24 Graph Transformations

The graph of $y = a \cdot f(x - h) + k$ is transformed thusly:

if $a > 1$: Vertical Stretch (Gets steeper)

$a < 1$: Vertical Shrink (Gets flatter)

$a < 0$: Reflected in x-axis (upside-down)

h: horizontal shift

k: vertical shift

Graphing Absolute Value Transformations

Step 0: Get a general idea of what the graph will look like.
Step 1: Plot the parent graph (including any (positive) "a" value.)
Step 2: Reflect in x-axis if a < 0.
Step 3: Translate h units horizontally and k units vertically.

$f(x) = -2|x + 3| + 1$

Step 0: ∧ ↘ steeper

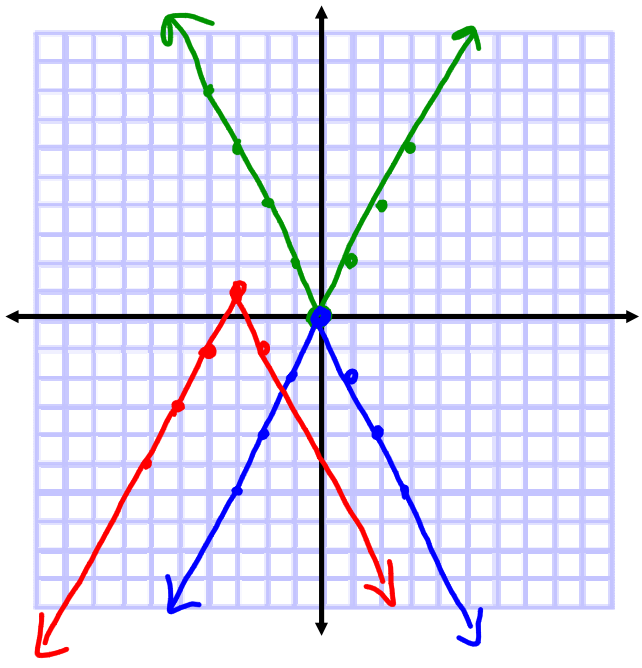
3 left 1 up

Step 1: $2|x|$

Step 2: Reflect

Step 3: 3 left

1 up



Piecewise Functions

A piecewise function:

is defined by at least two equations, each of which applies to a different part of the function's domain.

Example 1: Evaluate the function

$$g(x) = \begin{cases} 4x - 3, & \text{if } x > 3 \\ 5x + 2, & \text{if } x \leq 3 \end{cases}$$

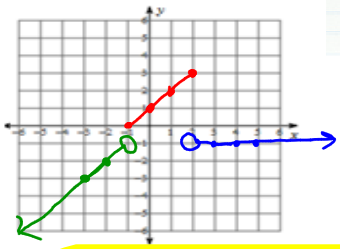
when $x = -2$ and $x = 5$

$5x + 2$
$5(-2) + 2$
-8

$4x - 3$
$4(5) - 3$
17

Example 2: Graph the function:

$$f(x) = \begin{cases} x, & \text{if } x < -1 \\ x + 1, & \text{if } -1 \leq x \leq 2 \\ -1, & \text{if } x > 2 \end{cases}$$



x	$f(x) = y$
-3	-3
-2	-2
-1	0
0	1
1	2
2	3
3	-1
4	-1
	⋮

Piecewise Functions

Cell phone plan:

Up to 200 minutes - $10 per month

Over 200, but less than 1000 minutes - $10 per month for the first 200 minutes, plus $0.05 per minute (beyond 200 minutes)

1000 minutes or over - $60 per month

#min	100	200	300	400	500	600	700	800	900	1000	1100	1200
cost	10	10	15	20	25	30	35	40	45	60	60	60

For the domain: $0 \leq x \leq 200$ $y = 10$

For the domain: $200 < x < 1000$ $y = 10 + .05(x - 200)$

For the domain: $x \geq 1000$ $y = 60$