Open up your books to pg. 9 start working on it. We will review these problems and go over 2.1 HW shortly.

Go

Topic: Properties of Exponents

Write each expression as an integer or a simple fraction.

17. 27^0 $= 1$

18. $11(-6)^0$ $11 \cdot 1 = 11$

19. -3^{-2}

20. $\frac{4^{-3}}{1} = \frac{1}{4^3} = \frac{1}{64}$

21. $\frac{9}{2^{-1}}$

22. $\frac{4^8}{8^0}$

23. $\frac{4^0}{2^{-5}}$

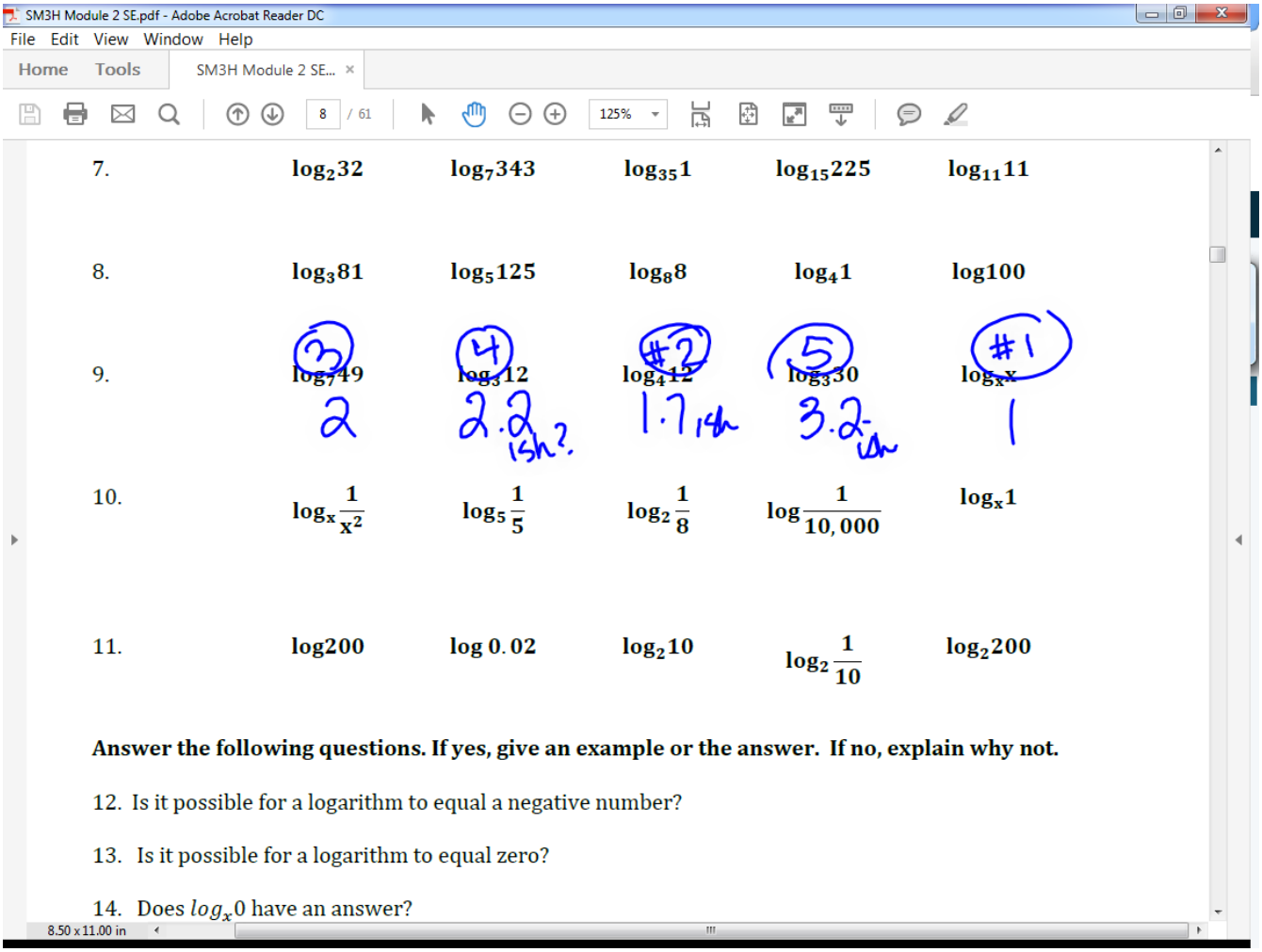
24. $3\left(\frac{29^8}{11^5}\right)^0$

25. $42 \cdot 6^{-4}$

26. $\frac{3}{6^{-1}}$

27. $\frac{7^{-2}}{4^{-1}} = \frac{\frac{1}{7^2}}{\frac{1}{4^1}} = \frac{1}{49} \cdot \frac{4}{1}$ $\frac{4^1}{7^2} = \frac{4}{49}$ $= \frac{4}{49}$

28. $\frac{32^{-1}}{4^{-1}}$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7.	$\log_2 32$	$\log_7 343$	$\log_{35} 1$	$\log_{15} 225$	$\log_{11} 11$
