

1.9 Graph Absolute Value Functions

pp. 51-54

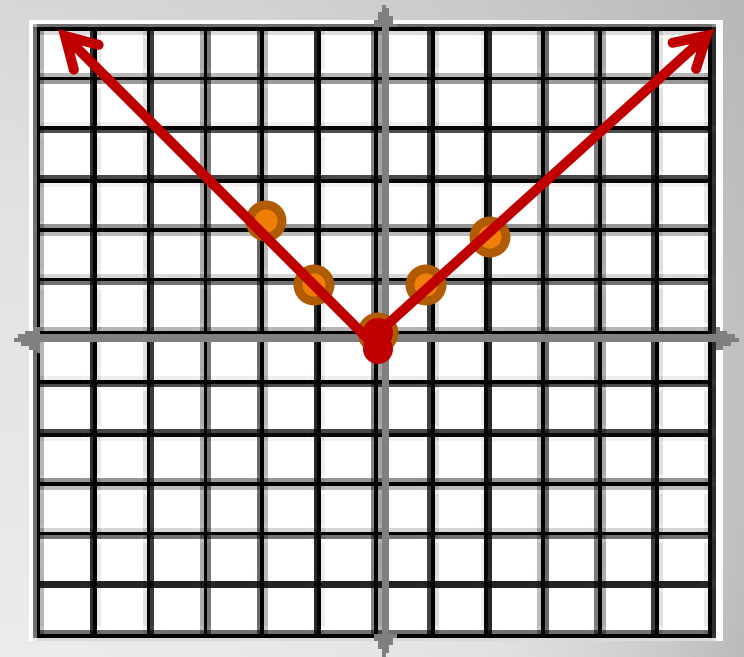


The **absolute value** of a number a is the distance between a and 0 on a number line. The symbol $| a |$ represents the absolute value of a .

Absolute value functions are transformations of the parent function $f(x) = | x |$.

- Graph of Parent Function for Absolute Value functions

| x | -2 | -1 | 0 | 1 | 2 |
|--------------|----|----|---|---|---|
| $f(x) = x $ | -2 | -1 | 0 | 1 | 2 |



$$g(x) = |x - h|$$

The graph of g is a horizontal shift of the graph of $f(x) = |x|$. The shift is h units right if $h > 0$ and $|h|$ units left if $h < 0$.

The graph of $h(x) = |x + h|$ is a reflection in the y -axis of the graph g .

$$g(x) = |x| + k$$

The graph of g is a vertical shift of the graph of $f(x) = |x|$. The shift is k units up if $k > 0$ and $|k|$ units down if $k < 0$.

$$g(x) = a|x|$$

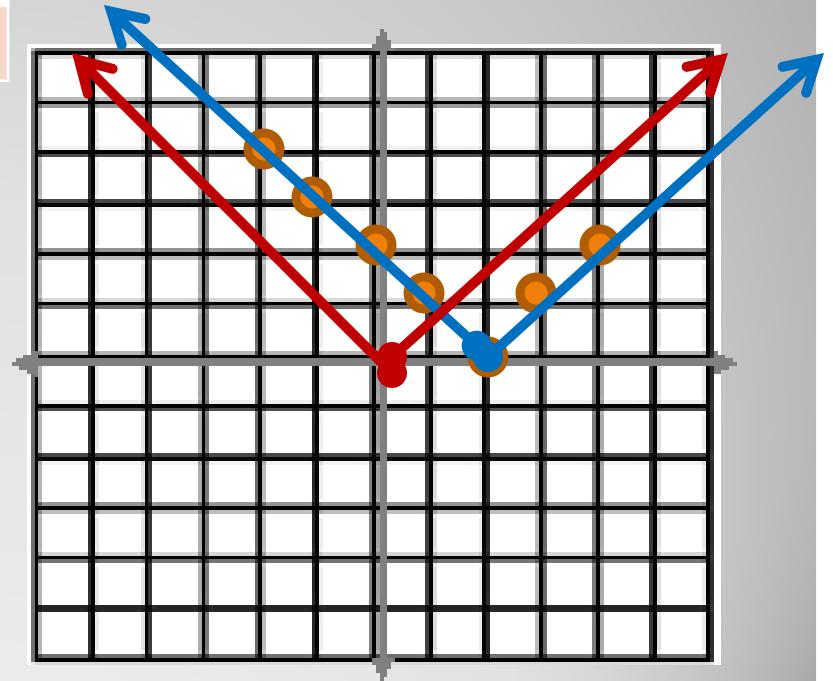
If $|a| > 1$, the graph of g is a vertical stretch of the graph of $f(x) = |x|$.
If $0 < |a| < 1$, the graph of g is a vertical shrink of the graph of $f(x) = |x|$.

The graph of $h(x) = -a|x|$ is a reflection in the x -axis of the graph of g .

- Graph and compare with $f(x) = |x|$.
- $g(x) = |x - 2|$

| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|------|----|----|---|---|---|---|---|
| g(x) | 4 | 3 | 2 | 1 | 0 | 1 | 2 |

