$\log a + \log b = \log ab$
$\log a - \log b = \log \frac{a}{b}$
$p \log a = \log a^p$

*write log once!

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Algebra II

# *Logarithm Rules Given Multiple Logarithms*

**Evaluate each of the following:**

1. $\log_3 54 - \log_3 2$

$\log_3 \frac{54}{2}$

$\log_3 27 = 3$

2. $\log_8 30 - \log_8 2$

$\log_8 \frac{30}{2}$

3. $3\log x + 5\log y$

$\log x^3 + \log y^5$

$\log x^3 y^5$

4. $\log_5 20 - \log_5 4 + \log_5 y$

$\log_5 \frac{20y}{4}$

$\log_5 5y$

5. $\log_2 16 - \log_2 2$

$\log_2 \frac{16}{2}$

$\log_2 8 = 3$

6. $\log_6 25 - \log_6 5$

$\log_6 \frac{25}{5}$

$\log_6 5$

7. $2\log x - 3\log y$

$\log x^2 - \log y^3$

$\log \frac{x^2}{y^3}$

8. $\log_4 60 - \log_4 4 + \log_4 x$

$\log_4 \frac{60x}{4}$

$\log_4 15x$

9. The expression $\frac{1}{2}\log m - 3\log n$ is equivalent to

(1) $\log \sqrt{m} + \log n^3$

(2) $\log \frac{1}{2}m - 3\log n$

(3) $\log \frac{m^2}{3\sqrt{n}}$

(4) $\log \frac{\sqrt{m}}{n^3}$

$\log m^{\frac{1}{2}} - \log n^3$

$\log \frac{m^{\frac{1}{2}}}{n^3}$

$\log \frac{\sqrt{m}}{n^3}$

10. If $\log x = 2\log a + \log b$, then $x$ equals

1) $a^2b$
2) $2ab$
3) $a^2 + b$
4) $2a + b$

11. If $\log x^2 - \log 2a = \log 3a$, then $\log x$ expressed in terms of $\log a$ is equivalent to

1) $\frac{1}{2}\log 5a$
2) $\frac{1}{2}\log 6 + \log a$
3) $\log 6 + \log a$
4) $\log 6 + 2\log a$

12. If $\log_b x = 3\log_b p - \left(2\log_b t + \frac{1}{2}\log_b r\right)$, then the value of $x$ is

1) $\frac{p^3}{\sqrt{t^2 r}}$
2) $p^3 t^2 r^{\frac{1}{2}}$
3) $\frac{p^3 t^2}{\sqrt{r}}$
4) $\frac{p^3}{t^2\sqrt{r}}$

13. The expression $2\log x - (3\log y + \log z)$ is equivalent to

1) $\log \frac{x^2}{y^3 z}$
2) $\log \frac{x^2 z}{y^3}$
3) $\log \frac{2x}{3yz}$
4) $\log \frac{2xz}{3y}$