8.	$\log_3 81$	$\log_5 125$	$\log_8 8$	$\log_4 1$	$\log 100$
9.	$\log_7 49$ 2	$\log_3 12$ 2.2 ish?	$\log_4 12$ 1.7 ish	$\log_3 30$ 3.2 ish	$\log_x x$ 1
10.	$\log_x \frac{1}{x^2}$	$\log_5 \frac{1}{5}$	$\log_2 \frac{1}{8}$	$\log \frac{1}{10,000}$	$\log_x 1$
11.	$\log 200$	$\log 0.02$	$\log_2 10$	$\log_2 \frac{1}{10}$	$\log_2 200$

Answer the following questions. If yes, give an example or the answer. If no, explain why not.

12. Is it possible for a logarithm to equal a negative number?

13. Is it possible for a logarithm to equal zero?

14. Does $log_x 0$ have an answer?

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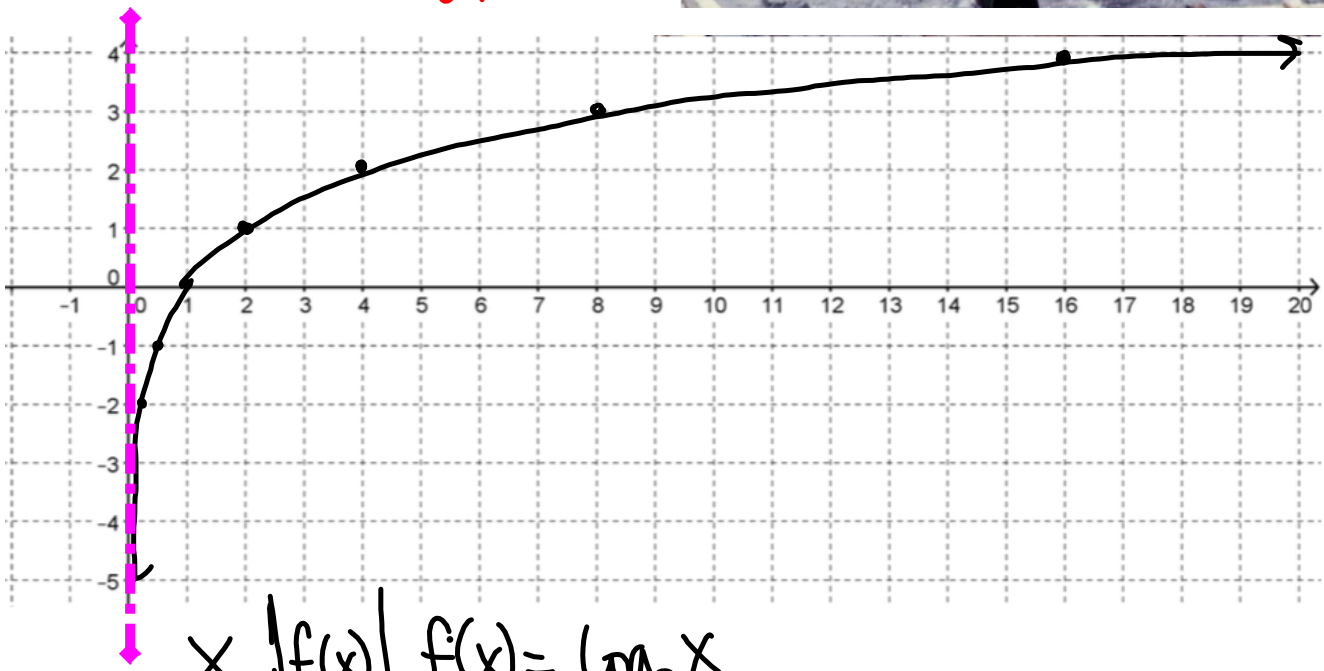
2.2 Falling Off A Log

