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

18. $11(-6)^0 = 11$

19. -3^{-2}

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

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

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

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

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

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

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

$\frac{4^1}{7^2}$

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

28. $\frac{32^{-1}}{4^{-1}} = \frac{4^1}{32^1} = \frac{4}{32} = \frac{1}{8}$

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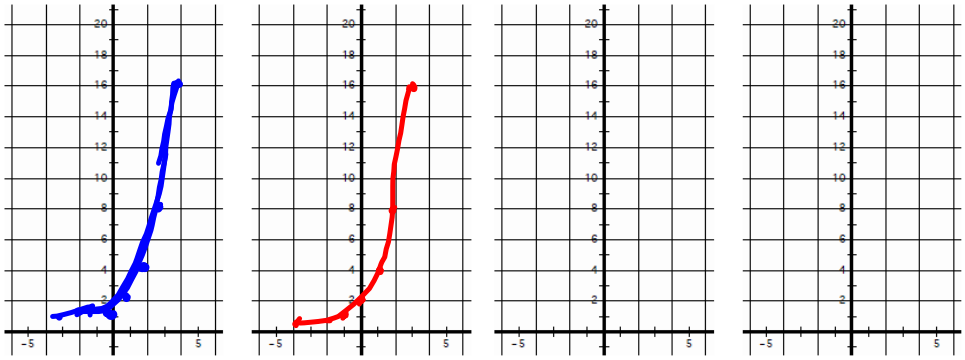
Graph each function over the domain $\{-4 \le x \le 4\}$.

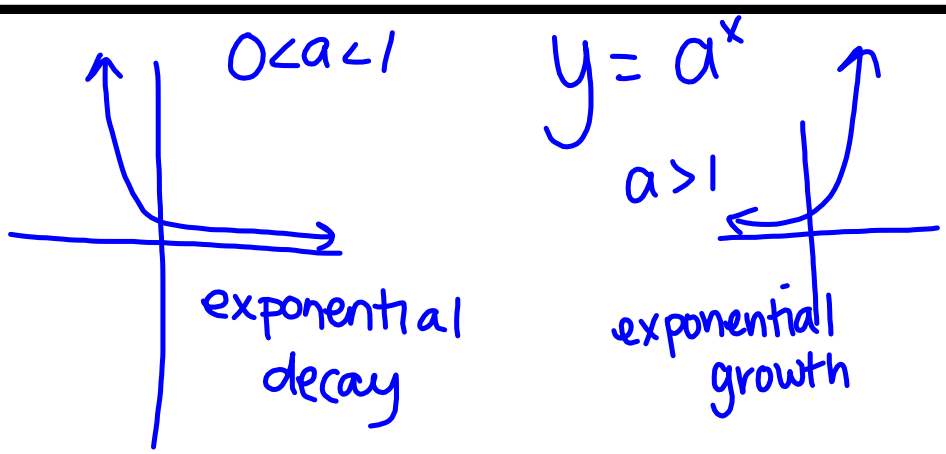
1. $y = 2^x$ 2. $y = 2^1 \cdot 2^x = 2^{x+1}$ 3. $y = \left(\frac{1}{2}\right)^x$ 4. $y = 2\left(\frac{1}{2}\right)^x$



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?

Exponent rules; $2 \cdot 2^x = 2^{x+1}$, which moves 2^x left 1 unit.

