

keep scrolling to get  
a sneak peek!

Help your Algebra 2 and Pre-Calculus students practice **solve logarithmic equations** without exponentiating. Students will be eager to get the self-checking benefits from this circuit activity!

# SOLVING LOGARITHMIC EQUATIONS

Differentiated Circuit Worksheet

**Answer Key**

**SOLVING LOGARITHMIC EQUATIONS CIRCUIT**

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

A circuit is a route that starts and ends at the same place. Start in the first box and solve the problem. Search through the remaining boxes for the answer you got for that question. Continue until you have completed the questions and you return to the original question. Record your path below.

4 → 8 → 6 → 2 → 9 → 5 → 3 → 10 → 7

Answer: $x = 2\sqrt{26}$	# 7	Previous Answer: $x = \pm\sqrt{10}$
$5) = \log_4(x+1)$ $3x+5 = x+1$ $-x \quad -x$ $2x+5 = 1$ $-5 \quad -5$ $2x = -4$ $\frac{2x}{2} = \frac{-4}{2}$ $x = -2$		$2. \log_5(x-2) = 2$ $5^2 = x-2$ $25 = x-2$ $+2 \quad +2$ $27 = x$
	# 5	Previous Answer: No solution
		$4. 2\log_3(x-1) = \log_3 16$ $(x-1)^2 = 16$

**SOLVING LOGARITHMIC EQUATION**

Directions: A circuit is a route that starts and ends at the same place. Start in the first box and solve the problem. Search through the remaining boxes for the answer you got for that question. Continue until you have completed the questions and you return to the original question. Record your path below.

1 → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_

Previous Answer: $x = 125$	# _____	Previous Answer: $x = 12$
1. $\log(x-1) + \log 2 = 1$		2. $\log_6 5x = \log_6(2x+9)$
Previous Answer: $x = 5$	# _____	Previous Answer: $x = 6$
3. $\log_3(x-1) = 2$		4. $\log_2 x = 5$



2 versions + Answer key included

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Why do you need this?



It's self-checking! Your students will know if they are correct or not.



2 differentiated versions for all students practice this essential math skill.

# Solving Logarithmic Equations Circuit

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

## SOLVING LOGARITHMIC EQUATIONS CIRCUIT

Directions: A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_

Previous Answer: $x = 2\sqrt{26}$	# _____	Previous
1. $\log_4(3x + 5) = \log_4(x + 1)$		2. $\log_5($
Previous Answer: $x = 4$	# _____	Previous
3. $\log(x + 6) - \log x = 1$		4. $2\log_3($
Previous Answer: $x = 12$	# _____	Previous
5. $\log_4(x + 5) = \log_4(2x + 1)$		6. $\log_3(x$

Previous Answer: $x = 1$	# _____	Previous Answer: $x = 32$
7. $\log_5 x = \log_5 125$		8. $\log(x - 4) = 2$
Previous Answer: $x = 3$	# _____	Previous Answer: $x = 10$
9. $\log(x + 4) - \log 2 = 1$		10. $\log(x + 9) - \log x = 1$

Helpful Hints: Use these hints to help you solve the problems.

Steps to solve:  
Step 1: Condense to one log.  
Step 2: Set it up based on what you are given.  
2a: Same base on both sides? Drop the logs.  
A log on just one side? Rewrite into \_\_\_\_\_ table.

Basic Log Rules:  
 $\log_b 1 = 0$   
Product Property:  $\log_b(xy) = \log_b x + \log_b y$   
Quotient Property:  $\log_b\left(\frac{x}{y}\right) = \log_b x - \log_b y$   
Power Property:  $\log_b(x^y) = y \log_b x$

# Solving Logarithmic Equations Circuit *includes:*

Challenge: Solve. Show all work!

$$\log_3(x + 2) + \log_3(x - 2) = \log_3 3x$$

How are you feeling about this topic? Circle one:

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Helpful Hints: Use these hints to help you solve the problems.

