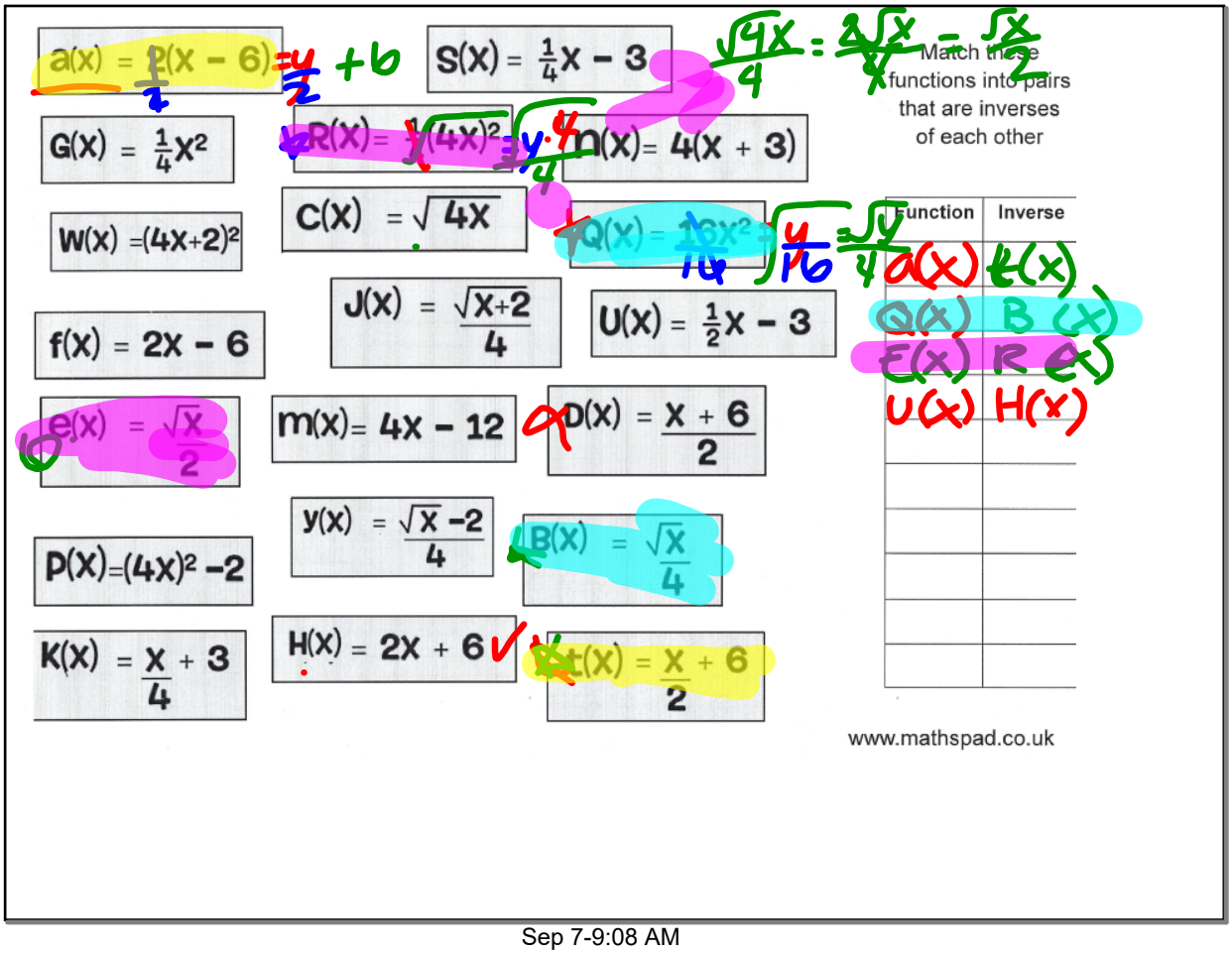


Sep 7-9:08 AM

Quiz 2.0a

Name_____ Period__

Find the inverse of:

1. $y = \frac{x+6}{5}$

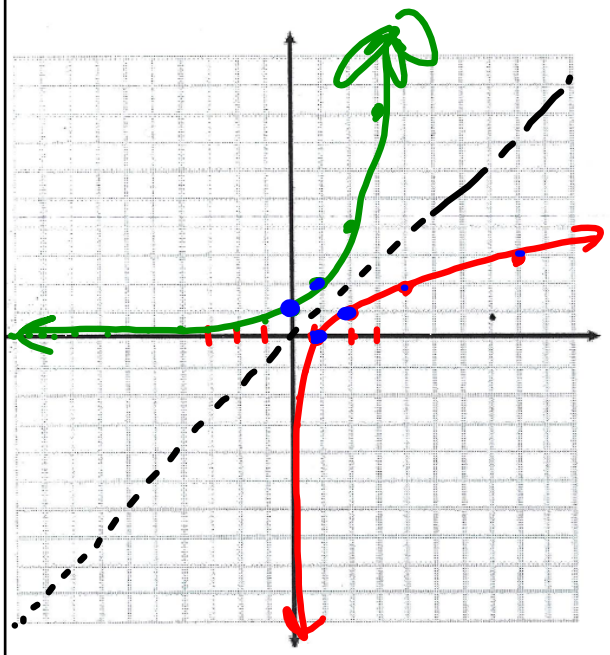
2. $y = 4x + 3$

3. $y = x - 1$

4. simplify: $\frac{a^7 \cdot a^{-3}}{a^2}$

Sep 11-9:13 AM

Introduction to Logarithms



raph $f(x) = x$ on the same graph with a dotted line.

$y = x$

1) Graph $f(x) = 2^x$

a. Write a table of values for $f(x) = 2^x$

x	f(x)
-3	1/8
-2	1/4
-1	1/2
0	1
1	2
2	4
3	8

2^{-3}, 2^{-2}, ⋮, ⋮

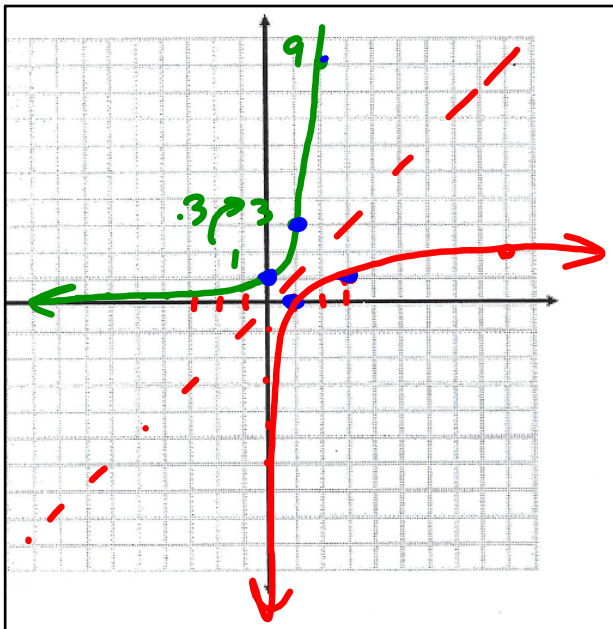
2) Graph $f^{-1}(x) = \log_2 x$ on the same graph.

a. Fill in a table of values for $f^{-1}(x) = \log_2 x$

x	f(x)
1/8	-3
1/4	-2
1/2	-1
1	0
2	1
4	2
8	3

$\log_2 \frac{1}{8} = -3$

Sep 11-9:06 AM



aph $f(x) = x$ on the same graph with a dotted line.