6. Compare graph #3 to graph #4. Is your explanation in #5 still valid for these two graphs? Explain.



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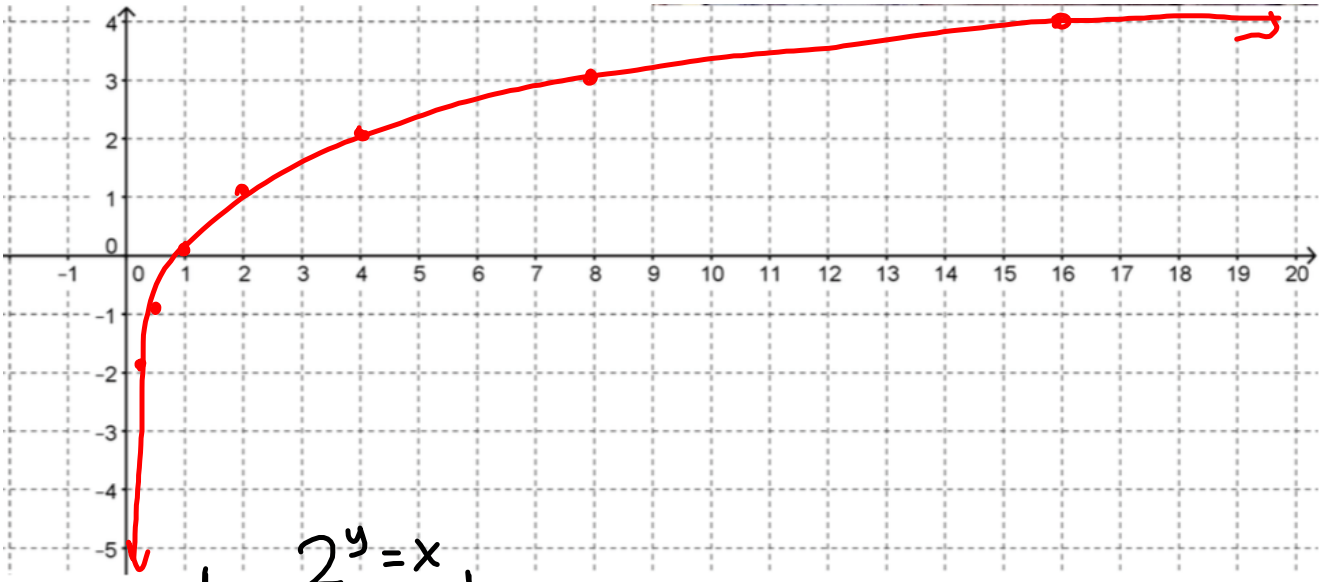
2.2 Falling Off A Log

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 $0 < x < 1$.

