

# 1.3 - Exploring Properties of Parent Functions

- GOAL: Explore and compare the graphs and equations of five basic functions.

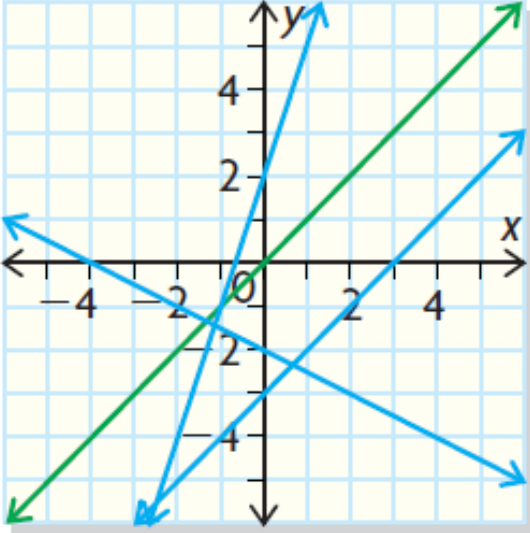
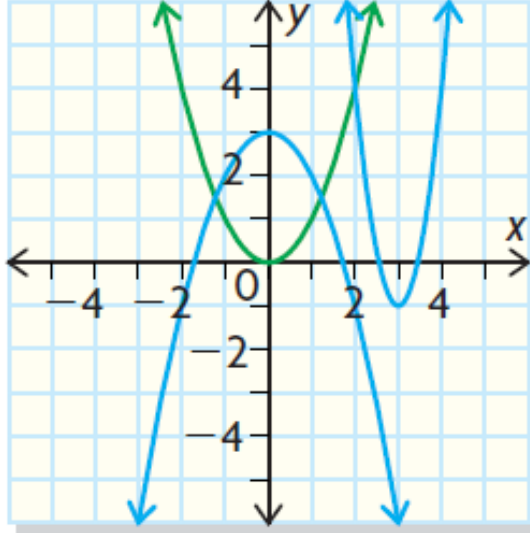


When you were a child, you learned to recognize different animal families.

In math, every function can be classified as a member of a **family**

Each member of a family of functions is related to the simplest, or most basic function sharing the same characteristics – this function is called the **parent function**

# Members of Linear & Quadratic Families

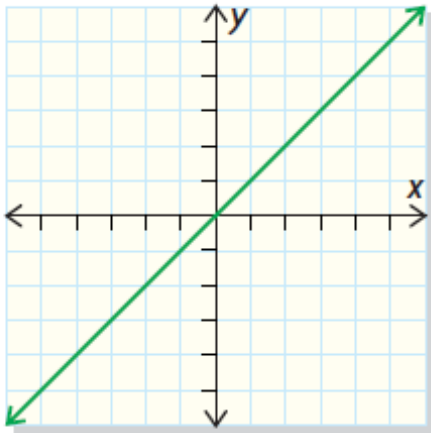
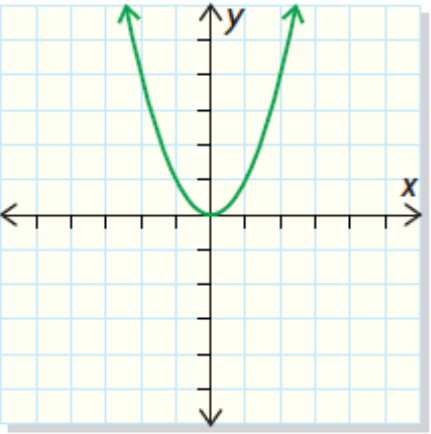
Linear Functions	Quadratic Functions
 <p data-bbox="410 1063 879 1106">Parent function: <math>f(x) = x</math></p>	 <p data-bbox="1200 1063 1668 1106">Parent function: <math>f(x) = x^2</math></p>
<p data-bbox="410 1142 1006 1185">Family members: <math>f(x) = mx + b</math></p>	<p data-bbox="1200 1142 1923 1185">Family members: <math>f(x) = a(x - h)^2 + k</math></p>
<p data-bbox="410 1220 879 1320">Examples: <math>f(x) = 3x + 2</math>, <math>f(x) = -\frac{1}{2}x - 2</math></p>	<p data-bbox="1200 1220 1821 1320">Examples: <math>f(x) = 5(x - 3)^2 - 1</math>, <math>f(x) = -x^2 + 3</math></p>

# Parent Functions

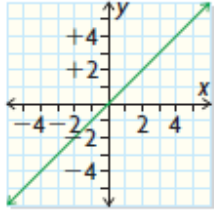
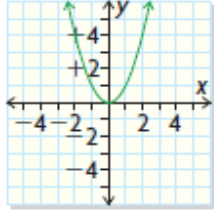
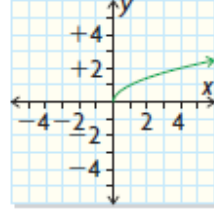
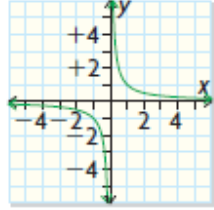
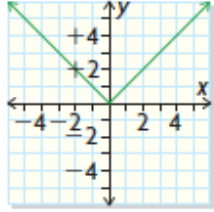
- On the previous slide, you saw the parent functions:
- $f(x) = x$
- $f(x) = x^2$
- Three more parent functions are:
- $f(x) = \sqrt{x}$  - The square root function
- $f(x) = \frac{1}{x}$  - The reciprocal function
- $f(x) = |x|$  - The absolute value function
- **Note: Absolute value means distance of x from 0.**
  - e.g.  $|3| = 3$  but  $|-4| = 4$

What are the characteristics of these parent functions that distinguish them from each other?

**Copy and complete the table.**

Equation of Function	Name of Function	Sketch of Graph	Special Features/ Symmetry	Domain	Range
$f(x) = x$	linear function		<ul style="list-style-type: none"> <li>• straight line that goes through the origin</li> <li>• slope is 1</li> <li>• divides the plane exactly in half diagonally</li> <li>• graph only in quadrants 1 and 3</li> </ul>		
$f(x) = x^2$	quadratic function		<ul style="list-style-type: none"> <li>• parabola that opens up</li> <li>• vertex at the origin</li> <li>• y has a minimum value</li> <li>• y-axis is axis of symmetry</li> <li>• graph only in quadrants 1 and 2</li> </ul>		
$f(x) = \sqrt{x}$	square root function				
$f(x) = \frac{1}{x}$	reciprocal function				
$f(x) =  x $	absolute value function				

# Graphs of Parent Functions

Equation of Function	Name of Function	Sketch of Graph
$f(x) = x$	linear function	
$f(x) = x^2$	quadratic function	
$f(x) = \sqrt{x}$	square root function	
$f(x) = \frac{1}{x}$	reciprocal function	
$f(x) =  x $	absolute value function	

# In Summary...

- Certain basic functions, called **parent functions**, form the building blocks for families of more complicated functions.
- Parent functions include but are not limited to  $f(x) = x$ ,  $f(x) = x^2$ ,  $f(x) = \sqrt{x}$ ,  $f(x) = \frac{1}{x}$  and  $f(x) = |x|$

