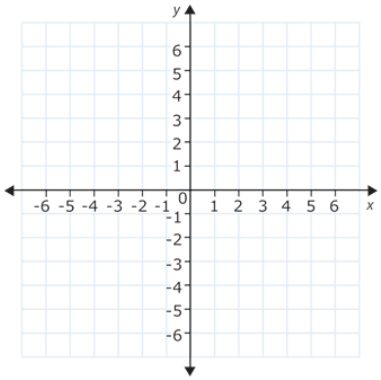
# Lumberjack Graphs

Name:_____

You learned yesterday that logarithms undo exponentials by finding the missing exponent. Today we're going to explore the graphs of these inverse functions.

The table below represents the function $y = \log_2(x)$. Use the table to graph the function and answer the following questions:

| $x$ | $y$ |
|---|---|
| ¼ | $-2$ |
| ½ | $-1$ |
| 1 | 0 |
| 2 | 1 |
| 4 | 2 |




1. What value of $x$ would produce an output of $-5$? How do you know?

2. What is the domain and range of this function?

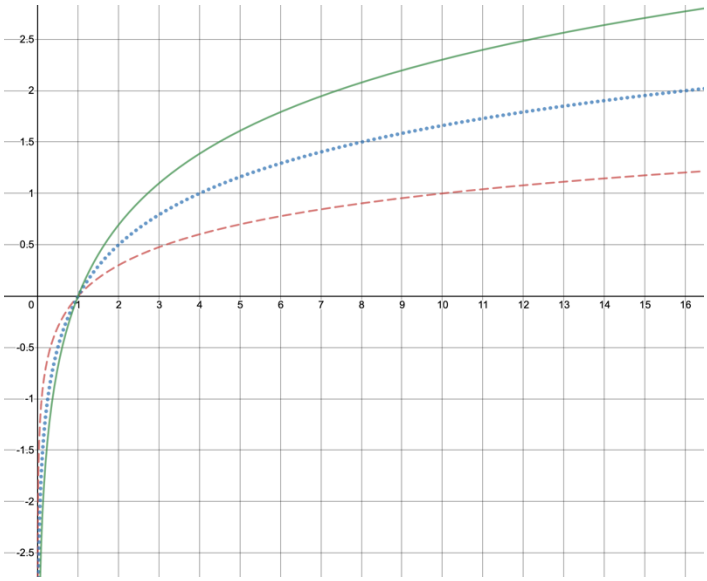
3. How are your answers to question 2 related to the domain and range of $y = 2^x$?

4. The graphs of three parent logarithmic functions are shown below.

   a) What do all of these graphs have in common?

   b) The equations for the three graphs are $y = \log x$, $y = \log_4 x$ and $y = \ln x$. Which is which? How do you know?

   c) Use the graph to estimate $\log_4 6$. What does your answer mean?



5. Suppose we shift the function $y = \log_4 x$ to the right three units.
   a) Write a new equation, $g(x)$, for the transformed function.

   b) How will this transformation affect the $x$-intercept, asymptote, domain, and range?

# Section 3.5—Graphs of Logarithmic Functions

Important Ideas:

## Check Your Understanding!

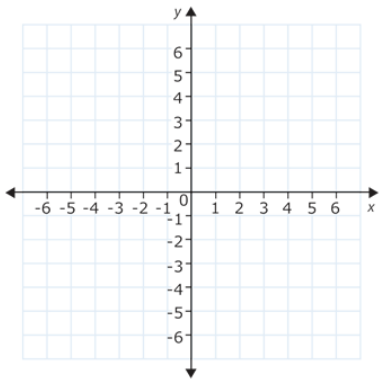
1. Graph $f(x) = \log_3(-x)$ without a calculator and identify the following:

   a. Vertical Asymptote

   b. X-intercept

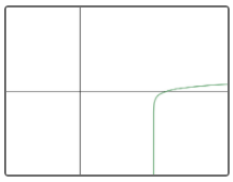
   c. Domain

   d. Range

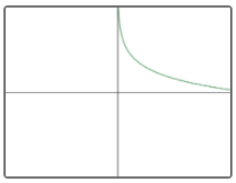



2. Match the following equations with their graphs. Do not use a calculator.

$y = -2\log_2 x$ $y = 3\log_2 x$ $y = \frac{1}{2}\log_2(x-5)$ $y = -2\log_2 x + 5$ $y = \frac{1}{2}\log_2 x - 5$



A



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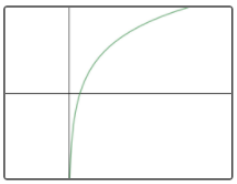

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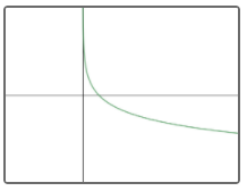

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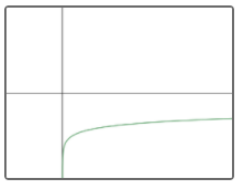

E

3. Write an equation for a logarithmic function that has a vertical asymptote at $x = 5$ and goes through the point $(11, 1)$.