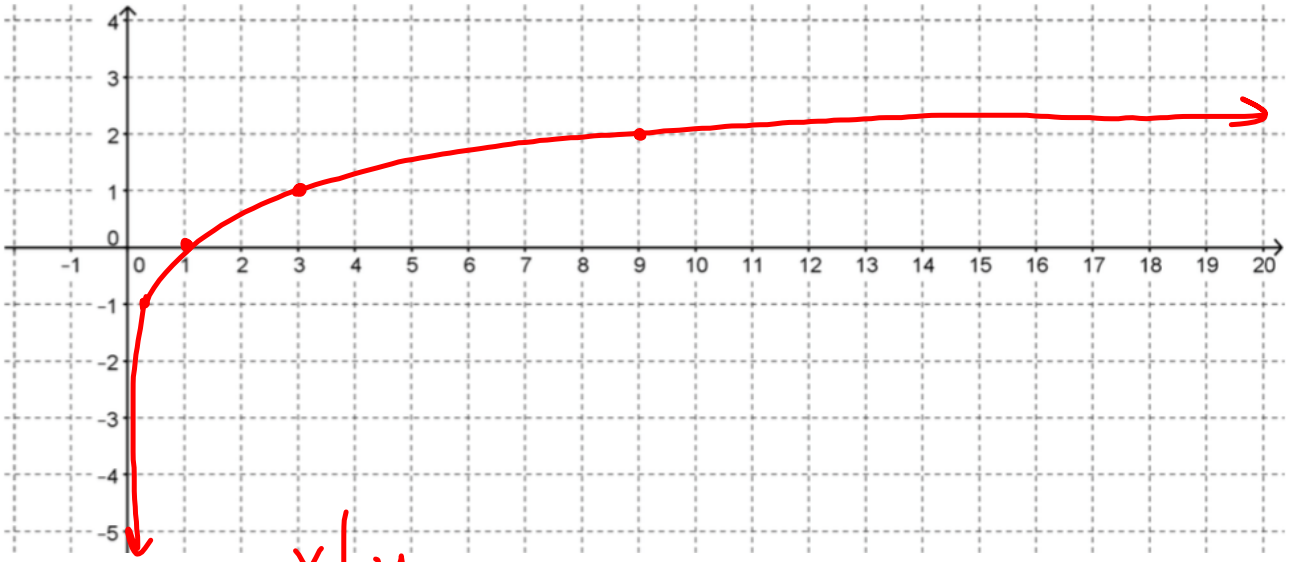
a) $f(x) = \log_2 x$



$2^y = x$

x	$y = \log_2 x$	y
$\frac{1}{4}$	$2^{-2} = \frac{1}{4} / \log_2(\frac{1}{4}) = -2$	-2
$\frac{1}{2}$	$2^{-1} = \frac{1}{2} / \log_2(\frac{1}{2}) = -1$	-1
1	$2^0 = 1$ or $\log_2 1 = 0$	0
2	$2^1 = 2$ or $\log_2 2 = 1$	1
4	$2^2 = 4$ or $\log_2 4 = 2$	2
8	$2^3 = 8$ or $\log_2 8 = 3$	3

