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Algebra II

Logarithm Rules

Express as multiple logs

1. $\log xy$

$$\log x + \log y$$

2. $\log \frac{7}{x}$

$$\log 7 - \log x$$

3. $\log_5 x^3$

$$3 \log_5 x$$

4. $\log_9 \frac{x^4 y^2}{z}$

$$\log_9 x^4 + \log_9 y^2 - \log_9 z$$

$$4 \log_9 x + 2 \log_9 y - \log_9 z$$

5. $\ln x^3 y^2$

$$\ln x^3 + \ln y^2$$

$$3 \ln x + 2 \ln y$$

6. $\log_x \frac{a^2 b}{c^4}$

$$\log_x a^2 + \log_x b - \log_x c^4$$

$$2 \log_x a + \log_x b - 4 \log_x c$$

$$7. \log_4 \frac{a^5 b^3}{c^6}$$

$$\rightarrow \log_4 a^5 + \log_4 b^3 - \log_4 c^6$$

$$5 \log_4 a + 3 \log_4 b - 6 \log_4 c$$

$$8. \ln \frac{\sqrt{x}}{y^3} \quad \ln \frac{x^{\frac{1}{2}}}{y^3}$$

$$\rightarrow \ln x^{\frac{1}{2}} - \ln y^3$$

$$\frac{1}{2} \ln x - 3 \ln y$$

$$9. \log_7 \frac{x^5 y}{\sqrt[3]{z}} \quad \log_7 \frac{x^5 y}{z^{\frac{1}{3}}}$$

$$\rightarrow \log_7 x^5 + \log_7 y - \log_7 z^{\frac{1}{3}}$$

$$5 \log_7 x + \log_7 y - \frac{1}{3} \log_7 z$$

$$10. \log \frac{m^3 \sqrt{n}}{k^2} \quad \log \frac{m^3 \sqrt{n}}{k^2}$$

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

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

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