The Mystery Function

Name:_____

We've been working with a lot of exponential functions, but today we're going to explore a different kind of function. Can you figure out how it works?

1. Selected values of a mystery function are given in the table below. Fill in the table as much as you can.

x	4	2	½	1	16	8	1/8	64	32	0	1/4	-1	$\sqrt{2}$	3
y	2		-1		4	3			5				1/2	

2. Write a rule that relates x and y.

3. Which of the outputs were you not able to find? Why do you think that is?

4. Piranavan believes that $(24, 4.585)$ is a point on the graph of this function. Is he correct? How do you know?

5. How are the outputs for $x = 8$ and $x = 1/8$ related? Why do you think this happens?

6. Pagiel thinks that the output for $x = 3$, would be $y = 1.5$. Give a convincing argument to prove whether she is correct or not.

7. Farah wants to know what power she can raise 4 to, to get 64. She writes $4^? = 64$.
   a. How is this similar or different than the mystery function?

   b. Provide Farah with a strategy for figuring out what "?" is.

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Important Ideas:

Check Your Understanding!

1. Evaluate each logarithm. Then write the logarithmic equation in exponential form.

    a. $\log_2 32$

    b. $\log_5 5$

    c. $\log_{36} 6$

    d. $\log \frac{1}{100}$

    e. $\ln e^3$

2. Fill in the table of values for each function.

x	-1	0	1	2	3
$f(x) = 3^x$					

x	1/3	1	3	9	81
$g(x) = \log_3 x$					

    What is the relationship between $f(x)$ and $g(x)$? How could someone tell this just by looking at the entries in the table?

3. You have a juicy secret. On the first day of school you tell your closest friend. On the second day you both tell one other person. Every day, each person that knows the secret passes it on to one more person that hasn't heard it before.
    a) On what day will 64 people have heard the rumor?

    b) On what day will the whole city of Kentwood (population 51, 868) have heard the rumor?

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