

keep scrolling to get
a sneak peek!

Help your Algebra 2 and Pre-Calculus students practice **expanding & condensing logs**. Students will be eager to get the self-checking benefits from this circuit activity!

EXPAND & CONDENSE LOGARITHMS

Differentiated Circuit Worksheet

Date: _____

Answer Key

EXPANDING & CONDENSING LOGS CIRCUIT

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.

6 → 7 → 8 → 4 → 5 → 10 → 9 → 3 → 2

Answer: $\log_5 x(x-1)$	# 2	Previous Answer: $2\log_2 x - \frac{1}{2}\log_2 y$
$\log_3\left(\frac{x^2y}{z}\right)$		2. Condense: $\log_5 x + \log_5(x-1)$
$x + \log_3 y - \log_3 z$		$\log_5 x(x-1)$
Answer: _____	# 9	Previous Answer: $\log_7\left(\frac{x^2}{y}\right)$
		4. Expand: $\log_4(16x^2y)$

EXPANDING & CONDENSING LOGS

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: $\log_5\left(\frac{x^2z}{y^3}\right)$	# _____	Previous Answer: $4\log_5 x - 3\log_5 y$
1. Expand: $\log_6(xyz)$		2. Condense: $2\log_5 x - 3\log_5 y$
Previous Answer: $\log_2\left(\frac{xy}{z}\right)$	# _____	Previous Answer: $\log_7(x^3y)$
3. Expand: $\log_{10}\left(\frac{x^4}{y^2z}\right)$		4. Expand: _____



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.

Expanding & Condensing Logarithms Circuit

Name: _____ Date: _____

EXPANDING & CONDENSING LOGS 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: $\log_5 x(x-1)$ # _____	Previous Answer: _____
1. Expand: $\log_3 \left(\frac{x^2 y}{z}\right)$	2. Condense: _____
Previous Answer: $\log_6(3x)$ # _____	Previous Answer: _____
3. Expand: $\log_2 \left(\frac{x^2}{\sqrt{y}}\right)$	4. Expand: _____
Previous Answer: $2 + 2\log_4 x + \log_4 y$ # _____	Previous Answer: _____
5. Condense: $\log_3 x + \log_3 y - \frac{1}{2}\log_3 z$	6. Condense: _____
Previous Answer: $\log_5 \left(\frac{2}{3}\right)$ # _____	Previous Answer: $3\log_2 x - \log_2 y$ # _____
7. Expand: $\log_2 \left(\frac{x^3}{y}\right)$	8. Condense: $3\log_7 x + \log_7 y$
Previous Answer: $2\log_3 x + 6\log_3 y$ # _____	Previous Answer: $\log_3 \left(\frac{x}{\sqrt{2}}\right)$ # _____
9. Condense: $\log_2 x + \log_2 y - \log_2 z$	10. Expand: $\log_6(x^2 y^6)$

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

Basic Log Rules:
 $\log_a 1 = 0$
 $\log_a a = 1$

Product Property: $\log_b(m \cdot n) = \log_b m + \log_b n$
Quotient Property: $\log_b \left(\frac{m}{n}\right) = \log_b m - \log_b n$
Power Property: $\log_b m^n = n \log_b m$

Expanding & Condensing Logs Circuit *includes:*

Challenge: Simplify completely and write your final answer as a single logarithm.

$$\log_3(9x^2) - 2\log_3 x + \log_3 4$$

How are you feeling about this topic? Circle one:

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

Basic Log Rules:	Product Property: $\log_b(m \cdot n) = \log_b m + \log_b n$
$\log_a 1 = 0$	Quotient Property: $\log_b\left(\frac{m}{n}\right) = \log_b m - \log_b n$
$\log_a a = 1$	Power Property: $\log_b m^n = n \log_b m$
$\log_a a^x = x$	

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

Expanding & Condensing Logs Circuit

standards covered:

CCSS: HSA-SSE.B.3

TEKs: P.5.G

EXPANDING & CONDENSING LOGS CIRCUIT

Previous Answer: $\log_2(xy)$	# 6	Previous Answer: $3\log_5 x - 2\log_5 y$	# 7
7. Expand: $\log_5\left(\frac{x^3}{y^2}\right)$		8. Condense: $2\log_7 x - \frac{1}{2}\log_7 y$	
$3\log_5 x - 2\log_5 y$		$\log_7\left(\frac{x^2}{\sqrt{y}}\right)$	
Previous Answer: $2 + 2\log x - \log y$	# 10	Previous Answer: $\log_3\left(\frac{xy}{z}\right)$	# 5
9. Condense: $\log_6 3 + \log_6 x$		10. Expand: $\log_{10}\left(\frac{100x^2}{y}\right)$	
$\log_6 3x$		$\log_{10} 100 + 2\log_{10} x - \log_{10} y$ $\log_{10} 10^2 + 2\log_{10} x - \log_{10} y$ $2 + 2\log_{10} x - \log_{10} y$ or $2 + 2\log x - \log y$	
Challenge: Simplify completely and write your final answer as a single logarithm. $\log_3(9x^2) - 2\log_3 x + \log_3 4$			
$\log_3 9 + 2\log_3 x - 2\log_3 x + \log_3 4$ $\log_3 3^2 + \log_3 4$			

