Starter

Grab pg. 9 from the desk next to mine and start working on it ASAP. :)

Go

Topic: Properties of Exponents

Write each expression as an integer or a simple fraction.

17. 27^0

18. $11(-6)^0$

19. -3^{-2}

20. 4^{-3}

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

$42 \cdot \frac{1}{6^4} =$

$\frac{42}{1} =$

$\frac{42}{1296} =$

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

$\frac{3}{\frac{1}{6}} = 3 \div \frac{1}{6} =$

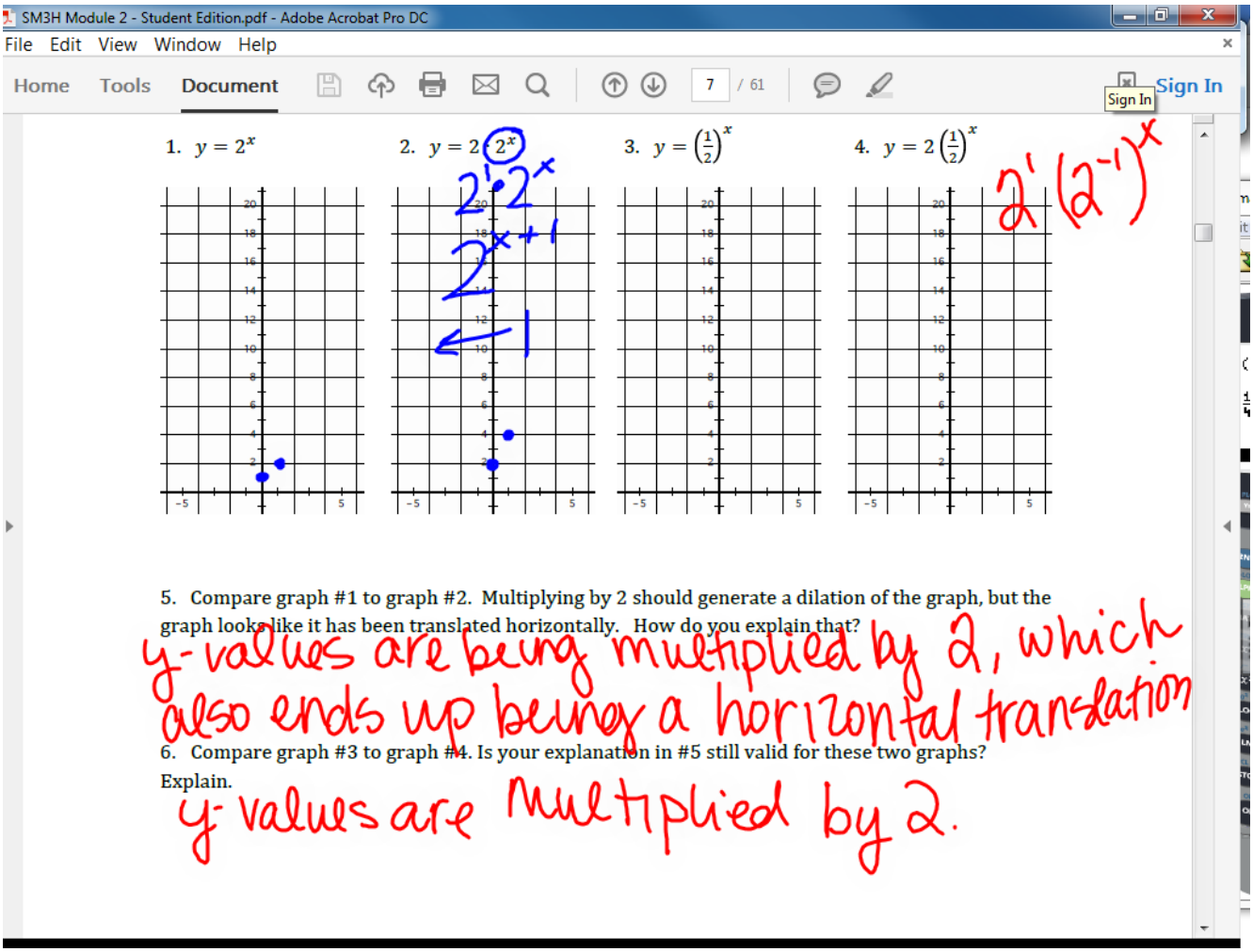
$3 \cdot \frac{6^1}{1} = 18$

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

$\frac{\frac{1}{7^2}}{\frac{1}{4^1}} = \frac{1}{49} \div \frac{1}{4} = \frac{1}{49} \cdot \frac{4}{1}$