3) Graph $f(x) = 3^x$

a. Write a table of values for $f(x) = 3^x$

x	f(x)
-3	1/27
-2	1/9
-1	1/3
0	1
1	3
2	9
3	27

3^{-3}, 3^{-2}, ⋮, 3^3

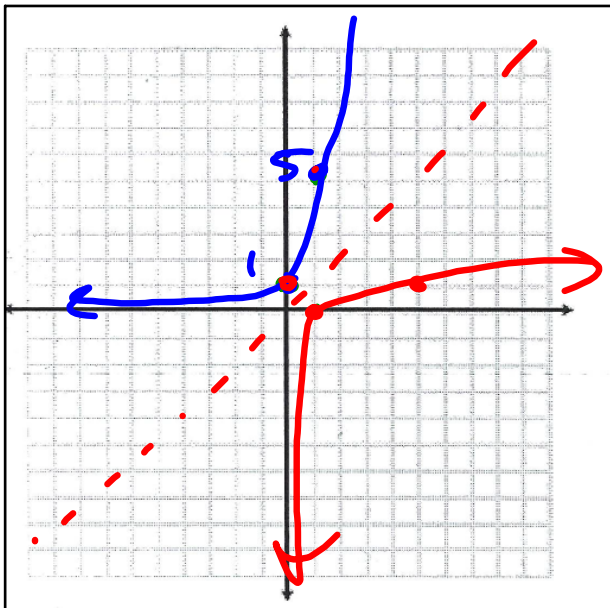
4) Graph $f^{-1}(x) = \log_3 x$ on the same graph.

a. Fill in a table of values for $f^{-1}(x) = \log_3 x$

x	f(x)
1/27	-3
1/9	-2
1/3	-1
1	0
3	1
9	2
27	3

$\log_3 \frac{1}{27} = -3$

Sep 11-9:06 AM



Graph $f(x) = x$ on the same graph with a dotted line.

5) Graph $f(x) = 5^x$

a. Write a table of values for $f(x) = 5^x$

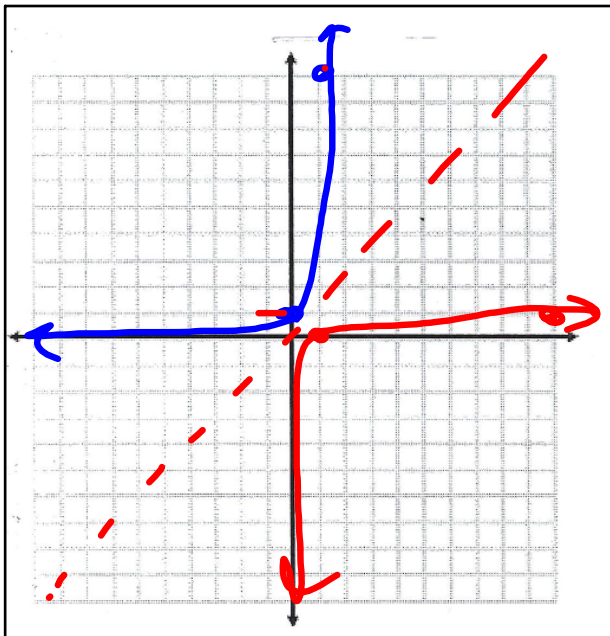
x	f(x)
-3	1/125
-2	1/25
-1	1/5
0	1
1	5
2	25
3	125

6) Graph $f^{-1}(x) = \log_5 x$ on the same graph.

a. Fill in a table of values for $f^{-1}(x) = \log_5 x$

x	f(x)
1/125	-3
1/25	-2
1/5	-1
1	0
5	1
25	2
125	3

Sep 11-9:07 AM



Graph $f(x) = x$ on the same graph with a dotted line.

7) Graph $f(x) = 10^x$

a. Write a table of values for $f(x) = 10^x$

x	f(x)
-3	1/1000
-2	1/100
-1	1/10
0	1
1	10
2	100
3	1000

8) Graph $f^{-1}(x) = \log_{10} x$ on the same graph.

a. Fill in a table of values for $f^{-1}(x) = \log_{10} x$

x	f(x)
1/1000	-3
1/100	-2
1/10	-1
1	0
10	1
100	2
1000	3

Sep 11-9:07 AM

2.1 Log Logic

A Develop Understanding Task

We began thinking about logarithms as inverse functions for exponentials in Tracking the Tortoise. Logarithmic functions are interesting and useful on their own. In the next few tasks, we will be working on understanding logarithmic expressions, logarithmic functions, and logarithmic operations on equations.

