Section 6-7: Graphs of Absolute Value Functions

Exploration

**Translations of $y = |x|$ and $y = -|x|$**

1. Graph $Y_2 = |x + 3|$ How has this graph moved compared to the parent function?

LEFT 3

What are the coordinates of the vertex?

$(-3, 0)$

2. Graph $Y_2 = |x - 5|$ How has this graph moved compared to the parent function?

RIGHT 5

What are the coordinates of the vertex?

$(5, 0)$

3. a) What equation would move the graph of $y = |x|$ 7 units to the left?

$y = |x + 7|$

b) What equation would be a translation of $y = |x|$ so that the vertex is $(9, 0)$?

9 RT

$y = |x - 9|$

4. Graph $Y_2 = |x| - 4$ How has this graph moved compared to the parent function?

4 down

What are the coordinates of the vertex?

(0, −4)

5. Graph $Y_2 = |x| + 6$ How has this graph moved compared to the parent function?

6 up

What are the coordinates of the vertex?

(0, 6)

6. a) What equation would move the graph of $y = |x|$ 2 units up?

b) What equation would be a translation of $y = |x|$ so that the vertex is $(0, -9)$?

Use each description to write the equation of the absolute value function

7. The parent function $y = |x|$ is moved 4 units right and 6 units down.

$y = |x - 4| - 6$

8. The parent function $y = |x|$ is moved 8 units up and 10 units left.

$y = |x + 10| + 8$

9. The parent function $y = -|x|$ and the vertex is $(-7, -5)$

7 left 5 down

$y = -|x + 7| - 5$

10. Describe the translations of the parent function $y = |x|$ that each equation represents and state the coordinates of the vertex.

a. $y = |x - 8| + 7$

Description: 8 RT 7 up

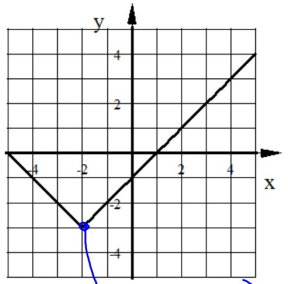
Vertex: (8, 7)

b. $y = |x + 10| - 9$

Description: 10 left 9 down

Vertex: (-10, -9)

11. The graph below is a translation of $y = |x|$.
Write the equation of this function.

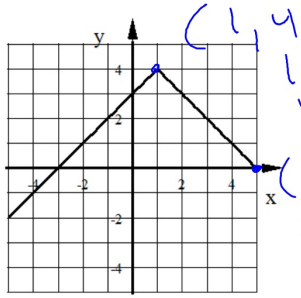



(-2, -3)

2 left 3 down

$y = |x + 2| - 3$

12. The graph below is a translation of $y = -|x|$
Write the equation of this function.




(1, 4) 1 RT 4 up

(5, 0) x 4

$y = -|x - 1| + 4$

## Streches and Shrinks

$y = a|x|$ This equation represents either a strecth (taller) or a shrink (shorter) V-shape.

1. Graph $Y_2 = 7|x|$ How does this graph compare to the parent function $y = |x|$?

7 x taller

2. Graph $Y_2 = \frac{1}{2}|x|$ How does this graph compare to the parent function $y = |x|$?

$\frac{1}{2}$ as tall

3. Write the equation of an absolute value function that is one-fourth as tall as $y = |x|$

$y = .25|x|$

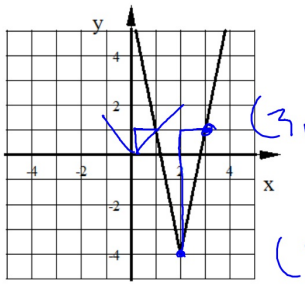
4. Write the equation of an absolute value function that is 3 times taller as $y = |x|$ but opens down.

$y = -3|x|$

$|y = ax|$ $a$ also represents the slope of the sides of the absolute value graph.

5. Write the equation of each absolute value function shown below:

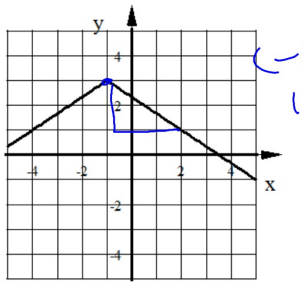
a) EQ:




(3,1) $y = 5|x-2| - 4$

(2,-4) 2rt 4down

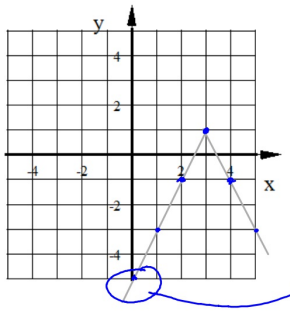
b) EQ:




(-1,3) 1 left 3 up $y = -\frac{2}{3}|x+1| + 3$

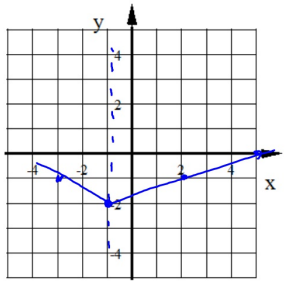
6. Graph each absolute value function.

a) $y = -2|x - 3| + 1$




(0,-5)

b) $y = \frac{1}{3}|x + 1| - 2$




Describe all the transformation of y=|x| each equation represents.

1. $y = -5|x + 9| - 3$

- 5x taller
- 9 left
- opens
- 3 down

2. $y = \frac{1}{3}|x - 6| + 11$

- 1/3 as tall
- 6 RT
- 11 up
- opens up

Write the equation of each transformation of y=|x|

1. Translated 12 units up, 7 units left, opens down, and is 8 times taller.

$y = 8|x+7| + 12$

2. Translated 2 units right, 13 units down, is one-third as tall, and opens up.

$y = \frac{1}{3}|x-2| - 13$