$= \frac{4}{49}$

28. ~~$\frac{3^{-1}}{4^{-1}}$~~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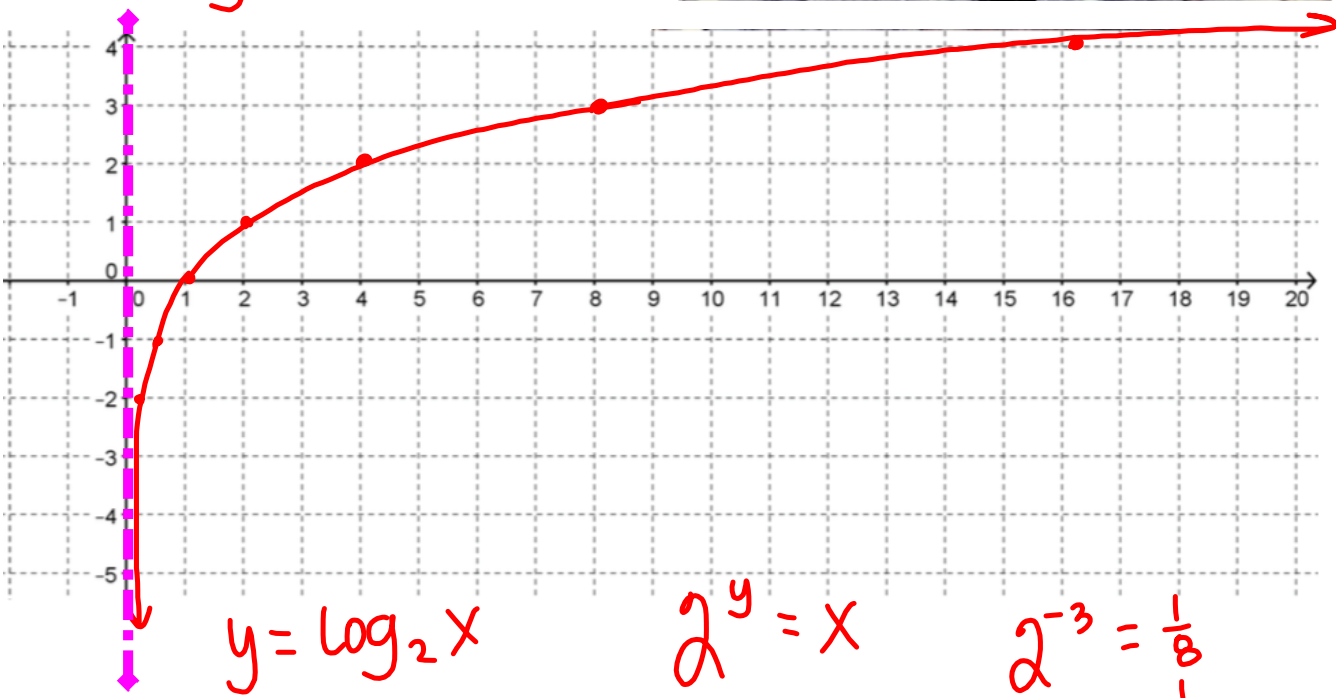
1. $y = 2^x$
2. $y = 2 \cdot 2^x$
3. $y = \left(\frac{1}{2}\right)^x$
4. $y = 2\left(\frac{1}{2}\right)^x$
5. Compare graph #1 to graph #2. Multiplying by 2 should generate a dilation of the graph, but the graph looks like it has been translated horizontally. How do you explain that?
y-values are being multiplied by 2, which also ends up being a horizontal translation
6. Compare graph #3 to graph #4. Is your explanation in #5 still valid for these two graphs? Explain.
y-values are multiplied by 2.