A Solidify Understanding Task

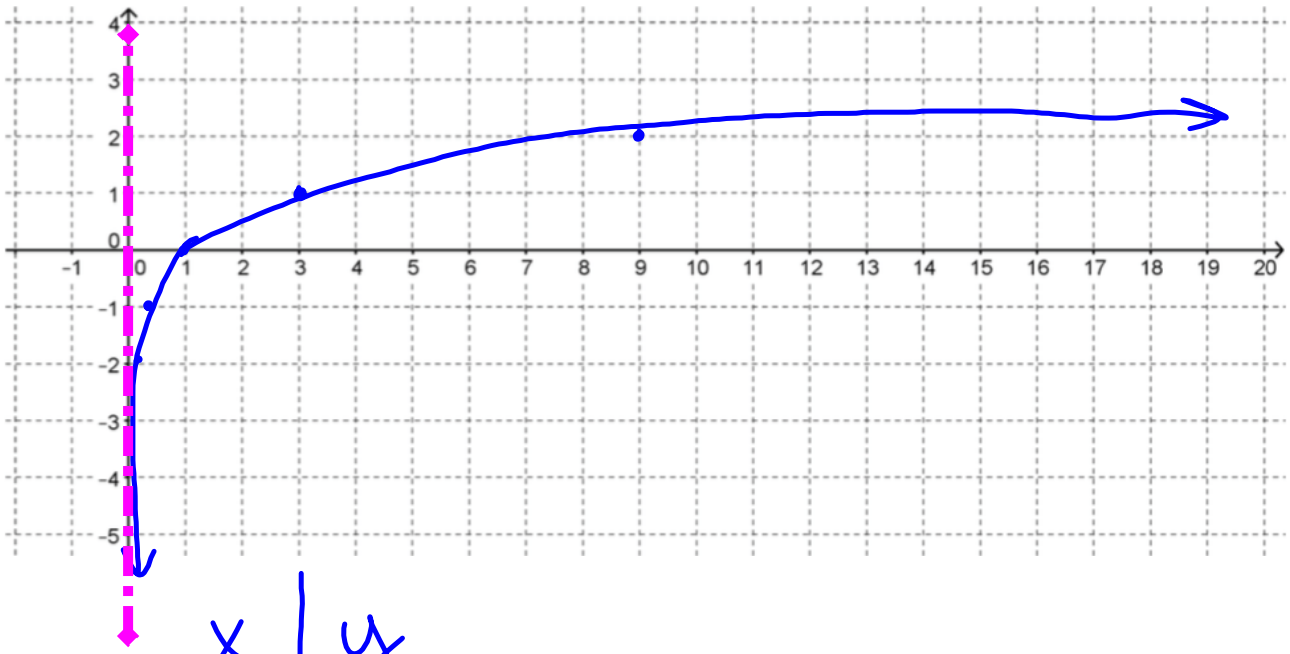
1. Construct a table of values and a graph for each of the following functions. Be sure to select at least two values in the interval $0 < x < 1$.