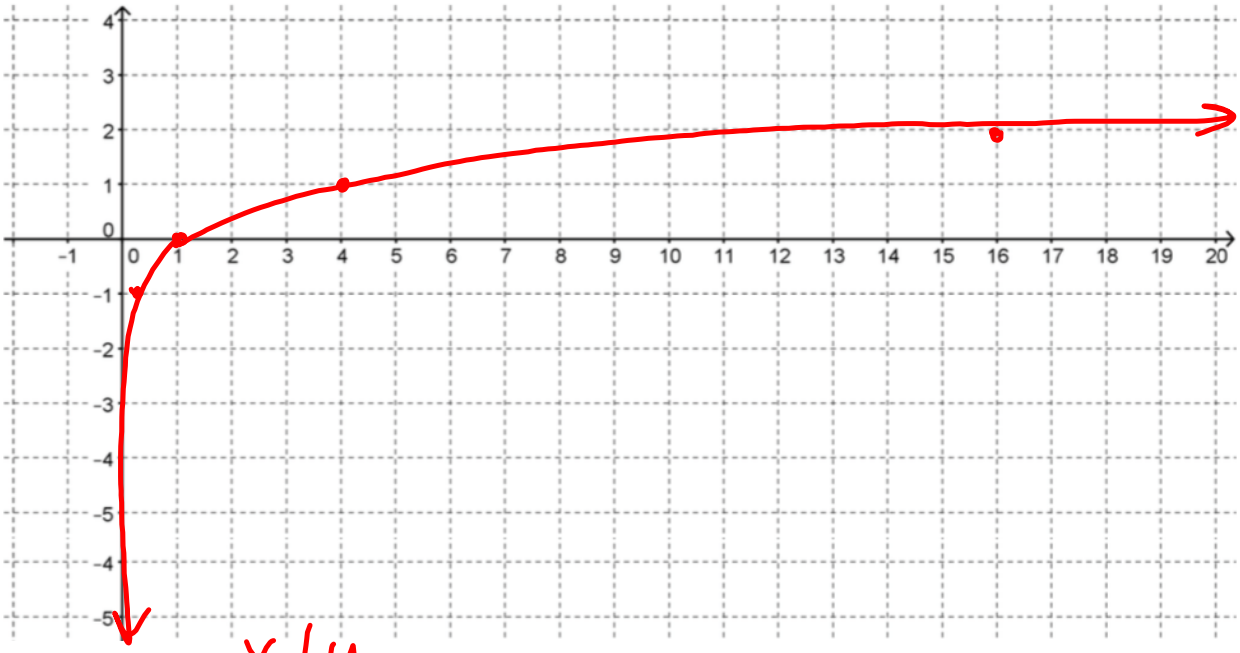
b) $g(x) = \log_3 x$



x	y
$\frac{1}{3}$	-1
1	0
3	1
9	2

Mar 28-10:23 AM

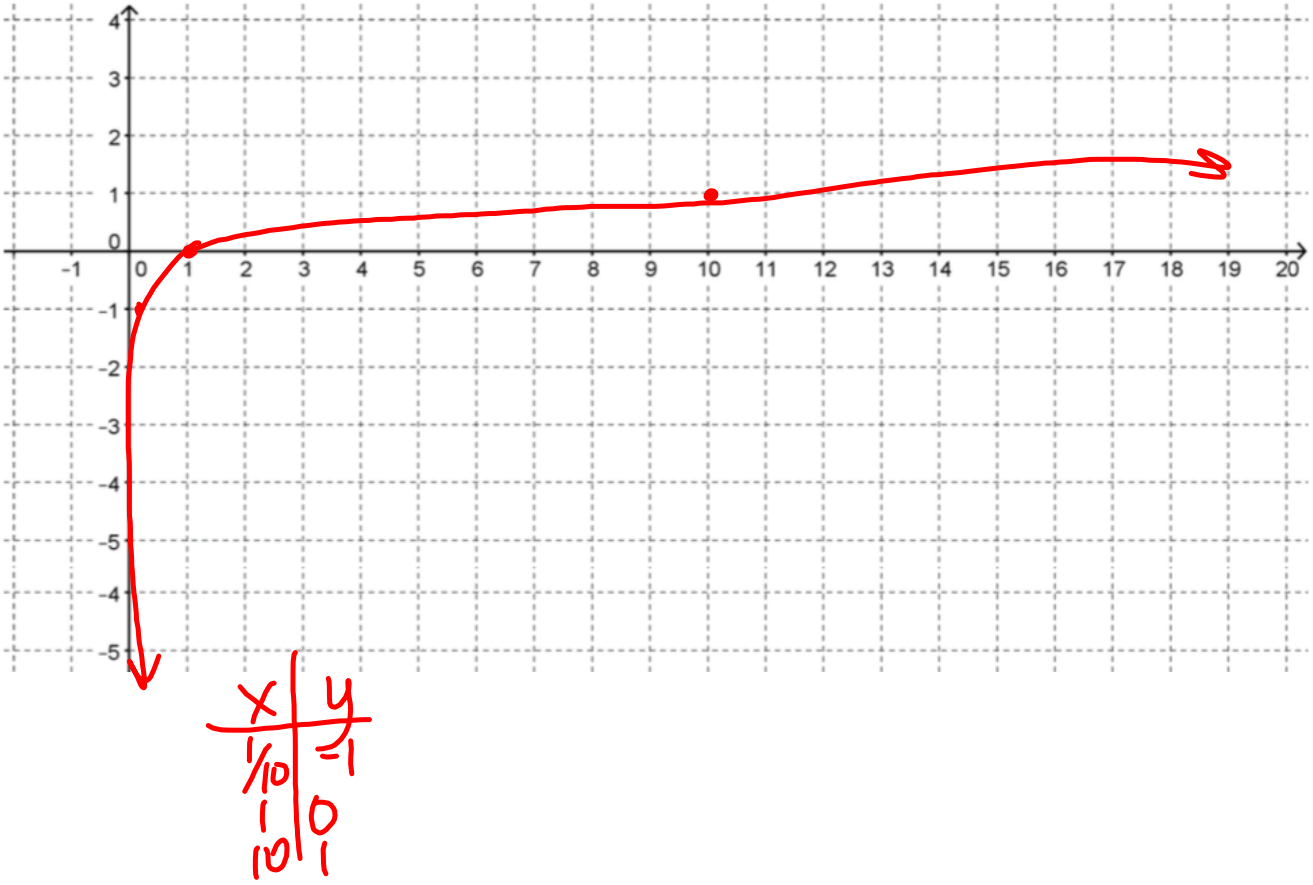
c) $h(x) = \log_4 x$



x	y
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
1/10	-1
1	0
10	1

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

Chose x's that are powers of the base

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

plug in x's

4. What similarities do you see in the graphs?

Same shape

(1,0)

5. What differences do you observe in the graphs?

as the base increases, the curve becomes sharper

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

#5

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.

translates ~~moves~~ graph up or down a units.

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?

translates ← b units

- What will be the effect of subtracting b?

