



The Mystery Function



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 | $\frac{1}{2}$ | 1 | 16 | 8 | $\frac{1}{8}$ | 64 | 32 | 0 | $\frac{1}{4}$ | -1 | $\sqrt{2}$ | 3 |
| y | 2 | | -1 | | 4 | 3 | | | 5 | | | | $\frac{1}{2}$ | |

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 $x = \frac{1}{8}$ related? Why do you think this happens?
6. Pagiell 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.



Lesson 5.4 – Inverses of Exponential Functions

QuickNotes

Check Your Understanding

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

a. $\log_2 32$

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

b. $\log_5 5$

e. $\ln e^3$

c. $\log_{36} 6$

2. Tables are shown for two functions, f and g . Complete the tables.

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

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

a. What is the relationship between f and g ? How could someone tell this just by looking at the entries in the table?

b. Find $g(f(x))$ and $f(g(x))$. What does the result tell you?

c. Complete the following sentences with the words "additively" or "multiplicatively".

As the inputs of f grow _____, the outputs of f grow _____.

As the inputs of g grow _____, the outputs of g grow _____.