We showed the inverse relationship between exponential and logarithmic functions using a diagram like the one below:

Input → Output

$x = 3$ → $2^3 = 8$ → 3

$f(x) = 2^x$ $\quad$ $f^{-1}(x) = \log_2 x$

inverses

We could summarize this relationship by saying:

$2^3 = 8$ so, $\log_2 8 = 3$

Logarithms can be defined for any base used for an exponential function. Base 10 is popular. Using base 10, you can write statements like these:

$10^1 = 10$ so, $\log_{10} 10 = 1$

$10^2 = 100$ so, $\log_{10} 100 = 2$

$10^3 = 1000$ so, $\log_{10} 1000 = 3$

Mar 28-10:11 AM

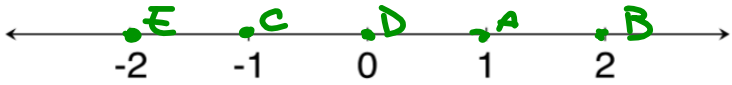
The notation is a little strange, but you can see the inverse pattern of switching the inputs and outputs.

The next few problems will give you an opportunity to practice thinking about this pattern and possibly make a few conjectures about other patterns that you may notice with logarithms.

Place the following expressions on the number line. Use the space below the number line to explain how you knew where to place each expression.

1. A. $\log_3 3$ B. $\log_3 9$ C. $\log_3 \frac{1}{3}$ D. $\log_3 1$ E. $\log_3 \frac{1}{9}$

$3^1 = 3$, $3^2 = 9$, $3^{-1} = \frac{1}{3}$, $3^0 = 1$, $3^{-2} = \frac{1}{9}$

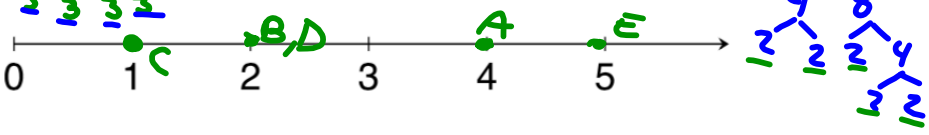


Explain: changed to exponential "How many 3's?"

