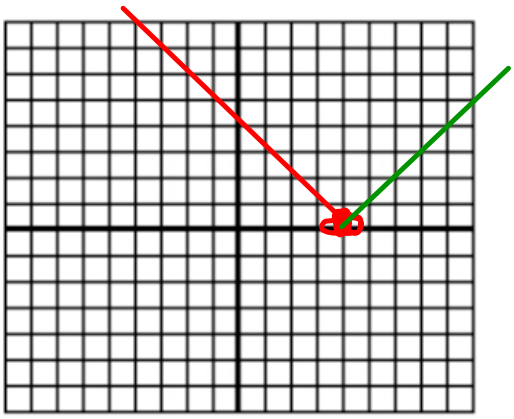


Abolute value: $f(x) = |x| + 2$

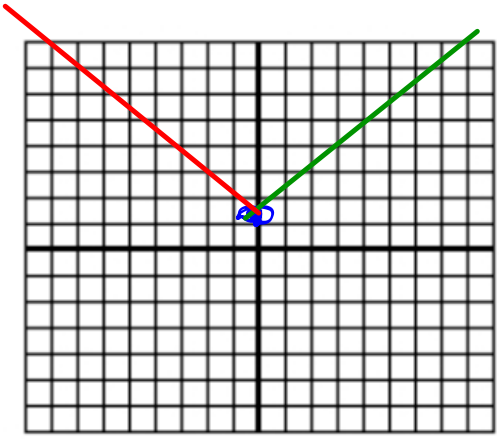
Piecewise: $f(x) =$

Graph the following linear absolute value piecewise functions.

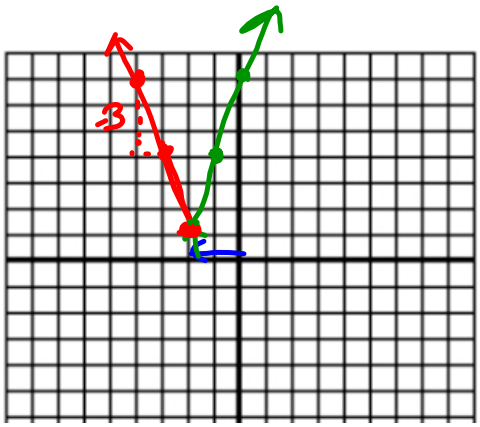
12. $f(x) = |x-4| = \begin{cases} -(x-4), & x < 4 \\ (x-4), & x \geq 4 \end{cases}$



13. $f(x) = |x| + 1 = \begin{cases} -(x)+1, & x < 0 \\ (x)+1, & x \geq 0 \end{cases}$



14.



slope left 2 up 1

Piecewise: $f(x) = \begin{cases} -3(x+2)+1, & x < -2 \\ 3(x+2)+1, & x \geq -2 \end{cases}$

Absolute Value: $f(x) = 3|x+2|+1$

15. Explain your method for doing the following:

a) Writing piecewise linear absolute value functions from a graph.

b) Writing piecewise linear absolute value functions from an absolute value function.

c) Graphing absolute value functions (from either a piecewise or an absolute value equation).

15. Explain your method for doing the following:

a) Writing piecewise linear absolute value functions from a graph.

b) Writing piecewise linear absolute value functions from an absolute value function.

c) Graphing absolute value functions (from either a piecewise or an absolute value equation).

SECONDARY MATH II // MODULE 4
MORE FUNCTIONS, MORE FEATURES – 4.3

4.3

READY, SET, GO! Name Period Date

READY

Topic: Finding the x-intercept(s) for a quadratic function

Find the x-intercepts of the following quadratic functions.

1. $y = x^2 + 3x - 10$
2. $y = x^2 + 8x + 7$
3. $y = 6x^2 + 7x - 20$
4. $y = (x - 2)^2 - 9$
5. $y = -(x + 3)^2 + 9$
6. $y = \frac{1}{2}(x - 1)^2 - 2$

SET

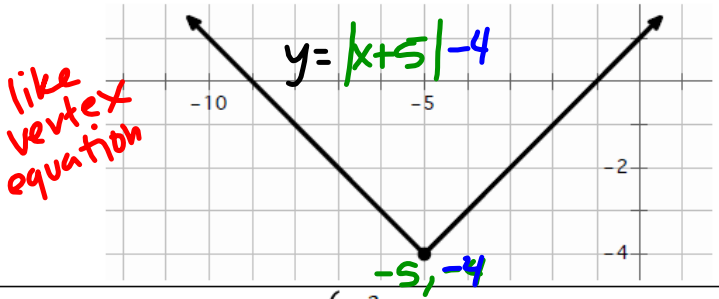
Topic: Absolute value equations

Use the given information to write the indicated form of the function.

7. Piecewise equation

x	$f(x)$
-1	9
0	6
1	3
2	0
3	3
4	6

8. Absolute value equation



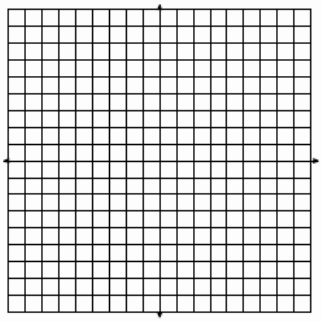
9. Make a table of values. Be sure to include the vertex in the table.

$h(x) = 5|x - 6| - 8$

6, -8

x	$h(x)$
6	-8

10. Graph $f(x) = \begin{cases} -\frac{2}{3}(x-6)+4, & x < 6 \\ \frac{2}{3}(x-6)+4, & x \geq 6 \end{cases}$



GO

Topic: Interpreting absolute value

Evaluate each expression for the given value of the variable.

11. $-s;\ s = 4$

-4

12. $-t;\ t = -7$

13. $-x;\ x = 0$

14. $-w;\ w = -11$

15. $|v|;\ v = -25$

16. $-(a);\ a = -25$

$-(-25)$

$+25$

17. $-(-n);\ n = -2$

18. $|-(-p)|;\ p = -6$

19. $|-(-q)|;\ q = 8$

20. $-|-(-r)|;\ r = -9$