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) $f(x) = \log_2 x$



$y = \log_2 x$ $\quad 2^y = x$

x	$y = \log_2 x$	y
$\frac{1}{4}$	$\log_2 \frac{1}{4} = -2$	-2
$\frac{1}{2}$	$\log_2 \frac{1}{2} = -1$	-1
1	$\log_2 1 = 0$	0
2	$\log_2 2 = 1$	1
4	$\log_2 4 = 2$	2
8	$\log_2 8 = 3$	3

$2^{-3} = \frac{1}{8}$

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

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

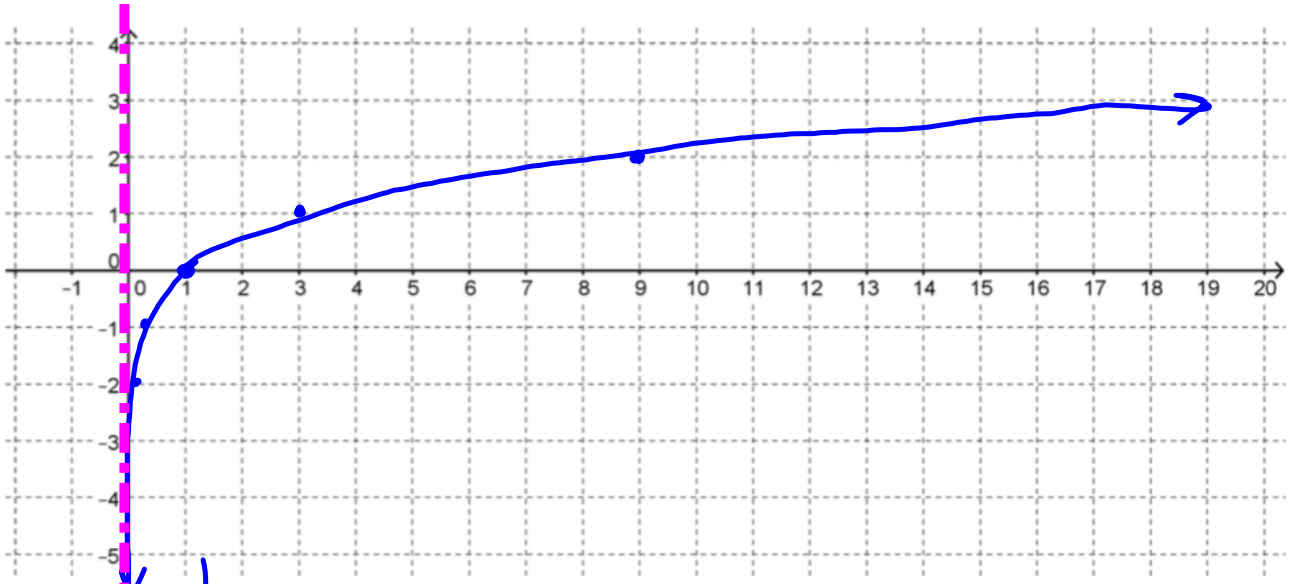
$2^0 = 1$

$2^1 = 2$

$2^2 = 4$

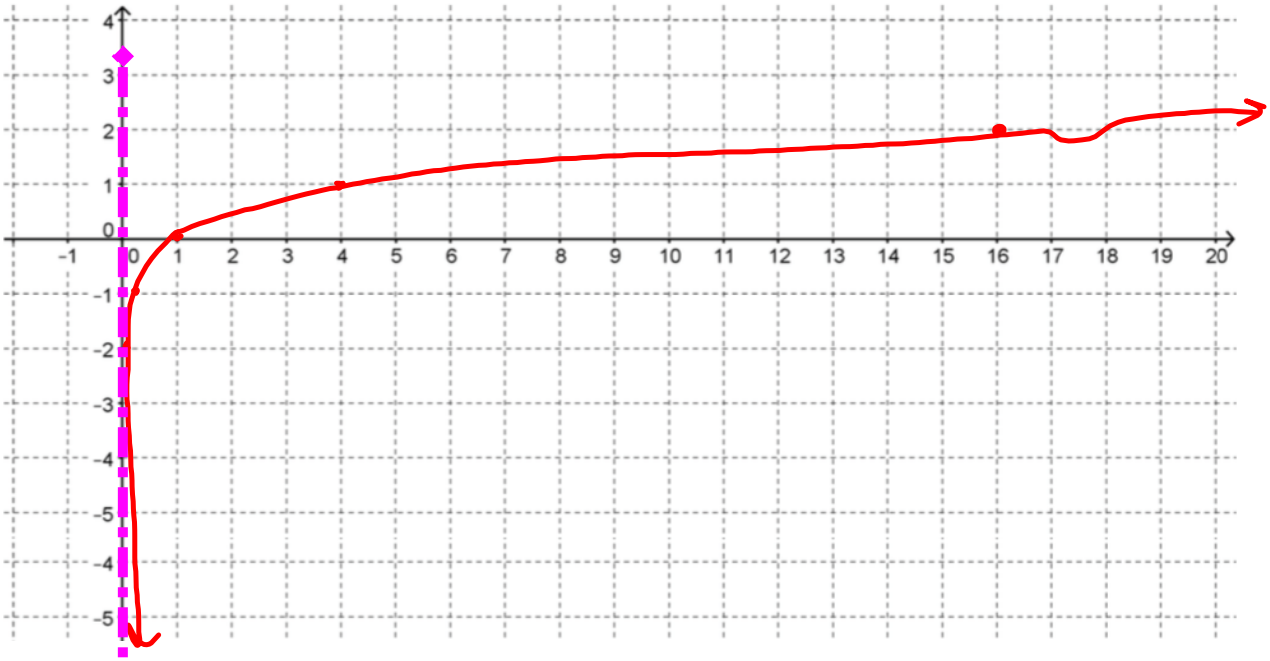
$2^3 = 8$

