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| **Topic 2.12: Logarithmic Function Manipulation** | **Transformations**  |
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**Practice Problem 1**

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| The function $g$, is given by the g$\left(x\right)= log\_{8}x$. The function $h$ is given by $h\left(x\right)= log\_{8}(x^{6})$. Which of the following would correctly describe a transformation for which the graph of $h$ is the image of the graph of $g$?(a) A horizontal dilation by a factor of 6(b) A horizontal dilation by a factor of $\frac{1}{6}$(c) A vertical dilation by a factor of 6(d) A vertical dilation by a factor of $\frac{1}{6}$ |

**Practice Problem 2**

The function $f $is given by $f\left(x\right)=log\_{b}\left(\frac{c}{d}\right)$, where b, c, and d are all positive integers. Which of the following is an equivalent representation of $f\left(x\right)$?

(a) $\frac{log\_{b}c}{log\_{b}d}$

(b) $log\_{b}c+log\_{b}d$

(c) $log\_{b}c-log\_{b}d$

(d) $log\_{b}\left(c-d\right)$

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| **Practice Problem 1 Solution:**(c) A vertical dilation by a factor of 6.Using the property: $log\_{b}x^{a}=a∙log\_{b}x$, you can rewrite $h\left(x\right)=6∙log\_{8}x$. Since $h\left(x\right)=6∙g(x)$, then the image is a **vertical** translation of $g(x)$ by a factor of 6. |
| **Practice Problem 2 Solution:**(c) $log\_{b}c-log\_{b}d$Using the property: $log\_{b}\left(\frac{c}{d}\right)=log\_{b}c-log\_{b}d$, (c) would be the answer. |

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