a) $f(x) = \log_2 x$ $\quad 2^{f(x)} = x$



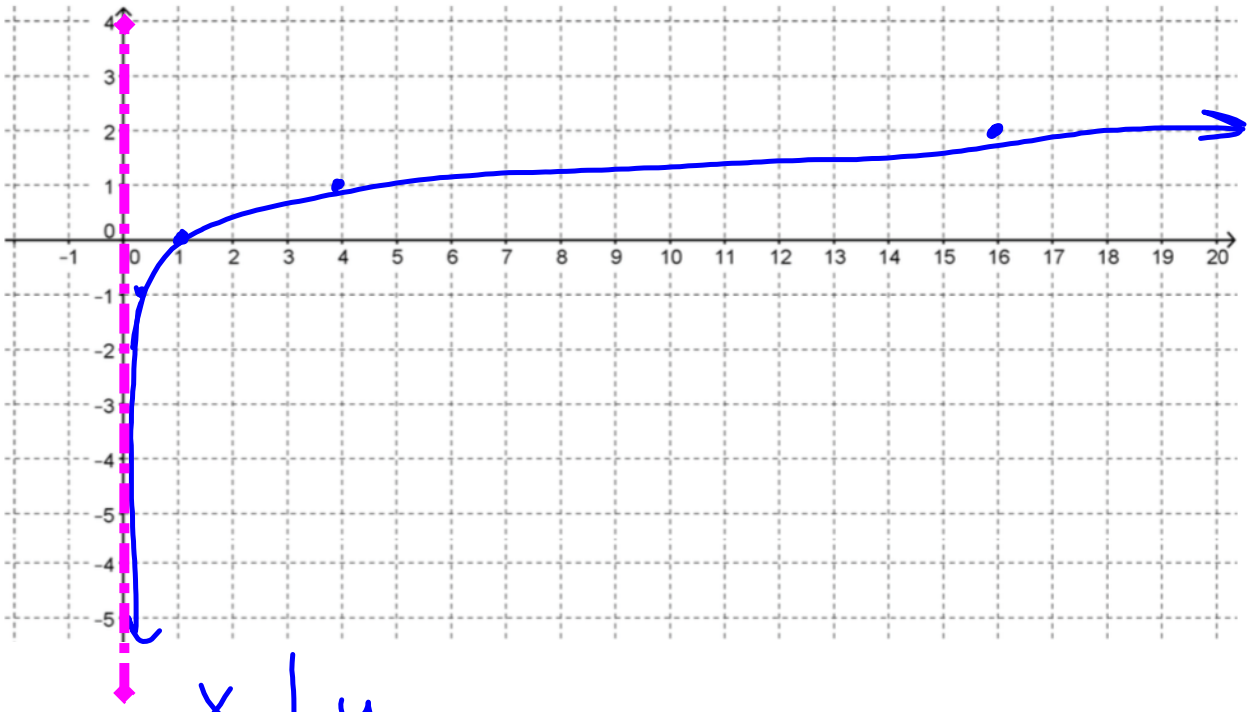
x	$f(x)$	$f(x) = \log_2 x$
$\frac{1}{4}$	-2	$\log_2 \frac{1}{4} = -2$
$\frac{1}{2}$	-1	$\log_2 \frac{1}{2} = -1$
1	0	$\log_2 1 = 0$
2	1	$\log_2 2 = 1$
4	2	$\log_2 4 = 2$
8	3	$\log_2 8 = 3$
16	4	$\log_2 16 = 4$