Steps to solve:	Basic Log Rules:
Step 1: Condense to one log.	$\log_a 1 = 0$ $\log_a a = 1$ $\log_a a^x = x$
Step 2: Set It up based on what you are given. 2a: Same base on both sides? <i>Drop the logs.</i> 2b: A log on just one side? <i>Rewrite into exponential form.</i>	Product Property: $\log_b(m \cdot n) = \log_b m + \log_b n$
Step 3: Solve to isolate the variable.	Quotient Property: $\log_b\left(\frac{m}{n}\right) = \log_b m - \log_b n$
Step 4: Check for extraneous solutions.	Power Property: $\log_b m^n = n \log_b m$

How are you feeling about this topic? Circle one:

- ✓ 10 self-checking problems
- ✓ a detailed answer key
- ✓ a standard version with an extension question
- ✓ a basic version with helpful hints section
- ✓ student self assessment

# Solving Logarithmic Equations Circuit

standards covered:

**CCSS:** HSF-BF.B.5

**TEKs:** A2.5.D, A2.5.E, P.5.H

**SOLVING LOGARITHMIC EQUATIONS CIRCUIT**

Previous Answer: $x = 2\sqrt{3}$ 7. $\log(x-2) + \log(x+2) = 2$ $\log(x-2)(x+2) = 2$ $\log(x^2-4) = 2$ $10^2 = x^2-4$ $+4 \quad +4$ $\sqrt{104} = \sqrt{x^2}$ $x = \pm 2\sqrt{26}$ $x = -2\sqrt{26}$ extraneous $x = 2\sqrt{26}$	Previous Answer: $x = 5$ 8. $\log_6 x = 3$ $6^3 = x$ $216 = x$
Previous Answer: $x = 27$ 9. $\log_2(x+4) - \log_2 8 = 1$ $\log_2\left(\frac{x+4}{8}\right) = 1$ $2^1 = \frac{x+4}{8}$ $16 = x+4$ $-4 \quad -4$ $x = 12$	Previous Answer: $x = 2/3$ 10. $\log_3(x+3) + \log_3(x-3) = 1$ $\log_3(x+3)(x-3) = 1$ $\log_3(x^2-9) = 1$ $3^1 = x^2-9$ $+9 \quad +9$ $\sqrt{12} = \sqrt{x^2}$ $x = \pm 2\sqrt{3}$ $x = -2\sqrt{3}$ extraneous $x = 2\sqrt{3}$
Challenge: Solve. Show all work! $\log_3(x+2) + \log_3(x-2) = \log_3 3x$ $\log_3(x+2)(x-2) = \log_3 3x$ $\log_3(x^2-4) = \log_3 3x$	

# how this circuit resource works

Then search for their answer on the worksheet. Once the answer is found, students complete the problem below it.

Students can track their path at the top.



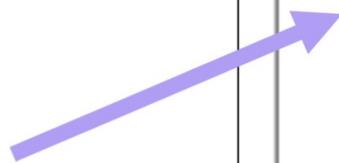
Name: \_\_\_\_\_ Date: \_\_\_\_\_

## SOLVING LOGARITHMIC EQUATIONS CIRCUIT

Directions: A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → 1

Previous Answer: $x = 125$ # _____	Previous Answer: $x = 12$ # _____
1. $\log(x - 1) + \log 2 = 1$	2. $\log_6 5x = \log_6 (2x + 9)$
Previous Answer: $x = 5$ # _____	Previous Answer: $x = 6$ # _____
3. $\log_3(x - 1) = 2$	4. $\log_2 x = 5$



Students start with the first question.

The last question they answer should lead back to problem #1 to “close” the circuit.