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: _____

EXPANDING & CONDENSING LOGS 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: $\log_5\left(\frac{x^2z}{y^3}\right)$ # _____	Previous Answer: $4\log x - 2\log y - \log z$ # _____
1. Expand: $\log_6(xyz)$	2. Condense: $2\log_5 x - 3\log_5 y + \log_5 z$
Previous Answer: $\log_2\left(\frac{xy}{z}\right)$ # _____	Previous Answer: $\log_7(x^3y)$ # _____
3. Expand: $\log_{10}\left(\frac{x^4}{y^2z}\right)$	4. Expand: $\log_4\left(\frac{4}{x}\right)$

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: _____

EXPANDING & CONDENSING LOGS 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 → **6** → **7** → **8** → **4** → **5** → **10** → **9** → **3** → **2** → 1

Previous Answer: $\log_5 x(x-1)$ # 2	Previous Answer: $2\log_2 x - \frac{1}{2}\log_2 y$ # 3
1. Expand: $\log_3 \left(\frac{x^2 y}{z}\right)$ $2\log_3 x + \log_3 y - \log_3 z$	2. Condense: $\log_5 x + \log_5 (x-1)$

Previous Answer: $\log_5 \left(\frac{2}{3}\right)$ # 6	Previous Answer: $3\log_2 x - \log_2 y$ # 7
7. Expand: $\log_2 \left(\frac{x^3}{y}\right)$ $3\log_2 x - \log_2 y$	8. Condense: $3\log_7 x + \log_7 y$ $\log_7 x^3 y$

Previous Answer: $\log_2 \left(\frac{x^2}{y}\right)$ # 4	Previous Answer: $2\log_8 x + 6\log_8 y$ # 10
3. Expand: $\log_2 \left(\frac{x^2}{y}\right)$ $2\log_2 x - \frac{1}{2}\log_2 y$	9. Condense: $\log_2 x + \log_2 y - \log_2 z$ $\log_2 \left(\frac{xy}{z}\right)$

Previous Answer: $2 + 2\log_4 x$ # 1	Previous Answer: $\log_3 \left(\frac{x}{yz}\right)$ # 5
5. Condense: $\log_3 x + \log_3 y$ $\log_3 \left(\frac{xy}{z}\right)$	10. Expand: $\log_8 (x^2 y^6)$ $2\log_8 x + 6\log_8 y$

This is a great activity to use when reviewing how to expand and condense logarithms using properties.

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

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

You may also enjoy ...

EXPANDING & CONDENSING LOGS

Collaborative Tessellation

EXPANDING & CONDENSING LOGS TESSELLATION
Directions: Expand or condense each logarithmic expression in each tessellation piece. Once you are finished, cut out the entire tessellation piece.

5 $\log_2(x^2+2)$
6 $\log_2\left(\frac{x}{y}\right)$
7 $\log_2(x^2 - 2x^2 - 4)$
8 $4\log_2 x + \frac{1}{3}\log_2 z - 2\log_2 y$

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SOLVING LOGARITHMIC EQUATIONS

Question	Answer
$\log_2 x = 3$	
$\log_5 x = 0$	
$\log_3 9x = 2$	
$\log_4(x-2) = 1$	
$\log_7(2x+3) = 2$	
$\log_2 x + \log_2 4 = 3$	
$\log_3(x+1) = \log_3 7$	
$\log_4(x-3) + \log_4(x+3) = 2$	
$\log_6 x = \log_6(2x-4)$	
$2\log_5 x = \log_5 4x$	

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Self-Checking

EXPONENTIAL & LOGARITHMIC FUNCTIONS

Algebra 2 Guided Notes

TRANSFORMATIONS OF LOGARITHMIC FUNCTIONS
Step 1: Identify the _____ and its base.
Step 2: Identify the _____ of the given function.
Step 3: Create a _____ of values.
Step 4: Plot the _____

GRAPHING EXPONENTIAL FUNCTIONS
Step 1: Identify the value of your _____ to determine if your function represents _____ or _____.
Step 2: Create a _____ of values.
Step 3: Plot your points _____

EXPERIMENTAL FUNCTIONS WITH BASE E
The Natural Base e
 $(1 + \frac{1}{n})^n = 2.71828182846$
e is on _____ number that was discovered by Jacob Bernoulli in 1683.
Natural base exponential function: $f(x) = e^x$
Exponential growth function: when _____ and _____
Exponential decay function: when _____ and _____

ANSWER KEY INCLUDED

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hey there!

My name is Malia and I'm passionate about making learning and practicing math fun. I love creating engaging math resources for my students and I hope your students enjoy this activity too!

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