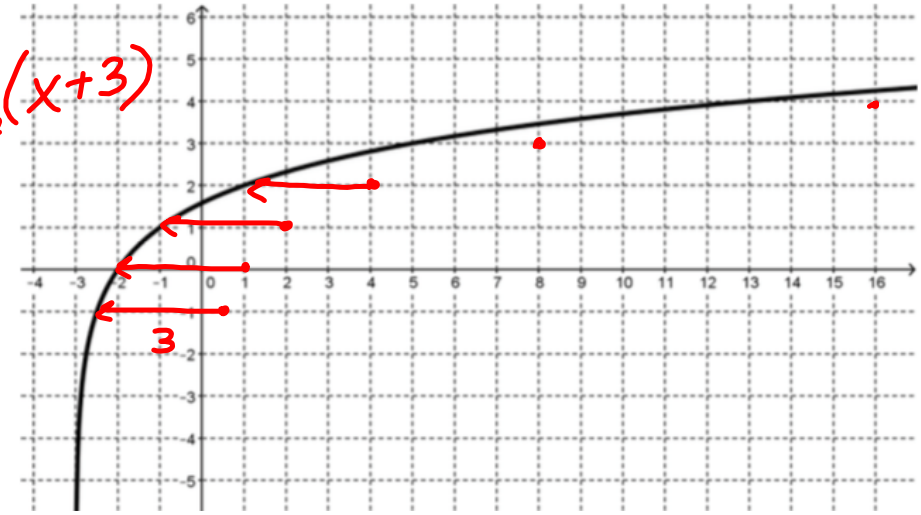
translates → b units

- 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 $f(x) = \log_2 x$.

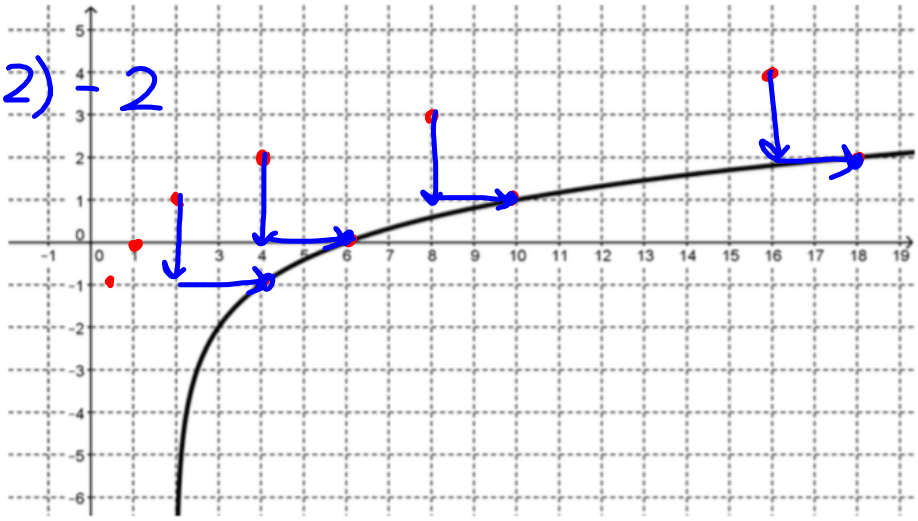
a.

$\log_2(x+3)$



b.

