NAME _____ DATE _____ PERIOD _____

9-4 Study Guide and Intervention *(continued)*

Common Logarithms

Change of Base Formula The following formula is used to change expressions with different logarithmic bases to common logarithm expressions.

Change of Base Formula	For all positive numbers a, b, and n, where $a \neq 1$ and $b \neq 1$, $\log_a n = \frac{\log_b n}{\log_b a}$

Example **Express $\log_8 15$ in terms of common logarithms. Then approximate its value to four decimal places.**

$$\log_8 15 = \frac{\log_{10} 15}{\log_{10} 8} \quad \text{Change of Base Formula}$$

$$\approx 1.3023 \quad \text{Simplify.}$$

The value of $\log_8 15$ is approximately 1.3023.

Exercises

Express each logarithm in terms of common logarithms. Then approximate its value to four decimal places.

1. $\log_3 16$ **2.** $\log_2 40$ **3.** $\log_5 35$

4. $\log_4 22$ **5.** $\log_{12} 200$ **6.** $\log_2 50$

7. $\log_5 0.4$ **8.** $\log_3 2$ **9.** $\log_4 28.5$

10. $\log_3 (20)^2$ **11.** $\log_6 (5)^4$ **12.** $\log_8 (4)^5$

13. $\log_5 (8)^3$ **14.** $\log_2 (3.6)^6$ **15.** $\log_{12} (10.5)^4$

16. $\log_3 \sqrt{150}$ **17.** $\log_4 \sqrt[3]{39}$ **18.** $\log_5 \sqrt[4]{1600}$

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