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



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

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



x	y
$\frac{1}{16}$	-2
$\frac{1}{4}$	-1
1	0
4	1
16	2

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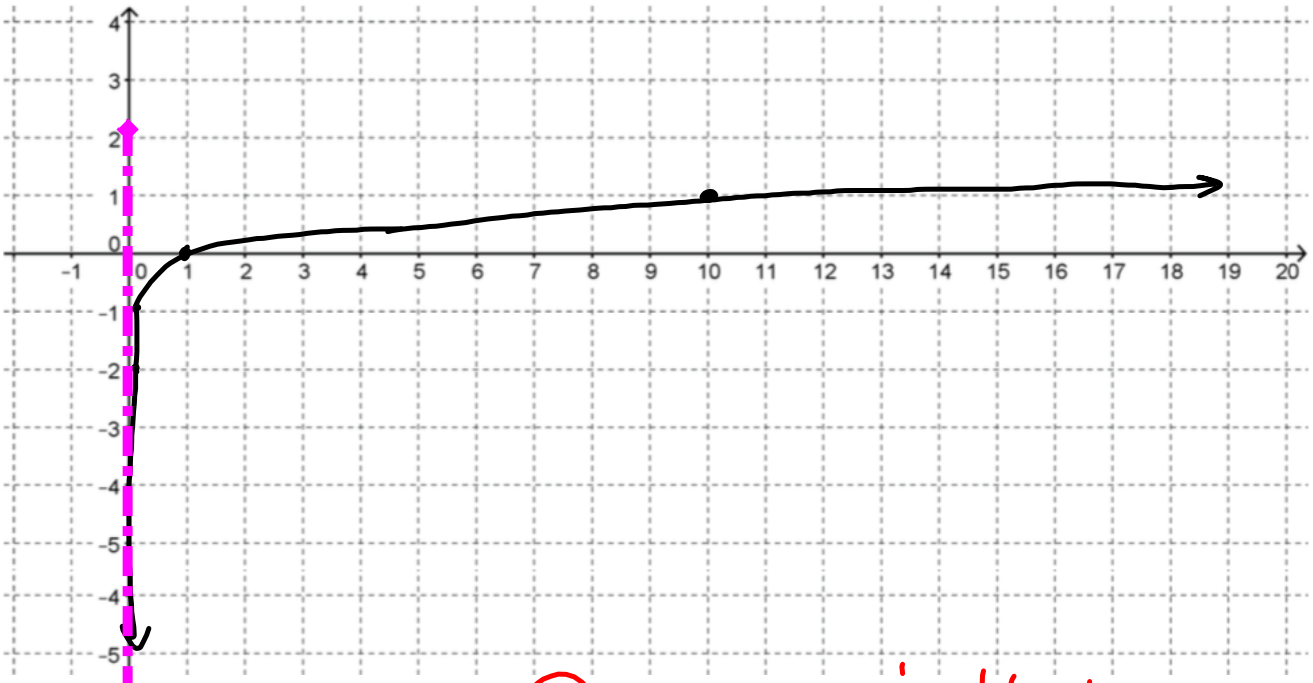
d) $k(x) = \log_{10} x$

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



x	y
$\frac{1}{100}$	-2
$\frac{1}{10}$	-1
1	0
10	1

② choose x's that are powers of the base

③ plug x's in, solve for y

④ (1,0); shape

⑤ All other points are diff.

