- Write **equivalent forms** for **exponential** and **logarithmic** equations
- Use the **common log** function to solve exponential and logarithmic equations
- **Simplify and evaluate expressions** involving logarithms and the **properties** of logarithms
- Use the definitions of exponential and logarithmic functions **to solve equations**
- **Graph** exponential and logarithmic functions
- **Model and solve real-world problems** involving exponential and logarithmic relationships

DO NOW!

1) Simplify:

a) $\log_3(27^5) =$ b) $\log_4(16^7) =$

2) **Expand** the logarithm. SIMPLIFY if possible.

a) $\log_2(\frac{5}{8}) =$ b) $\log_5(5 \cdot a) =$

3) Write as a **single** logarithm. SIMPLIFY if possible.

a) $\log_3(9) + \log_3(3) =$ b) $\log_4(64) - 4 \cdot \log_4(2) =$

4) Write in logarithmic form: $5^3 = 125 \rightarrow$ _____

5) Write in exponential form: $\log_4(256) = 4 \rightarrow$ _____

6) Solve for the variable: (*Hint* - switch to **exponential** form.)

a) $\log_3 81 = x$ b) $\log_6 n = 4$ c) $\log_b 1{,}000 = 3$

d) $\log_8 n = 0$ e) $\log_3 1 = x$ f) $\log_b(8) = 3$

Think...Write...Pair...Share

18. Correct the error
There is an error in the student work shown below.

Directions: Simplify $\log_2\left(\frac{7x}{3}\right)$.

$$\log_2\left(\frac{7x}{3}\right) = \log_2(7x) - \log_2 3$$
$$= \log_2 7 - \log_2 x - \log_2 3$$

What is the error in the work above?

_____

What should the student have done instead of what he or she did?

_____

*If you finish early, try this one!

18. Explain why $\log_3(x^2 + 2xy + y^2) = 2 \cdot \log_3 (x + y)$.

_____

_____

Practice with Properties...

Use the values given below to *approximate* the value of each logarithmic expression.

$\log_2 7 = 2.8074$	$\log_2 5 = 2.3219$	$\log_4 5 = 1.610$
$\log_4 3 = 0.7925$	$\log_2 3 = 1.5850$	$\log_{10} 8.3 = 0.919$

See the example for number 1.

1. $\log_4 15$

$\log_4(3 \cdot 5) =$

$= \log_4(3) + \log_4(5)$

$\approx 0.7925 + 1.610$

≈ 2.4025

2. $\log_2 35$

3. $\log_2 28$

4. $\log_4 12$

5. $\log_4 60$

6. $\log_2 105$

7. $\log_2 \frac{7}{10}$

8. $\log_4 \frac{5}{4}$

9. $\log_2 \frac{2}{7}$

*Challenge

10. Solve.

a. $\log_3(x) + \log_3(x+2) = 1$

b) $\log x^2 - \log 3x = 1$

HW: "Log worksheet #3"

Name: **LOGARITHM PRACTICE**

1. Write in logarithmic form.
a) $0.01 = 10^{-2}$

b) $5^0 = 1$

c) $4 = (\frac{1}{2})^x$

2. Write in exponential form.
a) $\log 1 = 0$

b) $\log_7 10 = e$

c) $\log_3 a = 5$

3. Solve for the variable.
a) $\log 0.1 = w$

b) $\log_5 a = 2$

c) $\log_2 32 = x$

4. Expand the logarithm completely.
$\log_6 27 =$

5. Expand the logarithm completely.
$\log \frac{2x^3}{y^5} =$

6. Write as a single logarithm.
$5\log_6 m + \log_6 n - \log_6 3 =$

7. Write in exponential form and solve. Round to 2nd decimal if needed.
a) $\log_2 x = 3$

b) $\log_x 75 = 3$

8. If $\log 3 = x$ and $\log 2 = y$, write each logarithm as an expression in x and y.
a) $\log 12$

b) $\log(\frac{3}{4})$