$\log_2(x-2) - 2$



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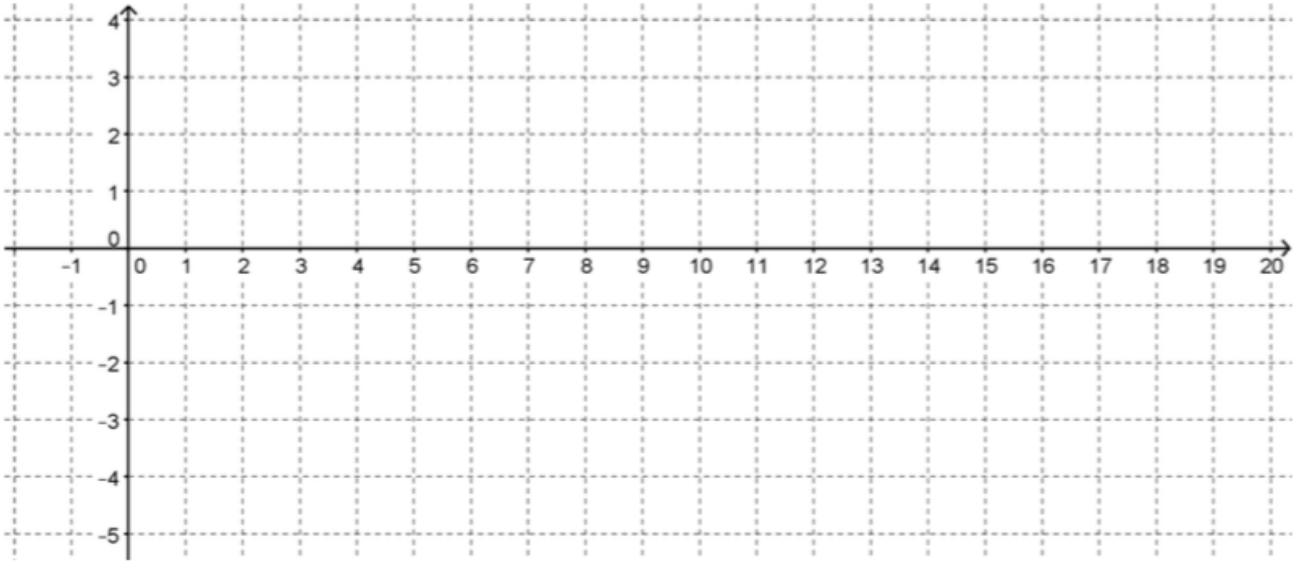
8. Graph and label each of the following functions:

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



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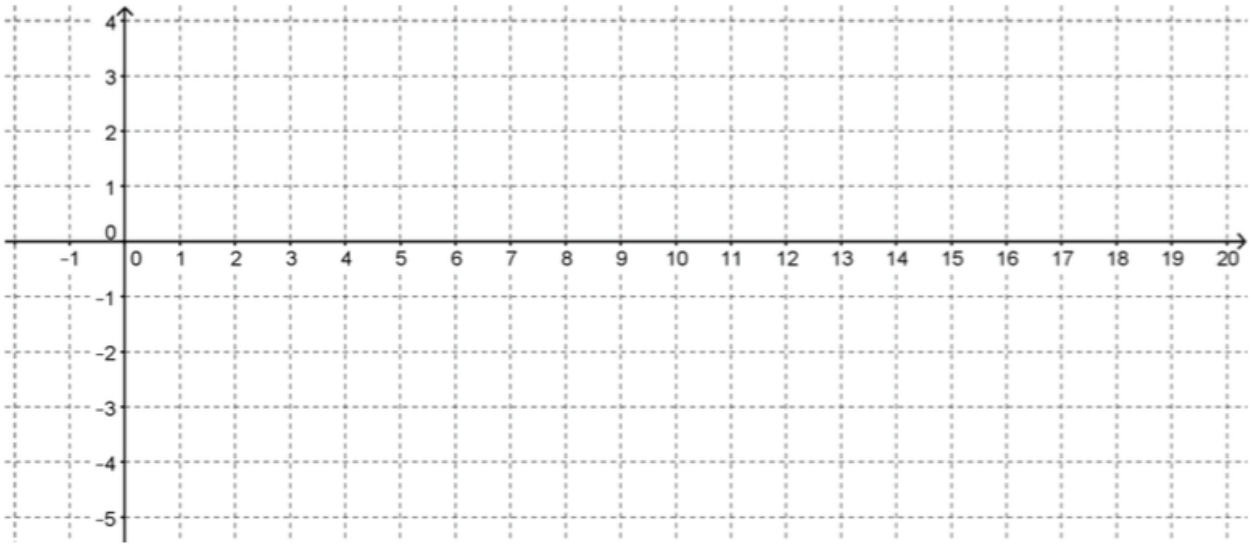
b. $g(x) = -1 + \log_2(x + 2)$



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"

Mar 28-9:36 AM