What is a parent graph?

A parent graph is <u>the most basic graph</u> of a function in Algebra. The graph has <u>no transformations</u> such as translations, reflections, or dilations that alter it.

For each of these functions, you must be able to recognize its graph, know its name, and know its domain and range.
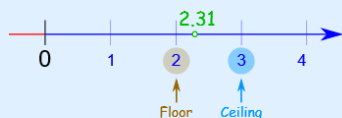
Constant	Square Root	Floor NEW
Linear	Cube Root	Ceiling NEW
Quadratic	Rational	
Cubic	Absolute Value	

Floor and Ceiling Functions

The floor and ceiling functions give us the **nearest** integer up or down.

Example: What is the floor and ceiling of 2.31?

2.31

0   1   2   3   4

Floor   Ceiling

The Floor of 2.31 is **2**
The Ceiling of 2.31 is **3**

Floor and Ceiling of Integers

What if we want the floor or ceiling of a number that is already an integer?

That's easy: no change!

Example: What is the floor and ceiling of 5?

The Floor of 5 is **5**
The Ceiling of 5 is **5**

$\lfloor x \rfloor$ $\lceil x \rceil$

floor(x)   ceil(x)

$\lfloor 2.31 \rfloor = 2$ $\lceil 2.31 \rceil = 3$

$\lfloor 5 \rfloor = 5$ $\lceil 5 \rceil = 5$

$\lfloor \frac{2}{3} \rfloor = 0$ $\lceil \frac{2}{3} \rceil = 1$

$\lfloor -7.5 \rfloor = -8$ $\lceil -7.5 \rceil = -7$

The Floor Function is this curious "step" function (like an infinite staircase):
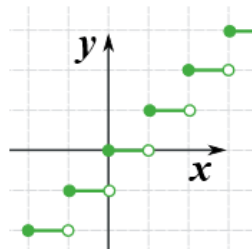
The Floor Function

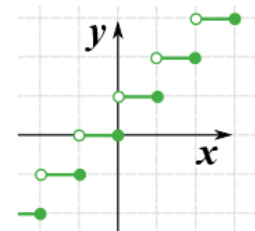And this is the Ceiling Function:

The Ceiling Function

A solid dot means "including" and an open dot means "not including".

Example: at **x=2** we meet:

