4.10 Vertical Stretch and Compression

SWBAT identify vertical stretch or compression and use it to graph functions.

Assignments

HW32

Independence Hall
Recreation.gov

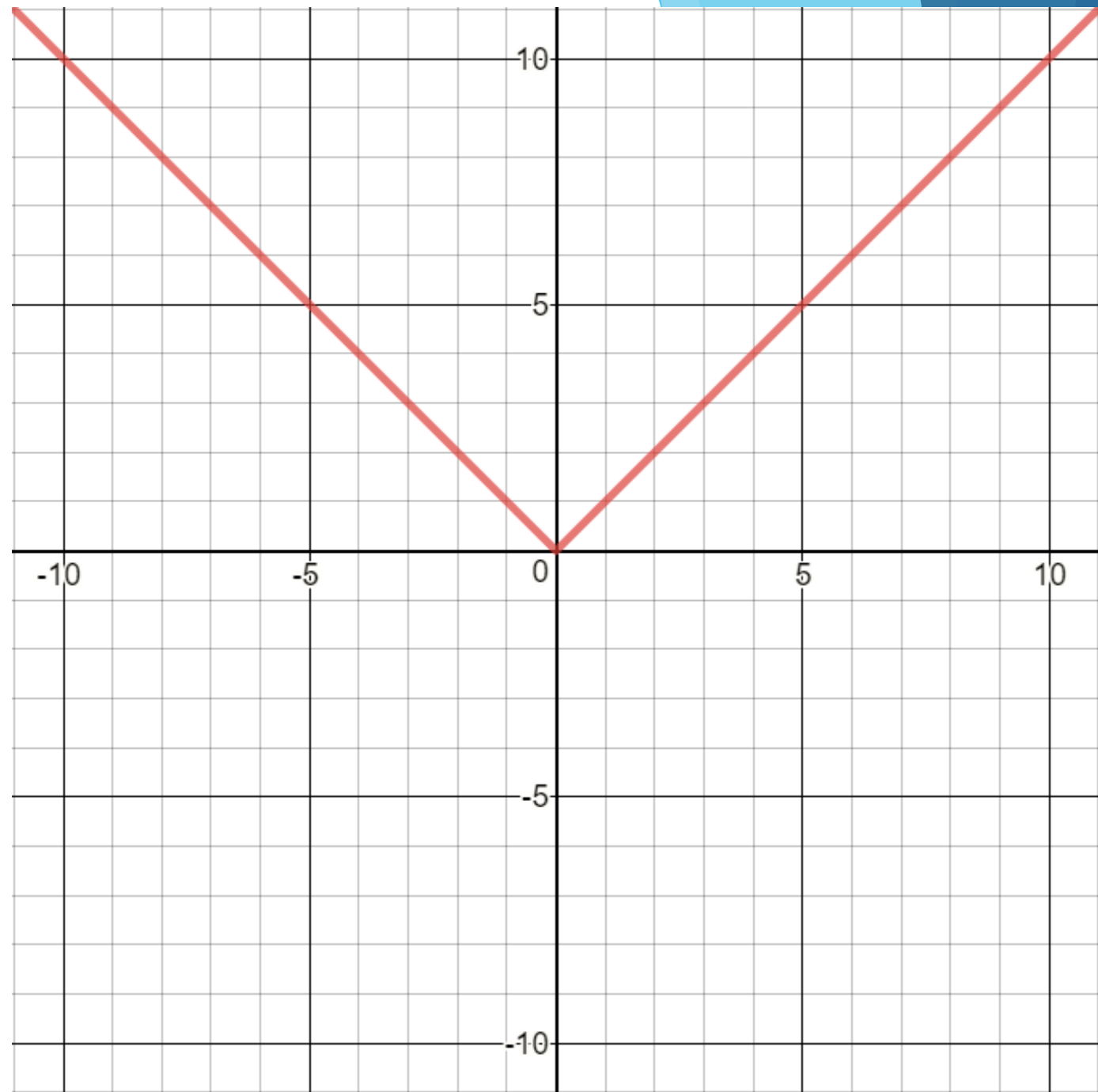▶ Create a table of values and graph the following functions.

1. $f(x) = |x|$

2. $g(x) = 2|x|$

3. $h(x) = 3|x|$

4. $n(x) = 4|x|$

▶ What happened?

▶ When we _____ a number _____ to the _____, the graph _____.

