

7.5 Apply Properties of Logarithms

**KEY CONCEPT**

**Properties of Logarithms**

Let  $b, m,$  and  $n$  be positive numbers such that  $b \neq 1$ .

**Product Property**  $\log_b mn = \log_b m + \log_b n$

**Quotient Property**  $\log_b \frac{m}{n} = \log_b m - \log_b n$

**Power Property**  $\log_b m^n = n \log_b m$

Expand or Condense

Mar 2-9:52 AM

**Product Property**  $\log_b mn = \log_b m + \log_b n$

Expand...

(ex1)  $\log_2 3x$

$\log_2 3 + \log_2 x$

(ex2)  $\log_4 5xy$

$\log_4 5 + \log_4 x + \log_4 y$

Apr 29-11:27 AM

**Quotient Property**  $\log_b \frac{m}{n} = \log_b m - \log_b n$

Expand

(ex1)  $\log \frac{3}{x}$

$\log 3 - \log x$

(ex2)  $\log_4 \frac{x}{y}$

$\log_4 x - \log_4 y$

*Gentle reminder:  $\log x = \log_{10} x$*

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**Power Property**  $\log_b m^n = n \log_b m$

Expand

(ex1)  $\log_2 x^3$

$3 \log_2 x$

(ex2)  $\log_3 x^2$

$2 \log_3 x$

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**Expand**

①  $\log_2 3x = \log_2 3 + \log_2 x$

②  $\log_4 \frac{5}{y} = \log_4 5 - \log_4 y$

③  $\log_3 5^x = x \log_3 5$

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**Condense:** *log written 1 time!*

①  $\log_4 2 + \log_4 x + \log_4 y =$

$\log_4 2xy$

②  $\log_3 7 - \log_3 y =$

$\log_3 \frac{7}{y}$

③  $4 \log x =$

$\log x^4$

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Expand:  
 $\log_3 \frac{3x^2y}{z} =$

$\log_3 3 + 2\log_3 x + \log_3 y - \log_3 z$

Condense:  
 $\log_a 5 + 7\log_z x + 3\log_2 y - 14\log_a z =$

$\log_a \frac{5x^7y^3}{z^{14}}$

log written time

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if it says  
 ln...

Expand  $\ln \frac{2x^2y^3}{z^5} =$

$\ln 2 + 2\ln x + 3\ln y - 5\ln z$

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Change of Base Formula

Calc

$\log_7 15 = \frac{\log 15}{\log 7}$

1.39

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Hw P510, #15-42 Multiples of 3  
 54-56(calc)

Apr 15-11:30 AM