

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Write each exponential equation as a corresponding logarithmic equation.

1.  $3^2 = 9$

$\log_3(9) = 2$

2.  $5^4 = 625$

3.  $4^{-3} = \frac{1}{64}$

4.  $10^{-5} = \frac{1}{100,000}$

5.  $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$

6.  $\left(\frac{1}{11}\right)^{-2} = 121$

Write each logarithmic equation as a corresponding exponential equation.

7.  $\log_7\left(\frac{1}{49}\right) = -2$

8.  $\log_{\frac{1}{3}}\left(\frac{1}{729}\right) = 6$

$7^{-2} = \frac{1}{49}$

9.  $\log_2(128) = 7$

10.  $\log_8\left(\frac{1}{1296}\right) = -4$



11.  $\log_{\frac{1}{5}}\left(\frac{1}{125}\right) = 3$

12.  $\log_9(729) = 3$

## Vocabulary

Write the term that best completes each sentence.

logarithm

logarithmic function

common logarithm

natural logarithm

1. The \_\_\_\_\_ of a number for a given base is the exponent to which the base must be raised in order to produce that number.
2. A \_\_\_\_\_ is a logarithm with base  $e$ , and is usually written as  $\ln$ .
3. A \_\_\_\_\_ is a function involving a logarithm.
4. A \_\_\_\_\_ is a logarithm with a base 10 and is usually written without a base specified.

3. Solve for the unknown in each logarithmic equation.

a.  $\log_8 64 = n$

b.  $\log_n \frac{1}{16} = -2$

c.  $\log_{\frac{1}{2}} 64 = n$

d.  $\log_3 n = -3$

e.  $\log_n \sqrt[3]{49} = \frac{2}{3}$

f.  $\log_9 27 = n$

4. Write three logarithmic expressions that are equivalent to each given expression. Explain your strategy.

a.  $\log_5 625$

b.  $\log_7 \frac{1}{7}$

c.  $\log_{64} 8$

d.  $\log_2 -2$