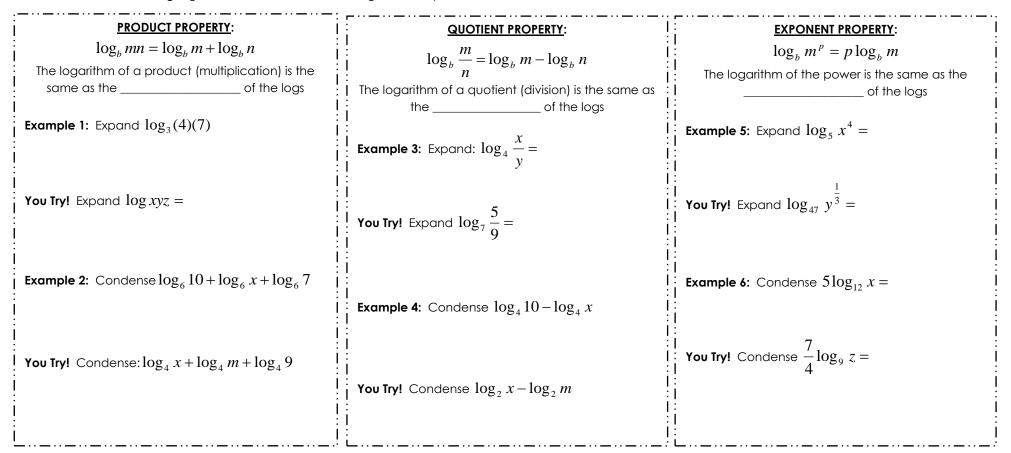
Math 3

2.4 Properties of Logarithms

OBJ: condense, expand, and solve logarithmic equations by using the properties of logarithms.

Since logarithms are inverses of

- the properties of logarithms can be derived from the properties of exponents. When **expanding** logs, we want to have multiple logs being added or subtracted from each other.
- When **condensing** logs, we want to end with one log and multiple variables.



Square Roots: If you ever see a square root in a problem, you must convert it to a rational exponent. *Remember – the index becomes the denominator of the exponent!

Example 7: Expand $\log_0 \sqrt{8z} =$

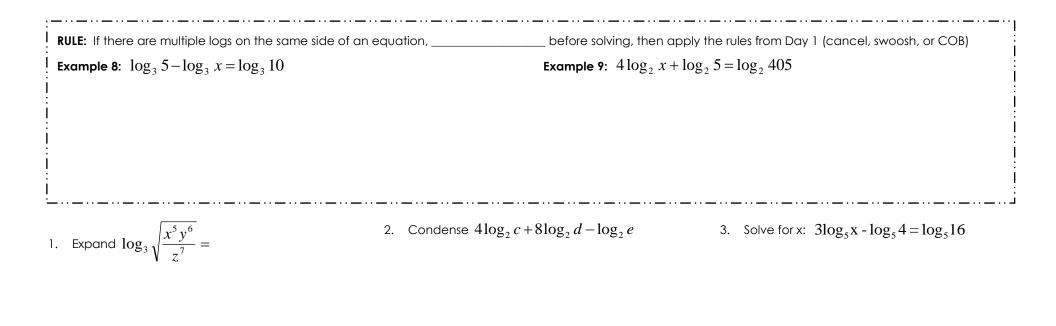
You Try! Expand
$$\log_{12} \sqrt[4]{\frac{x}{z}} =$$

Putting it all together: Expand or condense the following logarithms using properties listed above.

a) Expand
$$\log_3 x^5 y^7 =$$

b) Expand $\log_5 \frac{a^3}{b^7} =$
c) Expand $\log_5 \frac{g^6 h^2}{k^5} =$

d) Condense $5\log_2 x + 7\log_2 y$ e) Condense $6\log_5 g - 9\log_5 b$ f) Condense $7\log_4 x + \log_4 y - 6\log_4 z$



4. Solve for x: $\log a = \log(4a - 9)$

5. Solve for x: $\log(-3m - 1) = \log(-4m - 6)$

6. Solve for x: $5\log_{19} 2 - \log_{19} x = \log_{19} 8$