b) $g(x) = \log_3 x$



x	y
1/9	-2
1/3	-1
1	0
3	1
9	2
27	3

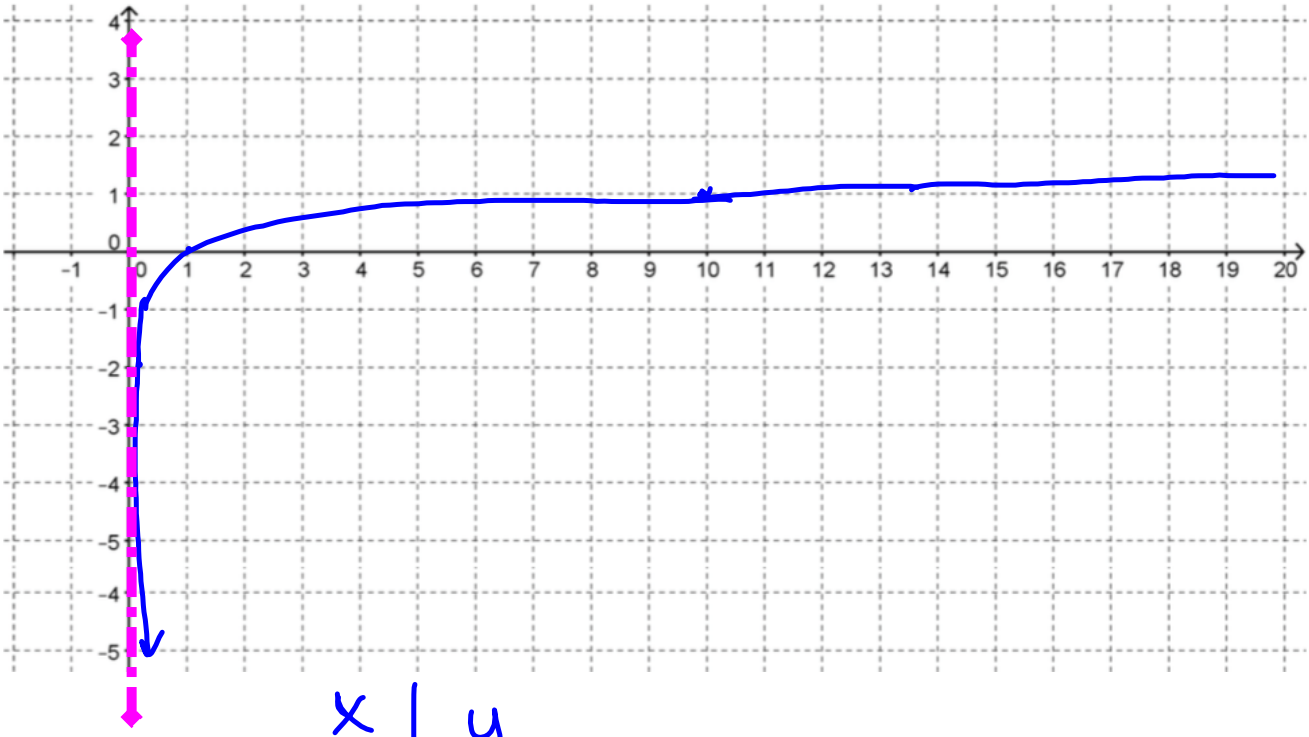
c) $h(x) = \log_4 x$



x	y
1/16	-2
1/4	-1
1	0
4	1
16	2

d) $k(x) = \log_{10} x$

*you will need graph paper for this graph, it is missing on your paper



x	y
1/100	-2
1/10	-1
1	0
10	1
100	2

2. How did you decide what values to use for x in your table?

choose powers of base

3. How did you use the x values to find the y values in the table?

plugged in x's to get y's

4. What similarities do you see in the graphs?

same shape; (1,0)

5. What differences do you observe in the graphs?

how far away curve is from x-axis (sharpness of curve).

6. What is the effect of changing the base on the graph of a logarithmic function?

Sharper curve, closer to x-axis

a) Let's focus now on $k(x) = \log_{10} x$ so that we can use technology to observe the effects of changing parameters on the function. Because base 10 is a very commonly used base for exponential and logarithmic functions, it is often abbreviated and written without the base, like this: $k(x) = \log x$.

b) Use technology to graph $y = \log x$. How does the graph compare to the graph that you constructed?

same

e) How do you predict that the graph of $y = a + \log x$ will be different from the graph of $y = \log x$?

f) Test your prediction by graphing $y = a + \log x$ for various values of a. What is the effect of a? Make a general argument for why this would be true for all logarithmic functions.

moves a units ↑ or ↓

g) How do you predict that the graph of $y = \log(x + b)$ will be different from the graph of $y = \log x$?

h) Test your prediction by graphing $y = \log(x + b)$ for various values of b.

