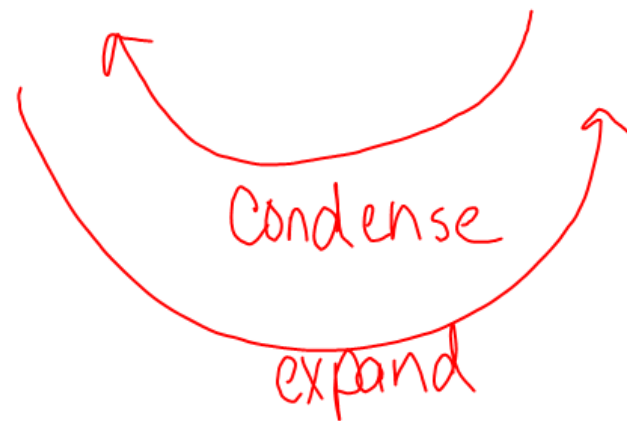


## 7-4 Properties of Logs

Product Prop.  $\log_b mn = \log_b m + \log_b n$

Quotient Prop.  $\log_b \frac{m}{n} = \log_b m - \log_b n$

★ Power Prop.  $\log_b a^p = p \log_b a$



a. Expand  $\log_3 \frac{x^2 y}{n^3}$

$$\log_3 x^2 + \log_3 y - \log_3 n^3$$

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

5.)

$$\log_3 \sqrt{MN}$$

$$\log_3 (MN)^{1/2}$$

$$\frac{1}{2} \log_3 (MN)$$

$$\frac{1}{2} \log_3 M + \frac{1}{2} \log_3 N$$

$$b.) \log_3 \frac{M^2}{N}$$

$$2 \log_3 M - \log_3 N$$

b. Condense

$$5 \log_4 X - \log_4 6 + 3 \log_4 Y$$

$$\log_4 \frac{X^5 Y^3}{6}$$

$$4.) \log \frac{a}{b} - 2 \log \left( \frac{a}{b} \right)$$

$$\log \frac{\frac{a}{b}}{\left( \frac{a}{b} \right)^2}$$

$$\log \left( \frac{\cancel{a}}{\cancel{b}} \cdot \frac{\cancel{b}^2}{\cancel{a}^2} \right)$$

$$\log \left( \frac{b}{a} \right)$$

c. Solve.

$$4 \log_2 X - \log_2 2 = \log_2 8$$

$$\cancel{\log_2} \frac{X^4}{2} = \cancel{\log_2} 8$$

$$2 \cdot \frac{X^4}{2} = 8 \cdot 2$$

$$\sqrt[4]{X^4} = \sqrt[4]{16}$$

$$X = \pm 2$$

$$\boxed{2}$$

$$11.) \quad \textcircled{3} \log_5 X - \log_5 4 = \log_5 16$$
$$\cancel{\log_5} \frac{X^3}{4} = \cancel{\log_5} 16$$

$$4 \cdot \frac{X^3}{4} = 16 \cdot 4$$

$$\sqrt[3]{X^3} = \sqrt[3]{64}$$

$$X = \boxed{4}$$

$$12.) \log_6 (b^2 + 2) + \log_6 2 = 2$$

$$\log_6 [2(b^2+2)] = 2$$

$$6^2 = 2(b^2 + 2)$$

$$36 = 2b^2 + 4$$

$$32 = 2b^2$$

$$16 = b^2$$

$$b = \boxed{\pm 4}$$



$$14.) \log_6 48 - \log_6 \frac{16}{5} + \log_6 5 = \log_6 5x$$

$$\log_6 \left( 48 \div \frac{16}{5} \cdot 5 \right) = \log_6 5x$$

$$\log_6 \left( \frac{48}{1} \cdot \frac{5}{16} \cdot \frac{5}{1} \right) = \log_6 5x$$

$$\cancel{\log_6 75} = \cancel{\log_6 5x}$$

$$75 = 5x$$

$$\boxed{15} = x$$

