

# Introduction to Logarithmic Functions

Algebra Worksheet · Grade 9–11

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

Date: \_\_\_\_\_

## Learning Objectives

- Understand and correctly read logarithmic notation
- Convert logarithmic expressions to exponential form and vice versa
- Evaluate basic logarithmic expressions using exponential relationships

## Problems

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1. Read the logarithmic expression below and write it in words using correct notation:

$$\log_2 8 = 3$$

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2. Identify the base, argument, and result in the logarithmic expression below:

$$\log_5 25 = 2$$

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3. Convert the logarithmic expression below into exponential form:

$$\log_2 16 = 4$$

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4. Convert the logarithmic expression below into exponential form:

$$\log_3 x = 2$$

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5. Convert the exponential equation below into logarithmic form:

$$5^3 = 125$$

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6. Convert the exponential equation below into logarithmic form:

$$2^7 = 128$$

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7. Evaluate the logarithmic expression below by converting to exponential form first:

$$\log_4 64 = y$$

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8. Evaluate the logarithmic expression below by converting to exponential form first:

$$\log_3 81 = y$$

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9. Solve for x by converting the logarithmic equation to exponential form:

$$\log_5 x = 3$$

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10. Solve for the unknown base b by converting the logarithmic equation to exponential form:

$$\log_b 32 = 5$$

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# Introduction to Logarithmic Functions — Answer Key

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## Answer Key

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### 1. Answer: Logarithm of 8 base 2 is equal to 3

- Identify the base: 2
- Identify the argument: 8
- Read as: logarithm of 8 base 2 is equal to 3

### 2. Answer: Base = 5, Argument = 25, Result = 2

- The subscript after 'log' is the base: 5
- The number inside the log is the argument: 25
- The value on the right side is the result: 2

### 3. Answer: 2 raised to 4 equals 16

- Identify the base: 2
- The result becomes the exponent: 4
- The argument becomes the answer: 16
- Write in exponential form:  $2^4 = 16$

### 4. Answer: 3 squared equals x

- Identify the base: 3
- The result becomes the exponent: 2
- The argument becomes the answer: x
- Write in exponential form:  $3^2 = x$

### 5. Answer: log base 5 of 125 equals 3

- The base of the exponent becomes the base of the log: 5
- The exponent becomes the result of the log: 3
- The answer of the exponential becomes the argument: 125
- Write in logarithmic form:  $\log_5(125) = 3$

### 6. Answer: log base 2 of 128 equals 7

- The base of the exponent becomes the base of the log: 2
- The exponent becomes the result of the log: 7
- The answer of the exponential becomes the argument: 128
- Write in logarithmic form:  $\log_2(128) = 7$

### 7. Answer: $y = 3$

- Convert to exponential form:  $4^y = 64$
- Rewrite 64 as a power of 4:  $64 = 4^3$

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- Therefore  $4^y = 4^3$
  - So  $y = 3$
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**8. Answer:  $y = 4$** 

- Convert to exponential form:  $3^y = 81$
  - Rewrite 81 as a power of 3:  $81 = 3^4$
  - Therefore  $3^y = 3^4$
  - So  $y = 4$
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**9. Answer:  $x = 125$** 

- Convert to exponential form:  $5^3 = x$
  - Calculate  $5^3 = 5 \times 5 \times 5 = 125$
  - Therefore  $x = 125$
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**10. Answer:  $b = 2$** 

- Convert to exponential form:  $b^5 = 32$
  - Find the 5th root of both sides:  $b = 32^{(1/5)}$
  - Rewrite 32 as a power:  $32 = 2^5$
  - Therefore  $b^5 = 2^5$ , so  $b = 2$
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