- What is the effect of adding b?

left b units

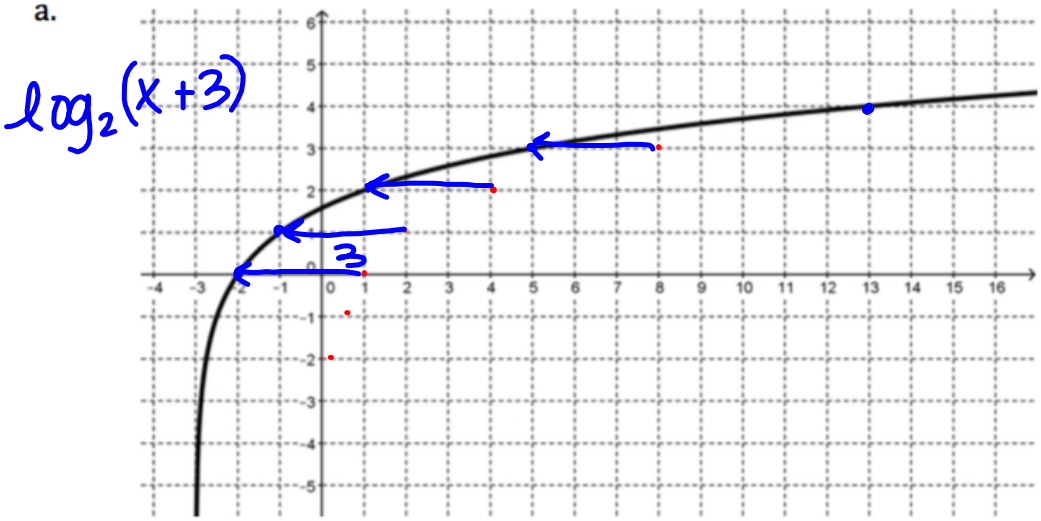
- What will be the effect of subtracting b?

right b units

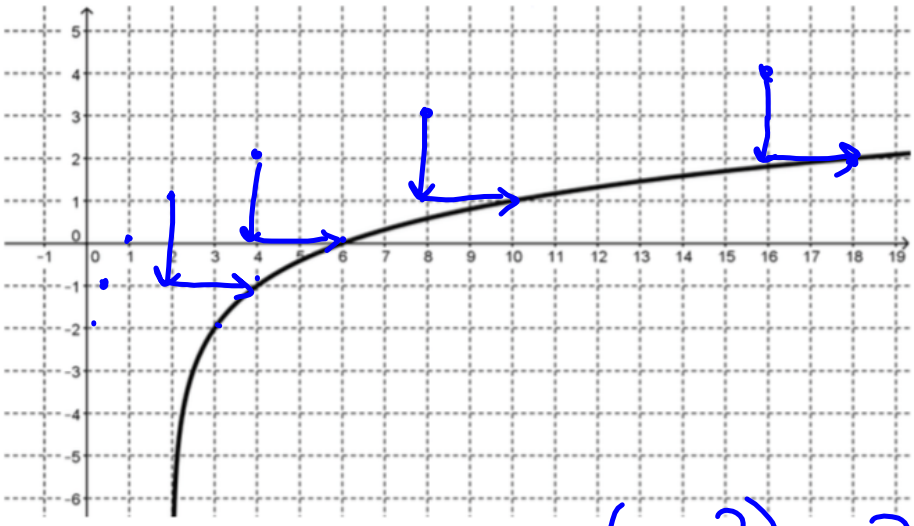
- Make a general argument for why this is true for all logarithmic functions.

7. Write an equation for each of the following functions that are transformations of $f(x) = \log_2 x$.

a.

