

Exponents and Logarithms 2.1(Key)  
Precalculus

1) What bold statement does a Logarithm make?

“I am the exponent that turns \_\_\_ into \_\_\_!”

Explain or describe the meaning of each expression and evaluate.

2)  $2^5$        $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$

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

4)  $a^0$        $\frac{a}{a} = \frac{a^1}{a^1} = a^{1-1} = a^0 = 1$

5)  $9^{1/2}$        $\sqrt{9} = 3$

6)  $3^{-2}$        $\frac{1}{3^2} = \frac{1}{9}$

7)  $8^2$        $8 \cdot 8 = 64$

8)  $16^{3/4}$        $(\sqrt[4]{16})^3 = 2^3 = 8$

9)  $5^0$        $\frac{5}{5} = 1$

10)  $4^{-3/2}$        $\frac{1}{(\sqrt{4})^3} = \frac{1}{8}$

11)  $81^{-3/4}$        $\frac{1}{(\sqrt[4]{81})^3} = \frac{1}{3^3} = \frac{1}{27}$

12)  $\text{Log}_2 8$       What is the exponent that raises 2 to 8?      3

13)  $\text{Log}_5 25$       What is the exponent that raises 5 to 25?      2

14)  $\text{Log}_6 36$       What is the exponent that raises 6 to 36?      2

15)  $\text{Log}_3 27$       What is the exponent that raises 3 to 27?      3

16)  $\text{Log}_8 8$       What is the exponent that raises 8 to 8?      1

17)  $\text{Log}_7 7$       What is the exponent that raises 7 to 7?      1

- 18)  $\text{Log}_4 1$       What is the exponent that raises 4 to 1?      0
- 19)  $\text{Log}_6 216$       What is the exponent that raises 6 to 216?      3
- 20)  $\text{Log}_7 49$       What is the exponent that raises 7 to 49?      2
- 21)  $\text{Log}_6 1$       What is the exponent that raises 6 to 1?      0
- 22)  $\text{Log}_2 1/2$       What is the exponent that raises 2 to 1/2? -1
- 23)  $\text{Log}_{27} 3$       What is the exponent that raises 27 to 3?      1/3
- 24)  $\text{Log}_{16} 4$       What is the exponent that raises 16 to 4?      1/2
- 25)  $\text{Log}_3 1/9$       What is the exponent that raises 3 to 1/9?      -2
- 26)  $\text{Log}_4 8$       What is the exponent that raises 4 to 8?      3/2
- 27)  $\text{Log}_9 27$       What is the exponent that raises 9 to 27?      3/2
- 28)  $\text{Log}_4 1/2$       What is the exponent that raises 4 to 1/2? -1/2
- 29)  $\text{Log}_{81} 1/27$       What is the exponent that raises 81 to 1/27? -3/4

Write the exponential equation in logarithmic form.

30)  $4^2 = 16$       31)  $5^3 = 125$       32)  $4^0 = 1$       33)  $8^{1/3} = 2$

$\text{Log}_4 16 = 2$        $\text{Log}_5 125 = 3$        $\text{Log}_4 1 = 0$        $\text{Log}_8 2 = 1/3$

Write the logarithmic equation in exponential form.

34)  $\text{Log}_8 64 = 2$       35)  $\text{Log}_2 32 = 5$       36)  $\text{Log}_9 3 = 1/2$       37)  $\text{Log}_2 1 = 0$

$8^2 = 64$

$2^5 = 32$

$9^{1/2} = 3$

$2^0 = 1$