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

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

4. What similarities do you see in the graphs?

5. What differences do you observe in the graphs?

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

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?

? TYPO cd ?

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.

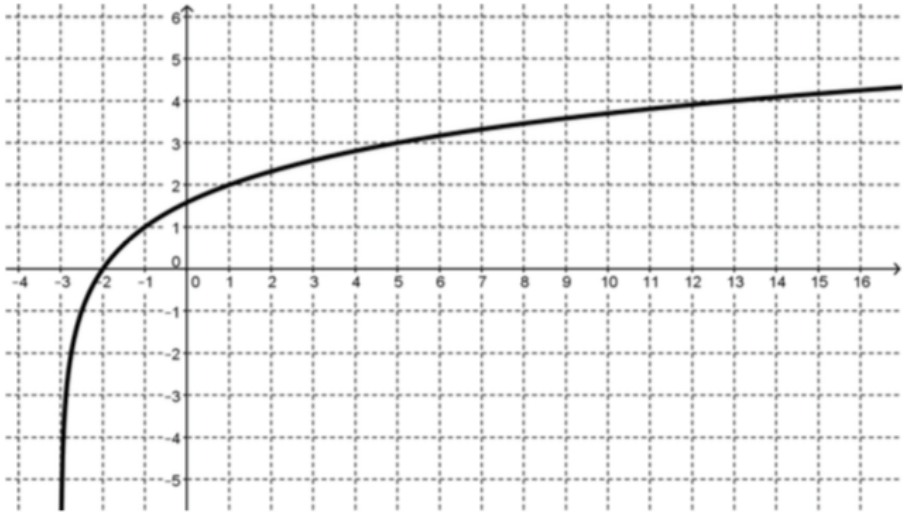
g) How do you predict that the graph of $y = \log(x + b)$ will be different from the graph of $y = \log x$?

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

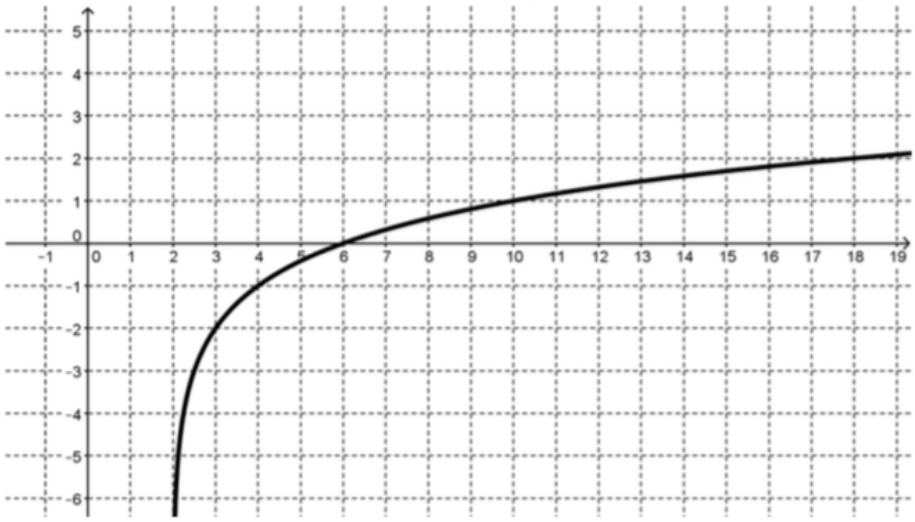
- What is the effect of adding b?
- What will be the effect of subtracting b?
- Make a general argument for why this is true for all logarithmic functions.

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

a.



b.