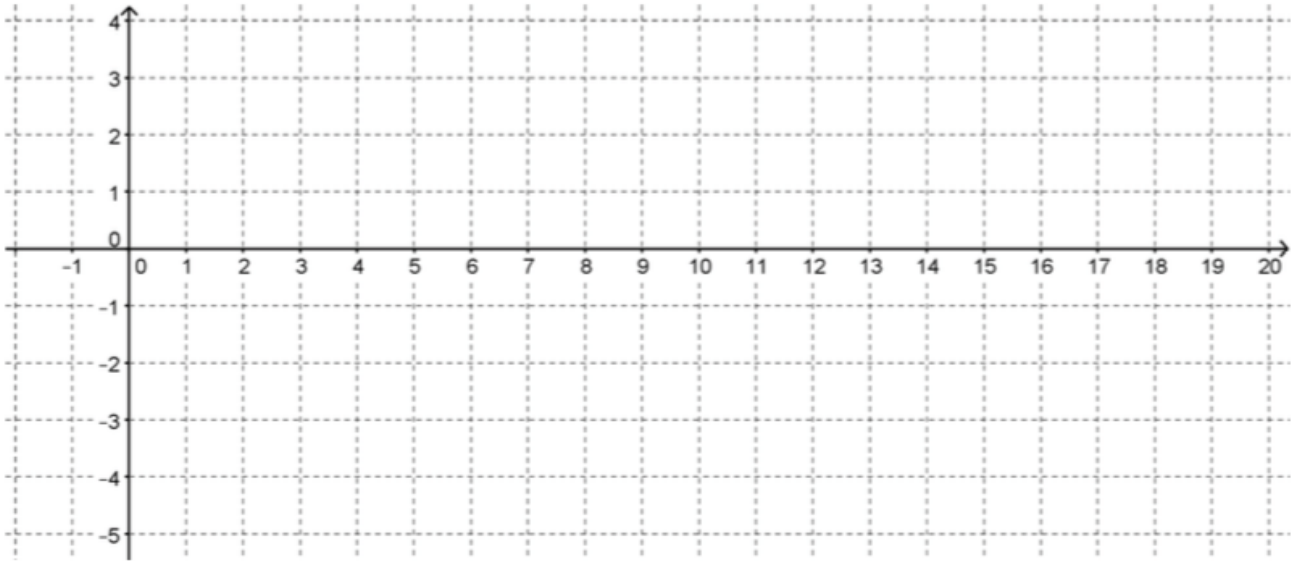


b.



8. Graph and label each of the following functions:

a. $f(x) = 2 + \log_2(x - 1)$



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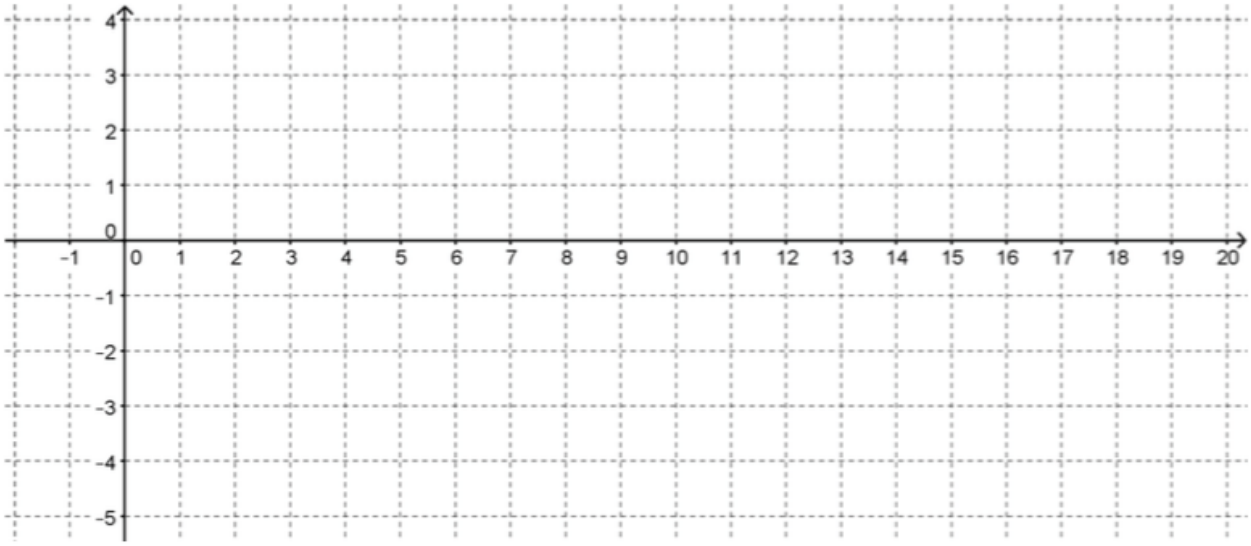
b. $g(x) = -1 + \log_2(x + 2)$



9. Compare the transformation of the graphs of logarithmic functions with the transformation of the graphs of quadratic functions.

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Homework

Finish 2.2 "Ready, Set, Go"