

S.3 Properties of Logs Pt. 2

① Simplify $3\log x^2 + 4\log 5y - 2\log 3y$

$$= \log x^6 + \log y^2 - \log y^{\frac{2}{3}}$$

$$= \log \left(\frac{x^6 y^2}{y^{\frac{2}{3}}} \right)$$

$$\rightarrow y^{2 - \frac{2}{3}} = y^{\frac{6}{3} - \frac{2}{3}} = y^{\frac{4}{3}}$$

$$= \log x^6 y^{\frac{4}{3}}$$

② Simplify

$$a) (\log_4 11)(\log_5 7)(\log_7 4)$$

$$\left(\frac{\log 11}{\log 4}\right) \left(\frac{\log 7}{\log 5}\right) \left(\frac{\log 4}{\log 7}\right)$$

$$\frac{\log 11}{\log 5} = \boxed{\log_5 11}$$

"Change of Base Rule"

$$b) \frac{1}{\log_2 10} + \frac{1}{\log_5 10}$$

$$\frac{1}{\log_2 10} + \frac{1}{\log_5 10} =$$

$$\frac{\log_2 2}{\log_2 10} + \frac{\log_5 5}{\log_5 10} =$$

$$\frac{\log_2 10}{\log_2 10}$$

=

$$\boxed{1}$$

$$c) \frac{1}{\log_3 7} + \frac{1}{\log_6 7}$$

$$\frac{1}{\log_3 7} + \frac{1}{\log_6 7}$$

$$= \frac{\log_3 3}{\log_3 7} + \frac{\log_6 6}{\log_3 7}$$

$$= \frac{\log_3 18}{\log_3 7}$$

$$= \boxed{\log_3 18}$$

③ Simplify

a) $\log_6 8 + \log_{36} 49$

*Need the same base

$$\log_6 8 + \log_{36} 49$$

$$\log_6 8 + \log_6 7$$

$$\log_6 56$$

b) $\log_4 2 + \log_2 32$

$$\log_4 2 + \log_2 32$$

$$\log_2 2^{\frac{1}{2}} + \log_2 32$$

$$\frac{1}{2} \log_2 2 + 5$$

$$\frac{1}{2} + 5$$

$$5\frac{1}{2} \text{ or } 5.5$$

$$c) \log_9 16 - 2 \log_3 2$$

$$\log_9 16 - 2 \log_3 2$$

$$\log_3 4 - \log_3 2^2$$

$$\log_3 4 - \log_3 4$$

$$\boxed{0}$$

or

$$\log_9 16 - 2 \log_3 2^2$$

$$\log_9 16 - 2 \log_9 4$$

$$\log_9 16 - \log_9 16$$

$$\boxed{0}$$

$$d) 6 \log_9 x - 12 \log_{27} x$$

$$\log_3 x \overset{6}{\cancel{\frac{6}{3}}} - \log_3 x \overset{12}{\cancel{\frac{12}{3}}}$$

OR

$$\log_3 x^3 - \log_3 x^4$$

$$\log_3 \left(\frac{x^3}{x^4} \right)$$

$$\log_3 x^{-1} = \log_3 \frac{1}{x}$$

OR

$$-\log_3 x$$

$$6 \log_9 x^{\frac{1}{3}} - 12 \log_{27} x^{\frac{1}{3}}$$

$$6 \log_3 x^{\frac{1}{3}} - 12 \log_3 x^{\frac{1}{3}}$$

$$3 \log_3 x - 4 \log_3 x$$

$$-\log_3 x$$

OR

$$\log_3 x^{-1} = \log_3 \frac{1}{x}$$

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2-4 (b, d, f)

S (a, b, k, l)