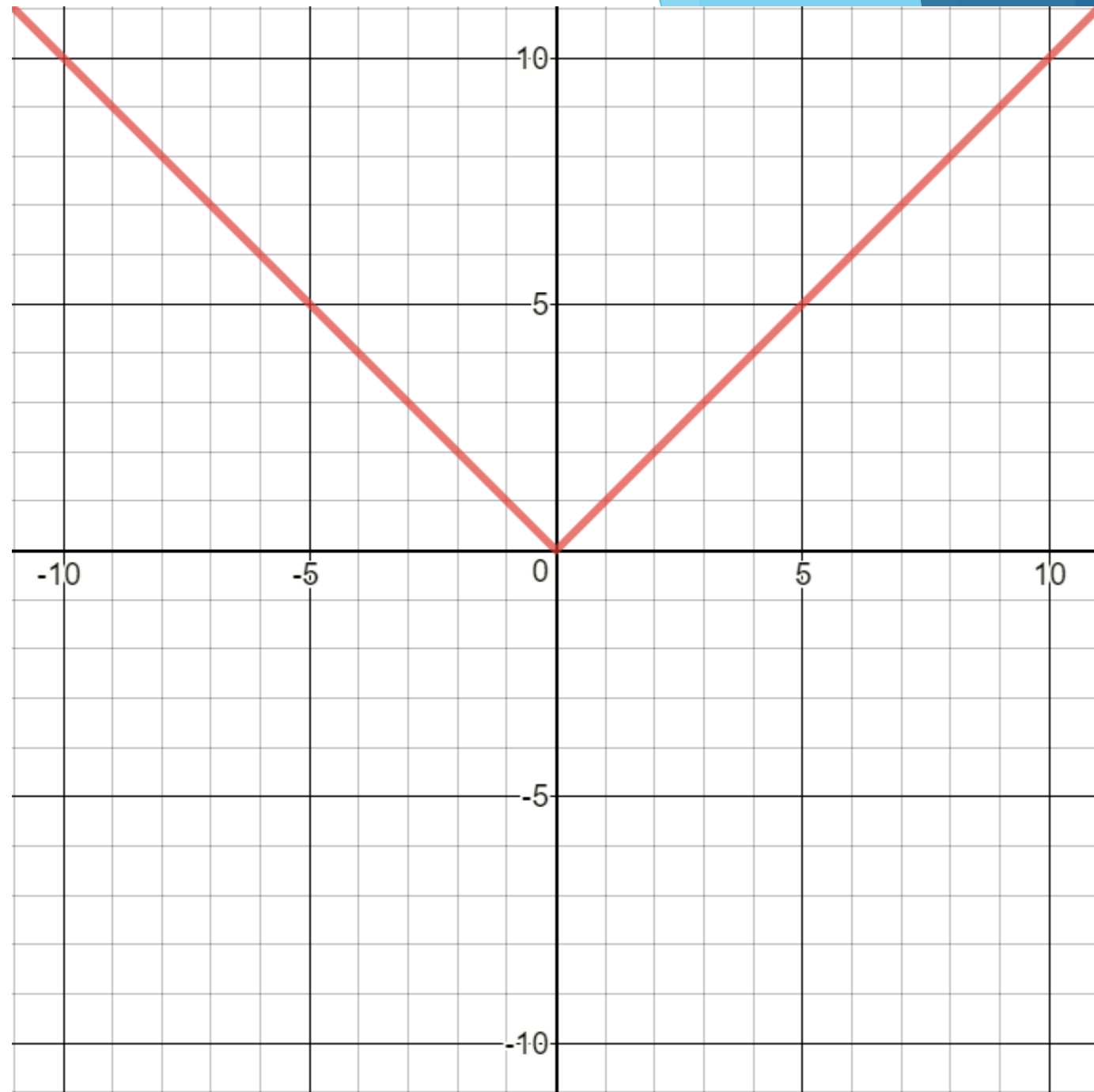► Create a table of values and graph the following functions.

1. $f(x) = |x|$

2. $g(x) = \frac{1}{2}|x|$

3. $h(x) = \frac{1}{3}|x|$

4. $n(x) = \frac{1}{4}|x|$

► What happened?

► When we _____ a number _____ to the _____, the graph _____.

Vertical Stretch and Compression

- Multiplying the output of the function by a number whose absolute value is bigger than 1 results in a *vertical stretch*.

- $y = k * f(x)$ when $|k| > 1$

- Multiplying the output of the function by a number whose absolute value is between 0 and 1 results in a *vertical compression*.

- $y = k * f(x)$ when $0 < |k| < 1$

Summary of Function Transformations

▶ Shifts: Adding or Subtracting

  ▶ Add outside parent: Shifts up that many units

  ▶ Subtract outside parent: Shifts down that many units

  ▶ Add inside parent: Shifts left that many units

  ▶ Subtract inside parent: Shifts right that many units

▶ Reflections: Multiplying by -1

  ▶ Multiply by -1 outside: Reflects across x-axis; flips graph upside down

  ▶ Multiply by -1 inside: Reflects across y-axis; flips graph sideways

▶ Stretching and Compressing: Multiplying on the outside

  ▶ Multiply by $|k| > 1$: Stretches by a factor of k; makes graph narrower

  ▶ Multiply by $0 < |k| < 1$: Compresses by a factor of k; makes graph wider

Multiplying by a Negative

▶ We know that if we multiply by -1, the graph flips. What about -2?

▶ $g(x) = -2|x|$