2. A. $\log_3 81$ B. $\log_{10} 100$ C. $\log_8 8$ D. $\log_5 25$ E. $\log_2 32$

$3^4 = 81$, $10^2 = 100$, $8^1 = 8$, $5^2 = 25$, $2^5 = 32$

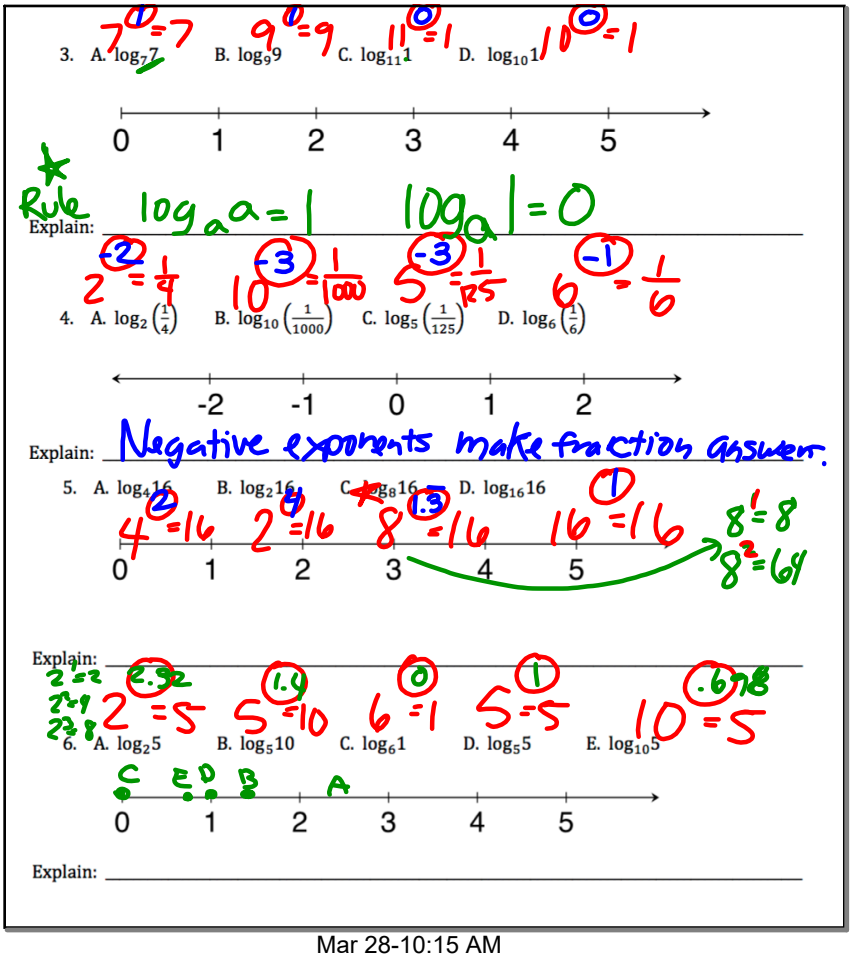
3·3·3·3



Explain: _____

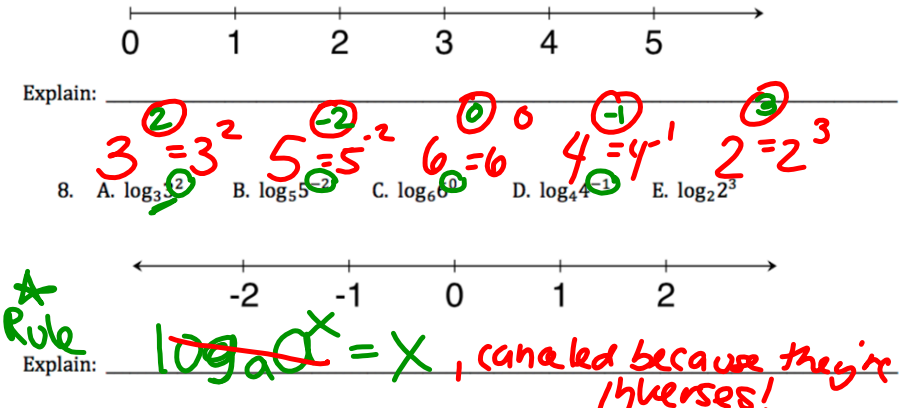
Mar 28-10:15 AM

3. A. $\log_7 7$ B. $\log_9 9$ C. $\log_{11} 1$ D. $\log_{10} 1$



Mar 28-10:15 AM

A. $\log_{10} 50$ B. $\log_{10} 150$ C. $\log_{10} 1000$ D. $\log_{10} 500$



Based on your work with logarithmic expressions, determine whether each of these statements is always true, sometimes true, or never true. If the statement is sometimes true, describe the conditions that make it true. Explain your answers.

9. The value of $\log_b x$ is positive.

Explain: _____

10. $\log_b x$ is not a valid expression if x is a negative number.

Explain: _____

Mar 28-10:15 AM

11. $\log_b 1 = 0$ for any base, b > 1.

Explain: _____

12. $\log_b b = 1$ for any b > 1.

Explain: _____

13. $\log_2 x < \log_3 x$ for any value of x.

Explain: _____

14. $\log_b b^n = n$ for any b > 1.

Explain: _____

Mar 28-10:15 AM

Name Logarithmic Functions 2.1

Ready, Set, Go!

Ready

Topic: Graphing exponential equations

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

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 vertically. How do you explain that?

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

Sep 12-10:56 AM

Set

Topic: Evaluating logarithmic functions

Arrange the following expressions in numerical order from smallest to largest. Do not use a calculator. Be prepared to explain your logic.

	A	B	C	D	E
7.	$\log_2 32$	$\log_7 343$	$\log_{35} 1$	$\log_{15} 225$	$\log_{11} 11$
8.	$\log_3 81 = 4$	$\log_5 125 = 3$	$\log_8 8 = 1$	$\log_4 1 = 0$	$\log 100 = 2$
9.	$\log_7 45$	$\log_3 12$	$\log_4 12$	$\log_3 30$	$\log_x x = 1$
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.	$\log 200$	$\log 0.02$	$\log_2 10$	$\log_2 \frac{1}{10}$	$\log_2 200$

D C E B A

Small Big

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?

Sep 12-10:57 AM

Name Logarithmic Functions | 2.1

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. $\frac{4^3}{8^0}$

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

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

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

$\frac{42}{6^4} = \frac{42}{1296} = \frac{7}{216}$

26. $\frac{3}{6^{-1}}$ → $3 \cdot 6 = 18$

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

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

Sep 12-12:49 PM