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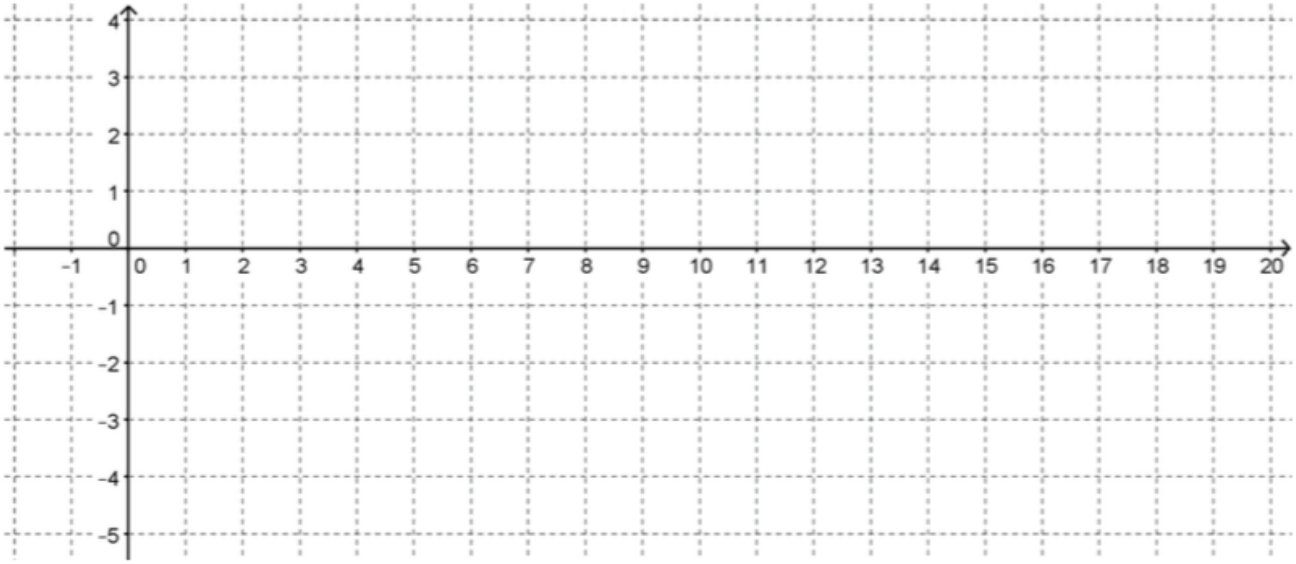
8. Graph and label each of the following functions:

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



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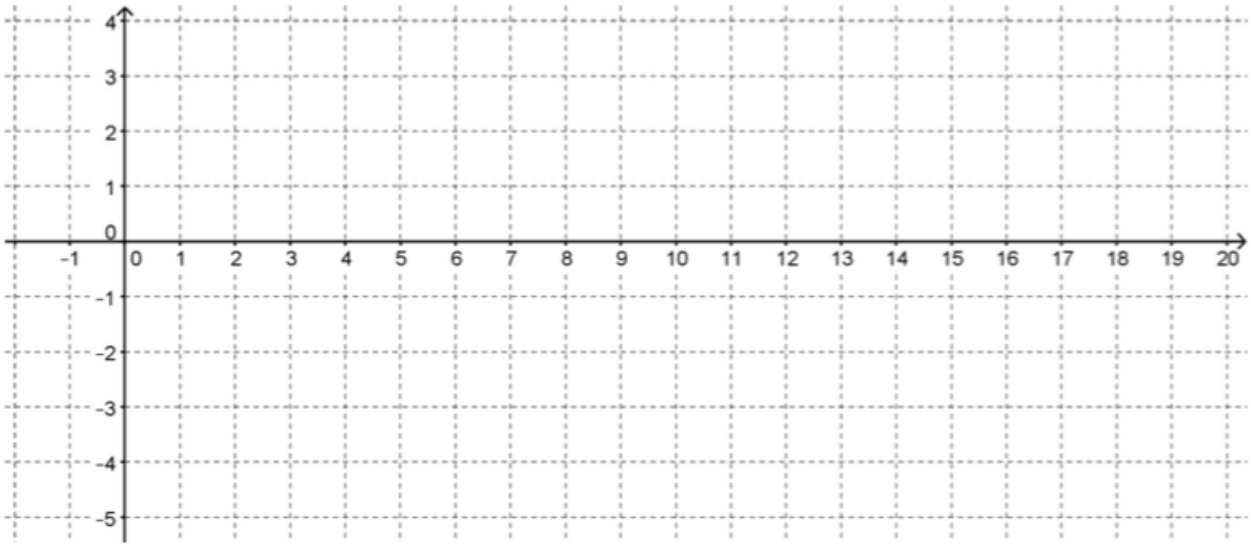
b. $g(x) = -1 + \log_2(x + 2)$



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"

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