- an **open dot** at y=1 (so it does not include x=2),
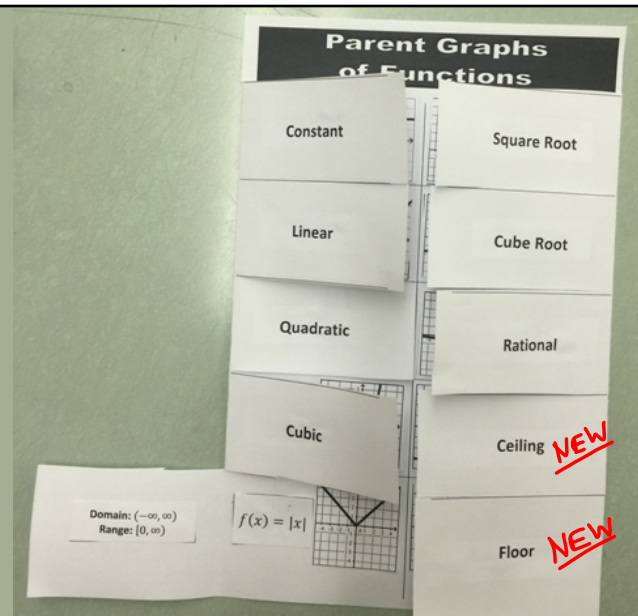- and a **solid dot** at y=2 (which *does* include x=2)
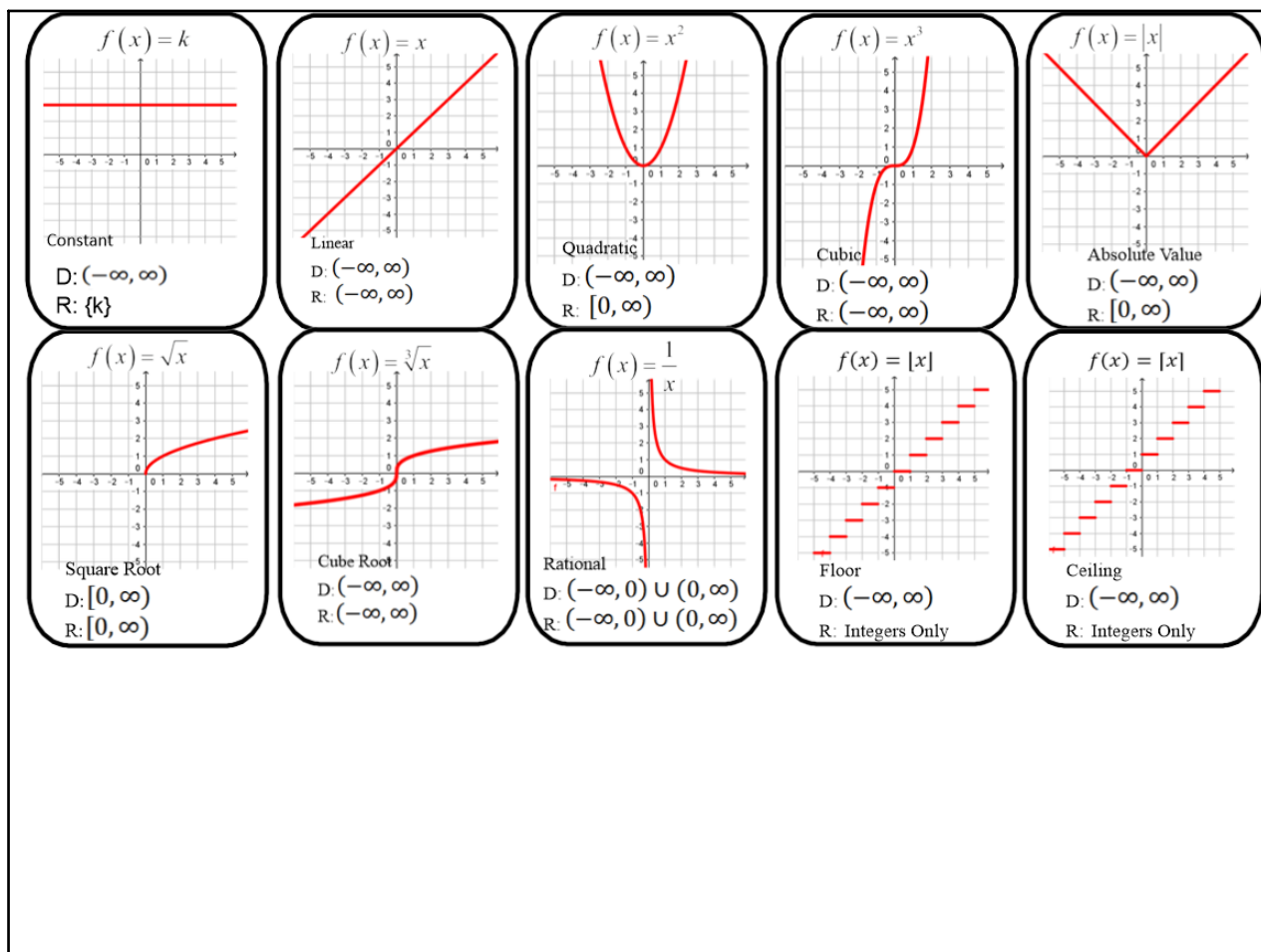
so the answer is **y=2**

1] Fold the graphic organizer and cut the tabs for each function.

2] Cut out the equation, domain, range, and graph tiles on the paper.

3] Work with your partner to place them under the correct tab for each function.

4] Double check with two classmates that your placement is correct before gluing down the tiles.

