Algebra: Log Equations — Expanding & Condensin

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DIRECTIONS *Expand or condense each logarithmic expression using the properties of logs.*

1 Expand the logarithm:

$$\log_2(8x^3)$$

Answer: _____

2 Condense into one logarithm:

$$3\log_2 x - \log_2 5$$

Answer: _____

3 Condense into one logarithm:

$$\frac{1}{2}\log x - \log 3$$

Answer: _____

4 Expand the logarithm:

$$\log\left(\frac{x^2}{y}\right)$$

Answer: _____

5 Expand the logarithm:

$$\ln(x^4y^2)$$

Answer: _____

6 Expand the logarithm:

$$\log\left(\frac{100}{x}\right)$$

Answer: _____

7 Expand the logarithm:

$$\log_3\left(\frac{x}{9}\right)$$

Answer: _____

8 Condense into one logarithm:

$$3\ln x - 2\ln y$$

Answer: _____

9 Condense into one logarithm:

$$\log 4 + 2\log x$$

Answer: _____

10 Condense into one logarithm:

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

Answer: _____

Answer Key & Solutions

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TEACHER NOTES *Expanding: split into separate logs. Condensing: reverse the rules. Domain must be x > 0.*

1 Expand the logarithm:

= $3 + 3\log_2 x$

$\log_2(8x^3)$

2 Condense into one logarithm:

= $\log_2\left(\frac{x^3}{5}\right)$

$3\log_2 x - \log_2 5$

3 Condense into one logarithm:

= $\log\left(\frac{\sqrt{x}}{3}\right)$

$\frac{1}{2}\log x - \log 3$

4 Expand the logarithm:

= $2\log x - \log y$

$\log\left(\frac{x^2}{y}\right)$

5 Expand the logarithm:

= $4\ln x + 2\ln y$

$\ln(x^4y^2)$

6 Expand the logarithm:

= $2 - \log x$

$\log\left(\frac{100}{x}\right)$

7 Expand the logarithm:

= $\log_3 x - 2$

$\log_3\left(\frac{x}{9}\right)$

8 Condense into one logarithm:

= $\ln\left(\frac{x^3}{y^2}\right)$

$3\ln x - 2\ln y$

9 Condense into one logarithm:

= $\log(4x^2)$

$\log 4 + 2\log x$

10 Condense into one logarithm:

= $\ln(x^2y)$

$2\ln x + \ln y$