

Your Name

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Notes

Lesson 1.2

ABSOLUTE VALUE AND

FUNCTION REFLECTIONS AND DILATIONS

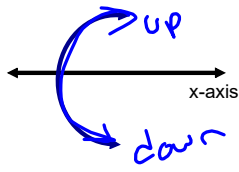


Math Skill Objective: To be able to identify the parent function given a function. To be able to describe transformations of functions. To be able to graph Dilated and translated absolute value functions using a Slope and Vertex transformations.

[HSF.BF.B.3](#)

Life Lessons: Consider where the real value of things and people come from. Who you are and what you have experienced shapes how you look at things and, more importantly to note for yourself, how you respond to your environment and to others. Who you are is shaped by the choices you make.

Vertical Reflection over x-axis



$$y = -f(x)$$

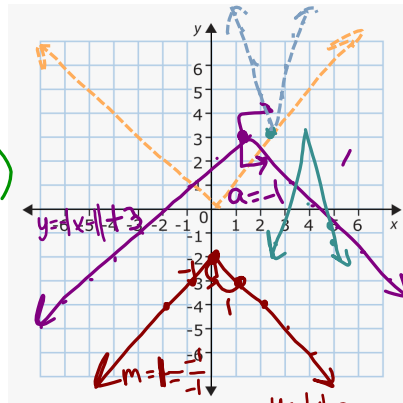
Note: because the (-) is applied after $f(x)$ it is saying all the y values are made negative, **flipping it up/down**

ex. $y = -|x| - 2$
 $a = -1$ $h = 0$ $k = -2$

Slope is: -1 Vertex is: $(0, -2)$

ex. $y = -|x-1| + 3$
 $a = -1$ $h = 1$ $k = 3$

Slope is: -1 Vertex is: $(1, 3)$



EX. Write an Absolute Value function that transforms

$y = 5|x-2| + 3$ after a reflection in the x-axis and a horizontal shift right 1.5 units.

$$a = 5 \cdot -1 = -5 \quad h = 2 + 1.5 = 3.5 \quad k = 3$$

Slope is: -5 Vertex is: $(3.5, 3)$

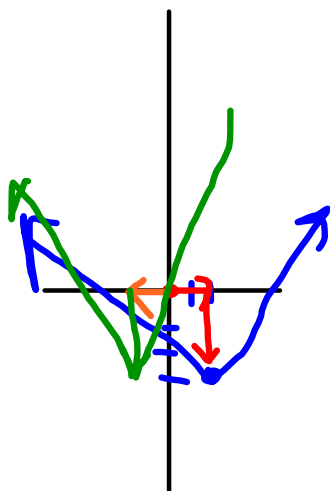
Function: $y = -5|x-3.5| + 3$

if
 $a = -2/3$
 after ref. $a = 2/3$

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

$$h = 2 \quad k = 3$$

$$h = -2 \quad k = -3$$



Vertical Stretch/Shrink

$y = a \cdot f(x)$ Note: because the (a) is applied after $f(x)$, it is multiplying (a) to all the y values

Vert. Shrink: when $0 < a < 1$ (when a is a fraction less than 1)

Vert. Stretch: When $a > 1$ (when a is bigger than 1)

shrink

Shorter

Taller

ex. $y = 3|x| + 0$
 $a = 3$ $h = 0$ $k = 0$
 Slope is: $3 \begin{matrix} \uparrow \\ \downarrow \end{matrix} -3$ Vertex is: $(0, 0)$

ex. $y = \frac{1}{2}|x|$
 $a = \frac{1}{2}$ $h = 0$ $k = 0$
 Slope is: $\frac{1}{2} \begin{matrix} \uparrow \\ \downarrow \end{matrix} -\frac{1}{2}$ Vertex is: $(0, 0)$

ex. $y = \frac{1}{2}|x - 2| - 1$
 $a = \frac{1}{2}$ $h = 2$ $k = -1$
 Slope is: $\frac{1}{2} \begin{matrix} \uparrow \\ \downarrow \end{matrix} -\frac{1}{2}$ Vertex is: $(2, -1)$

EX. Write an Absolute Value function that transforms $y = -5|x - 2| + 3$ after a reflection in the x-axis, a vertical shrink by $1/2$ and a horizontal shift left 4 units.

$a = -5 \cdot \frac{1}{2} = -\frac{5}{2}$ $h = 2$ $k = 3 - 4 = -1$

Slope is: $\frac{5}{2} \begin{matrix} \uparrow \\ \downarrow \end{matrix} -\frac{5}{2}$ Vertex is: $(2, -1)$

Function: $y = \frac{5}{2}|x - 2| - 1$

Perspective!

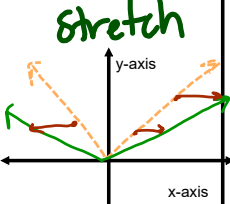
Vertically Shrunken/compressed
 $y = \frac{1}{2}|x|$

Vertically Stretched
 $y = 2|x|$


Horizontally Stretched
 $y = |\frac{1}{2}x|$

Horizontally Shrunken
 $y = |2x|$

Horizontal Stretch/Shrink



$y = |\frac{1}{2}x|$



$y = |2x|$

$y = f(\underline{bx})$ Note: because the (b) is applied before f(x) it is multiplying (b) to all the x values

Horz. Stretch: when $0 < a < 1$ (when a is a fraction less than 1)

Horz. Shrink: When $a > 1$ (when a is bigger than 1)

ex. $y = |3x|$ looks like $y = 3|x|$
the graph of

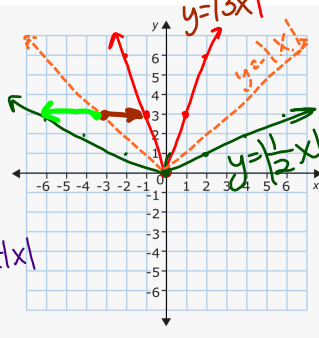
$a = 1$ $b = 3$ $h = 0$ $k = 0$

Slope is: 3 Vertex is: $(0, 0)$

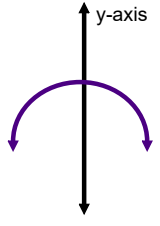
ex. $y = |\frac{1}{2}x|$ looks like $y = \frac{1}{2}|x|$
the graph of

$a = 1$ $b = \frac{1}{2}$ $h = 0$ $k = 0$

Slope is: $\frac{1}{2}$ Vertex is: $(0, 0)$



y-axis Reflection



$y = f(\underline{-x})$ Note: because the (-) is applied before f(x) it is saying all the x values are made negative, **flipping it left/right**

ex. $y = |-x| - 2$

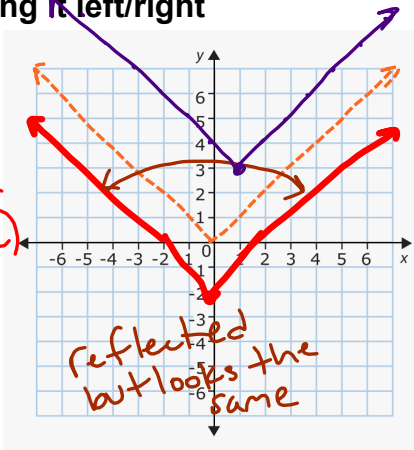
$a = 1$ $b = -1$ $h = 0$ $k = -2$

Slope is: 1 and -1 Vertex is: $(0, -2)$

ex. $y = |-(x-1)| + 3$

$a = 1$ $b = -1$ $h = 1$ $k = 3$

Slope is: 1 & -1 Vertex is: $(1, 3)$



reflected but looks the same