Parent Graphs Grid

$f(x)=k$	$f(x)=x$	$f(x)=x^2$	$f(x)=x^3$	$f(x)=|x|$
Constant D: $(-\infty,\infty)$ R: $\{k\}$	Linear D: $(-\infty,\infty)$ R: $(-\infty,\infty)$	Quadratic D: $(-\infty,\infty)$ R: $[0,\infty)$	Cubic D: $(-\infty,\infty)$ R: $(-\infty,\infty)$	Absolute Value D: $(-\infty,\infty)$ R: $[0,\infty)$

$f(x)=\sqrt{x}$	$f(x)=\sqrt[3]{x}$	$f(x)=\dfrac{1}{x}$	$f(x)=\lfloor x \rfloor$	$f(x)=\lceil x \rceil$
Square Root D: $[0,\infty)$ R: $[0,\infty)$	Cube Root D: $(-\infty,\infty)$ R: $(-\infty,\infty)$	Rational D: $(-\infty,0)\cup(0,\infty)$ R: $(-\infty,0)\cup(0,\infty)$	Floor D: $(-\infty,\infty)$ R: Integers Only	Ceiling D: $(-\infty,\infty)$ R: Integers Only

Parent Graphs of Functions

Includes the points (0,0) and (1,1)		Might include (0,0) or (1,1) or neither	Includes the point (1,1) but not (0,0)
Linear Quadratic Cubic Abs. Value	Sqr. Root Cube Root Floor Ceiling	Constant	Rational

Parent Graphs of Functions

Domain and Range are the same	Domain and Range are not the same
Linear Sqr. Root Cubic Cube Root Rational	Constant Abs. Value Quadratic Floor Ceiling

Parent Graphs of Functions

| Domain is all real numbers	Domain is $[0, \infty)$	Domain is $(-\infty, 0) \cup (0, \infty)$
Constant Cube Root Linear Floor Quadratic Ceiling Cubic Abs. Value	Sqr. Root	Rational

Parent Graphs of Functions

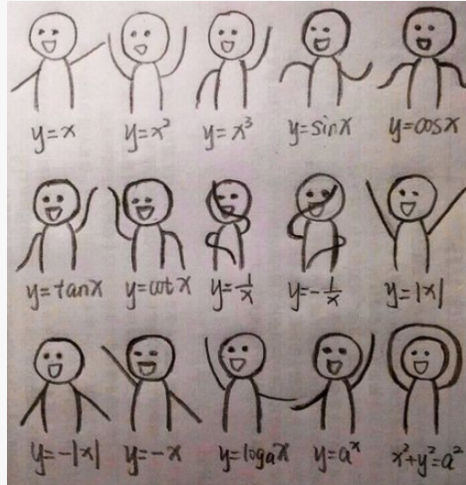| Range is all real numbers	Range is $[0, \infty)$	Range is $(-\infty, 0) \cup (0, \infty)$	Range is integers only	Range is a single real number
Linear Cubic Cube Root	Quadratic Sqr. Root Abs. Value	Rational	Floor Ceiling	Constant

Parent Graphs of Functions

Graph always increases from left to right	Graph always decreases from left to right	Graph has intervals of increasing and decreasing	Graph has one or more intervals where it is constant
Linear Sqr. Root Cubic Cube Root	Rational	Quadratic Abs. Value	Constant Floor Ceiling

Mathematical Dance Moves
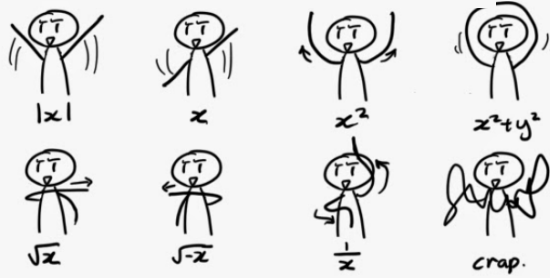
Here are some more...

Can you sketch the rest?