# how to use this resource

Name: **Answer Key** Date: \_\_\_\_\_

## SOLVING LOGARITHMIC EQUATIONS CIRCUIT

**Directions:** A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → **4** → **8** → **6** → **2** → **9** → **5** → **3** → **10** → **7** → 1

Previous Answer: $x = 2\sqrt{26}$ # <b>7</b>	Previous Answer: $x = \pm\sqrt{10}$ # <b>6</b>
1. $\log_4(3x + 5) = \log_4(x + 1)$	2. $\log_5(x - 2) = 2$

**SOLVING LOGARITHMIC EQUATIONS CIRCUIT**

Previous Answer: $x = 1$ # <b>10</b>	Previous Answer: $x = 32$ # <b>4</b>
7. $\log_5 x = \log_5 125$ $x = 125$	8. $\log(x - 4) = 2$ $10^2 = x - 4$ $100 = x - 4$ $+4 \quad +4$ $104 = x$
Previous Answer: $x = 3$ # <b>2</b>	Previous Answer: $x = 10$ # <b>3</b>
9. $\log(x + 4) - \log 2 = 1$ $\log\left(\frac{x+4}{2}\right) = 1$ $10^1 = \frac{x+4}{2}$ $20 = x + 4$ $-4 \quad -4$ $16 = x$	10. $\log(x + 9) - \log x = 1$ $\log\left(\frac{x+9}{x}\right) = 1$ $10^1 = \frac{x+9}{x}$ $10x = x + 9$ $-x \quad -x$ $9x = 9$ $\frac{9x}{9} = \frac{9}{9}$ $x = 1$

**SOLVING LOGARITHMIC EQUATIONS CIRCUIT**

Previous Answer: $x = 4$	3. $\log(x + 6) - \log x = 1$ $\log\left(\frac{x+6}{x}\right) = 1$ $10^1 = \frac{x+6}{x}$ $10x = x + 6$ $-x \quad -x$ $9x = 6$ $\frac{9x}{9} = \frac{6}{9}$ $x = \frac{2}{3}$
Previous Answer: $x = 12$	5. $\log_4(x + 5) = \log_4(2x + 1)$ $x + 5 = 2x + 1$ $-x \quad -x$ $5 = x + 1$ $-1 \quad -1$ $6 = x$

**SOLVING LOGARITHMIC EQUATIONS CIRCUIT**

Previous Answer: $x = 2\sqrt{26}$ # <b>7</b>	1. $\log_4(3x + 5) = \log_4(x + 1)$ $3x + 5 = x + 1$ $-x \quad -x$ $2x + 5 = 1$ $-5 \quad -5$ $2x = -4$ $\frac{2x}{2} = \frac{-4}{2}$ $x = -2$
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This is a great activity to use when reviewing how to solve logarithmic equations **without exponentiating.**

It can be used right after teaching the concept or as homework.

This is also a **substitute-friendly** assignment!

You may also enjoy...

## SOLVING LOGARITHMIC EQUATIONS

Question	Answer
$\log_2 x = 3$	
$\log_5 x = 0$	
$\log_3 9x = 2$	
$\log_{11} (x - 2) = 1$	
$\log_7 (2x + 3) = 2$	
$\log_2 x + \log_2 4 = 3$	
$\log_3 (x + 1) = \log_3 7$	
$\log_9 (x-3) + \log_9 (x+3) = 2$	
$\log_6 x = \log_6 (2x-4)$	
$2\log_5 x = \log_5 4x$	

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Self-Checking

## SOLVING EXPONENTIAL & LOGARITHMIC EQUATIONS Color by Number worksheet

Directions: Solve each problem. Check for extraneous solutions, if possible. Circle the given choices. Your answers will determine how you color the grid page.

$x = 11$ Blue	$x = -0.203$ Black	$x = 5$ Red	$x = -2$ Green	$x = -1$ Pink
$x = 3$ Red	$x = 8$ Pink	$x = 1$ Purple	$x = 1/4$ Green	

Answer key included



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## EXPONENTIAL & LOGARITHMIC FUNCTIONS Algebra 2 Guided Notes

TRANSFORMATIONS OF LOGARITHMIC FUNCTIONS

GRAPHING EXPONENTIAL FUNCTIONS

EXPONENTIAL FUNCTIONS WITH BASE E

ANSWER KEY INCLUDED



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hey there!

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