

Welcome!

-All cell phones in holder

-Quizzes are not graded. If you need to take quiz, you will take tomorrow in class.

## How to Solve Logs

**Type 1: Log = a number**

**1. Convert to an exponential**

**2. Solve the equation for the variable**

**3. Check your solution**

|                                                                                                                                   |                                                                                                                      |                                                                                                                                                                                                       |
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| <p><b>Example 1:</b><br/> <math>\log(4t) = 2</math></p> $10^2 = 4t$ $100 = 4t$ $25 = t$ $\log(4 \cdot 25) = 2$ $2 = 2 \checkmark$ | <p><b>Example 2:</b><br/> <math>\ln(x - 1) = 3</math></p> $e^3 = x - 1$ $e^3 + 1 = x$ $21.09 = x$ <p>3.000227...</p> | <p><b>Example 3:</b><br/> <math>\log_4 2 + \log_4(3 + x) = 1</math></p> $\log_4(2(3+x)) = 1$ $\log_4(6+2x) = 1$ $4^1 = 6+2x$ $-2 = 2x$ $-1 = x$ $\frac{\log(2)}{\log(4)} + \frac{\log(3-1)}{\log(4)}$ |
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**Type 2: Log = Log**

1. Cross out the log on both sides
2. Solve the equation for the variable
3. Check the solution

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| <p><b>Example 4:</b><br/> <del><math>\log_3(4t)</math></del> = <del><math>\log_3(3t - 6)</math></del><br/> <math>4t = 3t - 6</math><br/> <math>t = -6</math><br/> <math>\log_3(-24) = \log_3(-24)</math></p> | <p><b>Example 5:</b><br/> <math>\log_2(-x) = \log_2(2 - 3x)</math><br/> <math>-x = 2 - 3x</math><br/> <math>2x = 2</math><br/> <math>x = 1</math><br/> <math>\log_2(-1) = \log_2(-1)</math></p> | <p><b>Example 6:</b><br/> <math>\log(x - 5) = \log(2x + 1)</math><br/> <math>x - 5 = 2x + 1</math><br/> <math>-5 = x + 1</math><br/> <math>-6 = x</math></p> |
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**Type 3 Exponential = Exponential**

1. Get the bases the same
2. Cross out the bases
3. Solve for the variable

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| <p><b>Example 7:</b><br/> <math>2^{x-2} = 2^3</math><br/> <math>x - 2 = 3</math><br/> <math>x = 5</math></p> | <p><b>Example 8:</b><br/> <math>8^x = 2</math><br/> <math>2^{3x} = 2^1</math><br/> <math>x = \frac{1}{3}</math></p> |
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**Type 4 Exponential = Number**

1. Get the base by itself
2. Convert to a log
3. Solve for the variable

$$3^x = -7$$

**Example 9:**

$$8^x = 6$$

$$\log_8 6 = x$$

$$.8617 = x$$

**Example 10:**

$$4 = 15 - e^{x-8}$$

$$-5 - 15$$

$$\frac{-11}{-1} = \frac{-e^{x-8}}{-1}$$

$$11 = e^{x-8}$$

$$\ln 11 = x - 8$$

$$\ln(11) + 8 = x$$

$$10.398 = x$$

$$\ln 11 + 8$$

**Example 11:**

$$e^x + 33 = 12e^x$$

$$\frac{-e^x}{-e^x} \quad \frac{-e^x}{-e^x}$$

$$33 = 11e^x$$

$$3 = e^x$$

$$\ln 3 = x$$

$$1.099 = x$$

