

Practice Problem 1

Let $f(x) = \log_3 x$ and $g(x) = \log_{27} x$. Which choice describes the relationship between f and g ?

- (a) g is a horizontal dilation of f by a factor of $\frac{1}{3}$
- (b) g is a vertical dilation of f by a factor of $\frac{1}{3}$
- (c) g is a horizontal dilation of f by a factor of 3
- (d) g is a vertical dilation of f by a factor of 3

Practice Problem 2

The function h is given by $h(x) = \log_4 x$. Which of the following is equivalent to $h(10)$?

- (a) $\log_7 \frac{10}{4}$
- (b) $\frac{\log_7 4}{\log_7 10}$
- (c) $\frac{\log_4 10}{\log_{10} 4}$
- (d) $\frac{\log_7 10}{\log_7 4}$

Practice Problem 1 Solution:

(b) g is a vertical dilation of f by a factor of $\frac{1}{3}$

$$g(x) = \log_{27} x = \frac{\log_3 x}{\log_3 27} = \frac{\log_3 x}{3} = \frac{1}{3} \log_3 x = \frac{1}{3} f(x)$$

Practice Problem 2 Solution:

(d) $\frac{\log_7 10}{\log_7 4}$

Using the change of base property, we need to find an equivalent form for $h(10) = \log_4 10$. Choice (d) has the only equivalent expression using, in this case, a base of 7 and the change of base property correctly.

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