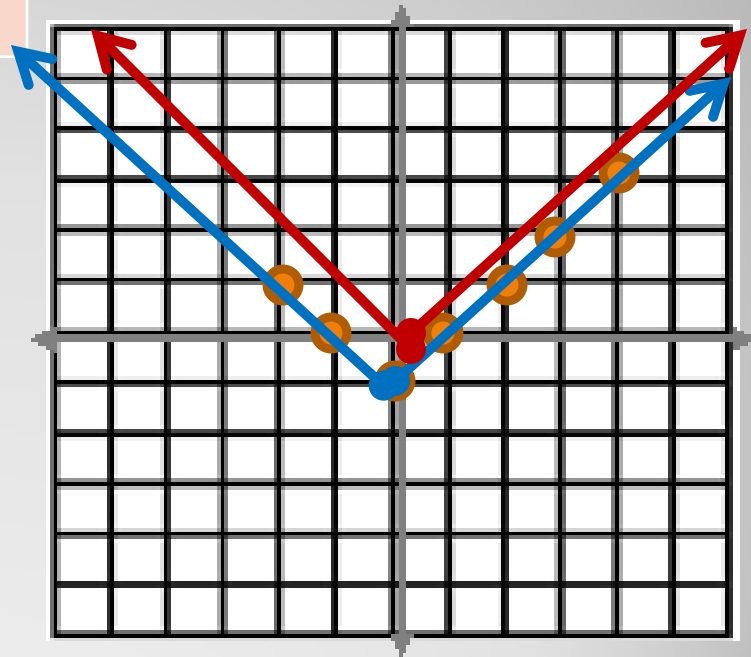
- The graph is a Horizontal shift 2 units Right.



- Graph and compare with $f(x) = |x|$.
- $g(x) = |x| - 1$

| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|------|----|----|----|---|---|---|---|
| g(x) | 1 | 0 | -1 | 0 | 1 | 2 | 3 |

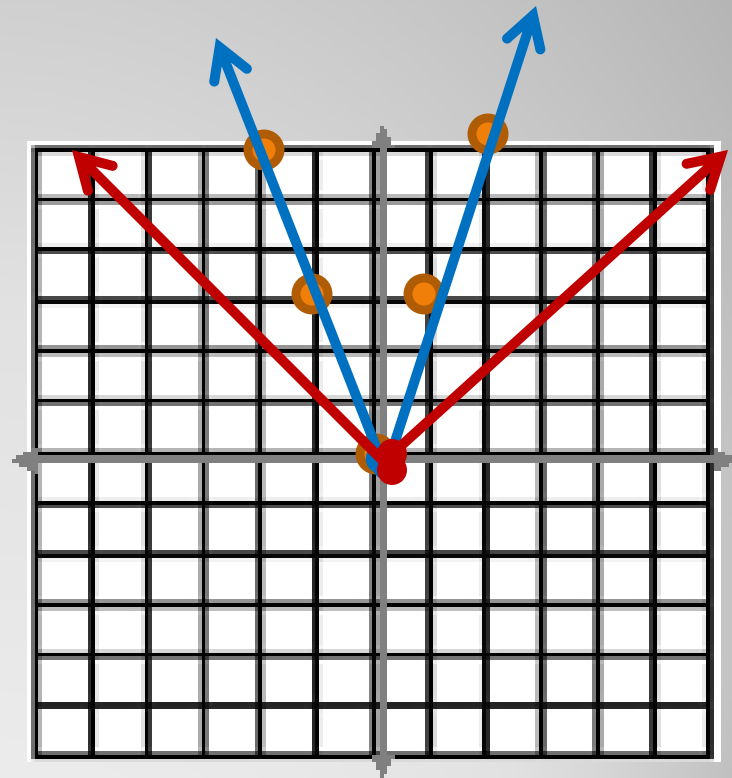
- The graph is a vertical shift 1 unit Down.



- Graph and compare with $f(x) = |x|$.
- $g(x) = 3|x|$

| x | -2 | -1 | 0 | 1 | 2 |
|------|----|----|---|---|---|
| g(x) | 6 | 3 | 0 | 3 | 6 |

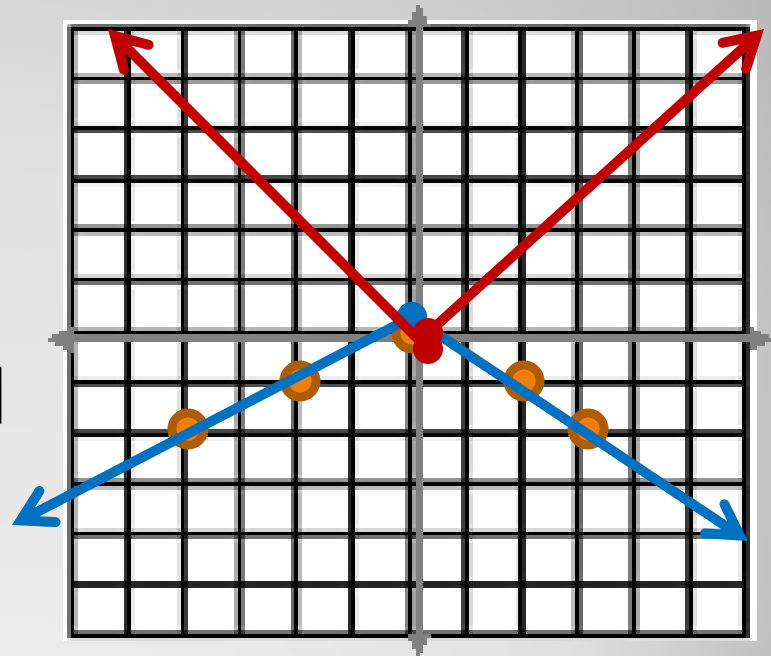
- The graph is a vertical stretch using a Scale factor of 3.



- Graph and compare with $f(x) = |x|$.
- $g(x) = -0.5|x|$

| x | -4 | -2 | 0 | 2 | 4 |
|------|----|----|---|----|----|
| g(x) | -2 | -1 | 0 | -1 | -2 |

- The graph is a vertical shrink using a Scale factor of 0.5 and a reflection in the x-axis.



- Assignment (change from calendar):
- p. 53. 1 -6 all, 8 – 14 even
- p. 54 1- 6 all, 8, 12

Work on in class, finish for homework.