Unit 4: Graphing Functions

Lesson 1: Properties of Parent Functions

A family of functions is a set of functions whose equations have a similar form. The "**parent**" of the family is the equation in the family with the **simplest form**.

Ex 1) Identify the equation of the parent function for each function

a) $g(x)=\frac{3}{x-2}$ reciprocal $g(x)=\frac{1}{x}$

b) $h(x)=3\sqrt{5x-10}-2$ Square root $h(x)=\sqrt{x}$

c) $k(x)=3(x+2)^2-5$ Quadratic $k(x)=x^2$

Today you will be investigating properties of some parent functions by graphing them. These graphs will be referred to throughout the unit, so make them precise and accurate!

For each parent function provided:

- **Name** the function (look it up if you don't know!)
- Complete the **table of values**
- **Graph** the function. Verify with graphing technology before continuing.
- State the **domain** and **range**
- Identify the **quadrant(s)** the function resides in
- Choose between 3 and 5 "**key points**" of the graph that would enable someone else to do a proper sketch of the graph
- State any other **key features** of the graph/table (slope, intercepts, vertex, asymptotes, 1st/2nd differences, etc. Anything that would help you identify the function!) ***Recall: An asymptote is a line (often horizontal or vertical) that a function approaches***.

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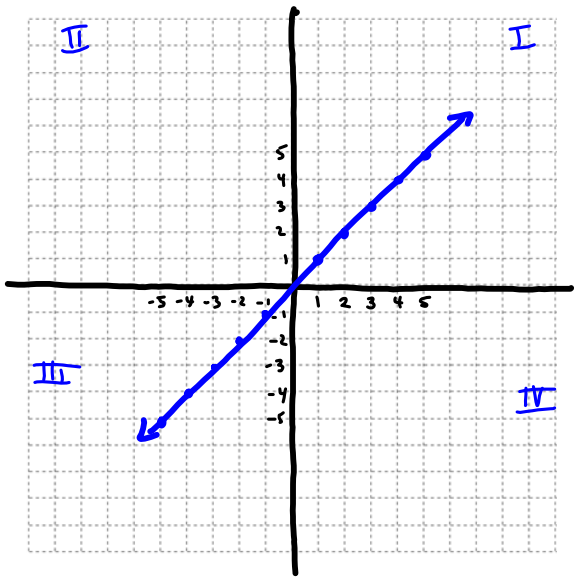
1) $f(x)=x$ Name: Linear Function

x	$f(x)$
-4	-4
-3	-3
-2	-2
-1	-1
0	0
1	1
2	2
3	3
4	4



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R}\}$

Quadrant(s): I & III

Key Points: (-1,-1) (0,0) (1,1)

Features: straight line
slope of $m=+1$
x and y intercepts are both 0
1st differences are constant

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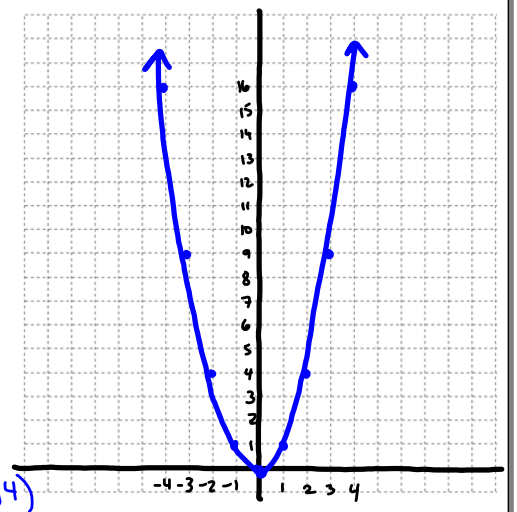
2) $f(x)=x^2$ Name: Quadratic Function

x	$f(x)$
-4	16
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9
4	16



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \geq 0\}$

Quadrant(s): I and II

Key Points: (-2,4) (-1,1) (0,0) (1,1) (2,4)

Features: symmetrical
parabola
opens up
vertex at (0,0)
AOS at $x=0$
x and y intercepts are both 0
2nd differences are constant

