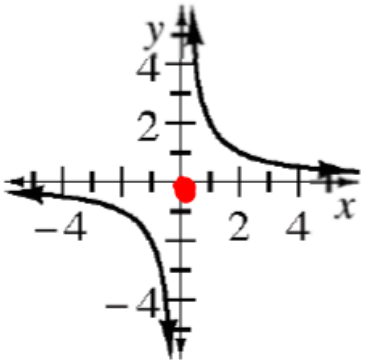

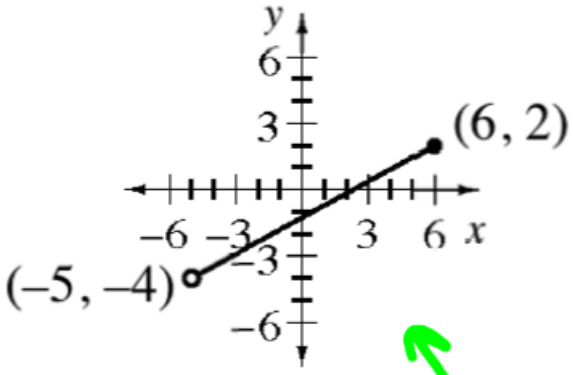

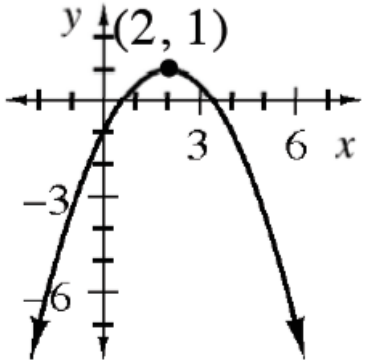

$D: \{-\infty < x < \infty;\ x \neq 0\}$

$\{(-\infty, \infty);\ x \neq 0\}$

$R: \{-\infty < y < \infty;\ y \neq 0\}$

$D: \{-5 < x \leq 6\}$

$R: \{-4 < y \leq 2\}$

$D: \{\mathbb{R}\}$

$R: \{y \leq 1\}$

$\{-\infty < y \leq 1\}$

Final Prep

- Domain and Range
- Pages: 78-82

5.2.3 What can I learn about logs?

Investigating the Family of Logarithmic Functions

In the last two lessons you have learned what a log is and how to convert an equation in log form to exponential form (and back again). In this lesson, you will explore the family of logarithmic functions.

$\log_b(x) = y$ $\quad\quad$ $b^y = x$

5-75. INVESTIGATING THE FAMILY OF LOGARITHMIC FUNCTIONS

You have learned that a logarithmic function is the inverse of an exponential function. Since exponential functions can have different bases, so can logarithms. Investigate the family of logarithmic functions $y = \log_b(x)$. The "Discussion Points" below will help you with your investigation. Explore using Log & Exponential Graphs (Desmos). Click in the lower right corner of the graph to view it in full-screen mode. Desmos

Your Task: Generate tables and graphs for the logarithmic function with your team and use them to fully describe this family of functions. Create a poster that shows your multiple representations, including your description, and be prepared to present it to the class.

Discussion Points

How can we create tables for this family? How many tables is enough?

What have we learned about logs and inverses that can help us work with this family? How can a graphing calculator help?

What patterns can we recognize? Why do they happen?

What are all the possible inputs and outputs for our function?
Are there some x-values that do not make sense? Why or why not?
How do these results appear in the different representations?

What are some characteristics that all logarithmic functions have in common?

What happens as the value of b changes? What values of b make sense?

What goes up
and down but
does not move?

Rewrite each equation in exponential form.

1) $\log_{18} 324 = 2$

$18^2 = 324$

Rewrite each equation in exponential form.

$\log_y z = x$

$y^z = x$

$y^x = z$

What did one wall say to the other wall?

Evaluate each expression. Check by rewriting

$\log_4 64 = 3$

$4^3 = 64$

Evaluate each expression. Check by rewriting

$\log_2 -16$

$2^{-4} = \frac{1}{2^4}$

$\log_2\left(\frac{1}{16}\right) = -4$

Why do bicycles fall over?