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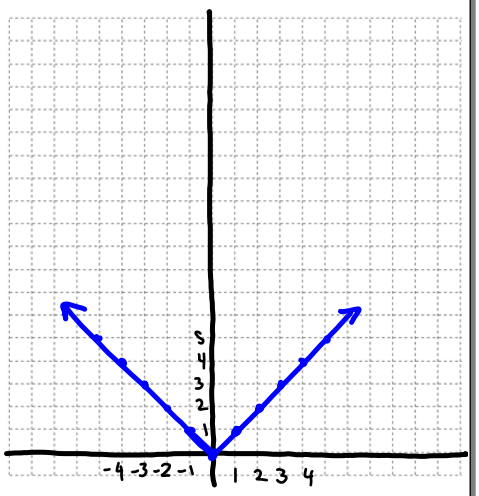
3) $f(x)=|x|$ Name:

x	$f(x)$
-4	4
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3
4	4



Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R} \mid y \geq 0\}$

Quadrant(s): I and II

Key Points: (-1,1) (0,0) (1,1)

Features: vertex (0,0)
2 straight lines: slope is +1 when $x > 0$
slope is -1 when $x < 0$
x and y intercepts are both 0
First differences are constant * when all positive values are together (different from the negatives.)

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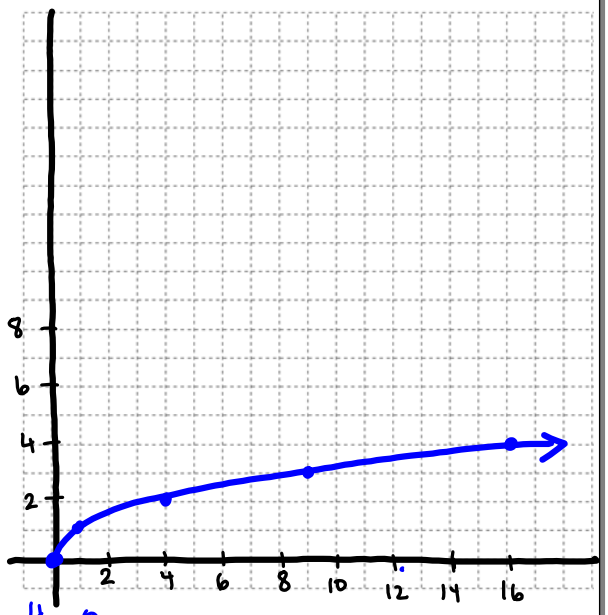
4) $f(x) = \sqrt{x}$ Name: Square Root Function

x	$f(x)$
-4	undefined
-1	undefined
0	0
1	1
4	2
9	3
16	4



Domain: $\{x \in \mathbb{R} \mid x \geq 0\}$

Range: $\{y \in \mathbb{R} \mid y \geq 0\}$

Quadrant(s): I

Key Points: (0,0) (1,1) (4,2) (9,3)

Features: starting point is (0,0)
y and x intercepts are both 0
increasing curve

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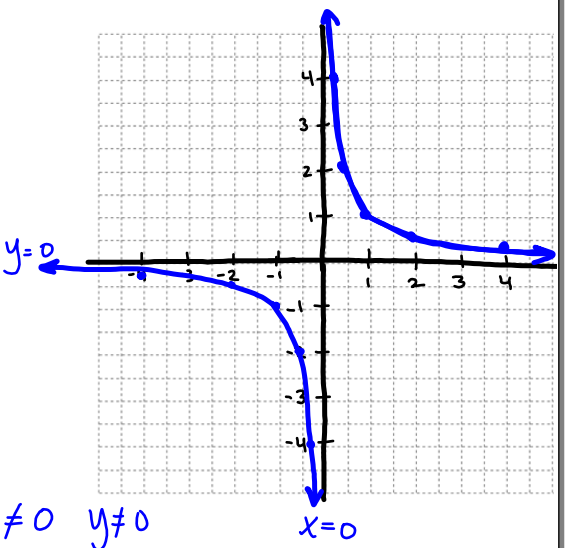
5) $f(x) = \frac{1}{x}$ Name: Reciproca lFunction

x	$f(x)$	
-4	-0.25	$= -\frac{1}{4}$
-2	-0.5	$= -\frac{1}{2}$
-1	-1	
-½	-2	$= \frac{1}{-\frac{1}{2}}$
-¼	-4	$= \frac{1}{-\frac{1}{4}}$ $= \frac{1}{-0.25}$
0	undefined	
¼	4	
½	2	
1	1	
2	0.5	
4	0.25	



Domain: $\{x \in \mathbb{R} \mid x \neq 0\}$

Range: $\{y \in \mathbb{R} \mid y \neq 0\}$

Quadrant(s): I and III

Key Points: (-1,-1) (1,1) $x \neq 0$ $y \neq 0$

Features: 2 separate curves
horizontal asymptote at $y = 0$
vertical asymptote at $x = 0$
no x and y intercepts
x and y have a constant product of 1.

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HW U4L1:

1. Handout (in your package)

2. correct and sign quiz