

Why do you need this?

Solving Logarithm & Exponential Equations Circuit



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.

Name: _____ Date: _____

SOLVING LOG & EXPONENTIAL 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: $x = (\ln 5)/4$ | # _____ | Previous |
| 1. $e^{2x} = e^x + 2$ | | 2. \log_3 |
| Previous Answer: $x = 5$ | # _____ | Previous |
| 3. $\ln(3x - 4) = 1$ | | 4. $2^{x+1} =$ |
| Previous Answer: $x = e^5 - 1$ | # _____ | Previous |
| 5. $3e^{1/x} = 15$ | | 6. $\log(2x)$ |
| Previous Answer: $x = 3$ | # _____ | Previous Answer: $x = (e + 4)/3$ |
| 7. $\log_2(2x + 1) = \log_2 11$ | | 8. $2^x = 7$ |
| Previous Answer: $x = 4$ | # _____ | Previous Answer: $x = 100$ |
| 9. $\log_2(x - 1) = 4$ | | 10. $\log(x - 2) + \log 5 = 2$ |

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

- Same base on both sides? Set the exponents equal.
- Exponential with different bases (or $e^x = a$ number)? take log or ln of both sides.
- One log or ln in the equation? Rewrite into exponential form or exponential form.
- log on a side? Condense first.
- Previous solutions!

Log & Exponential Equations Circuit *includes:*

Challenge: Solve. Show all work!

$10^x = 2^{x+3}$

How are you feeling about this topic? Circle one:

😊 😐 😱 😞

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

Same base on both sides? Set the exponents equal.

Exponential with different bases (or $e^x = a$ number)? take log or ln of both sides.

One log or ln in the equation? Rewrite into exponential form or exponentiate both sides for ln.

More than one log on a side? Condense first.

Always check log solutions for extraneous solutions!

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 Log & Exponential Equations Circuit

standards covered:

CCSS: HSF-BF.B.5

TEKs: A2.5.C, A2.5.D, A2.5.E

Includes natural log and base e equations.

SOLVING LOG & EXPONENTIAL EQUATIONS CIRCUIT

| | |
|--|--|
| Previous Answer: $x = 3$ # 4 7. $7^x = 12$ $\ln 7^x = \ln 12$ $x \ln 7 = \ln 12$ $\frac{\ln 12}{\ln 7}$ $x = \frac{\ln 12}{\ln 7}$ | Previous Answer: $x = (e + 4)/3$ # 3 8. $2 \ln(x + 1) = 10$ $\frac{2}{2}$ $e^{\ln(x+1)} = e^5$ $x + 1 = e^5$ $-1 -1$ $x = e^5 - 1$ |
| Previous Answer: $x = \ln(2)$ # 1 9. $2 \ln x = \ln(5x + 6)$ $\ln x^2 = \ln(5x + 6)$ $x^2 = 5x + 6$ $-5x - 6 -5x - 6$ $x^2 - 5x - 6 = 0$ $(x - 6)(x + 1) = 0$ $x - 6 = 0$ $+6 +6$ $x = 6$ $x + 1 = 0$ $-1 -1$ $x = -1$ extraneous | Previous Answer: $x = 1/9$ # 2 10. $e^{x+2} = 5e$ $\ln e^{x+2} = \ln 5e$ $x + 2 = \ln 5 + \ln e$ $x + 2 = \ln 5 + 1$ $-2 -2$ $x = \ln 5 - 1$ |

Challenge: Solve. Show all work!

$10^x = 2^{x+3}$
 $x \log 10 = (x+3) \log 2$
 $x = (x+3) \log 2$

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 LOG & EXPONENTIAL EQUATIONS CIRCUIT

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1 → ___ → ___ → ___ → ___ → ___ → ___ → ___ → ___ → 1

| | |
|--|-----------------------------------|
| Previous Answer: $x = 2\ln 2$ # _____ | Previous Answer: $x = 5$ # _____ |
| 1. $3^x = 81$ | 2. $2 = \log x$ |
| Previous Answer: $x = \ln 9 - 1$ # _____ | Previous Answer: $x = 17$ # _____ |
| 3. $\ln(3x - 4) = 1$ | 4. $2^{x+2} = 32$ |

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

This is a great activity to use when reviewing how to solve logarithmic and exponential equations.

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

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

Name: **Answer Key** Date: _____

SOLVING LOG & EXPONENTIAL 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 → **9** → **4** → **7** → **2** → **10** → **6** → **3** → **8** → **5** → 1

| | |
|--|-------------------------------------|
| Previous Answer: $x = 2\ln 2$ # 5 | Previous Answer: $x = 5$ # 7 |
| 1. $3^x = 81$ $3^x = 3^4$ $x = 4$ | 2. $2 = \log x$ |

| | |
|--|---|
| Previous Answer: $x = 3$ # 4 | Previous Answer: $x = (e + 4)/3$ # 3 |
| 7. $\log_2(2x + 1) = \log_2 11$ $2x + 1 = 11$ $-1 -1$ $2x = 10$ 2 $x = 5$ | 8. $2^x = 7$ $\ln 2^x = \ln 7$ $x \ln 2 = \ln 7$ $\frac{x \ln 2 = \ln 7}{\ln 2}$ $x = \frac{\ln 7}{\ln 2}$ |
| Previous Answer: $x = 4$ # 1 | Previous Answer: $x = 100$ # 2 |
| 9. $\log_2(x - 1) = 4$ $2^4 = x - 1$ $16 = x - 1$ $+1 +1$ $x = 17$ | 10. $\log(x - 2) + \log 5 = 2$ $\log 5(x - 2) = 2$ $10^2 = 5(x - 2)$ $100 = 5x - 10$ $+10 +10$ $110 = 5x$ 5 $x = 22$ |

| |
|--|
| Previous Answer: $x = \ln 9 - 1$ |
| 3. $\ln(3x - 4) = 1$ e e $3x - 4 = e^1$ $+4 +4$ $3x = e + 4$ 3 $x = \frac{e + 4}{3}$ |
| Previous Answer: $x = \ln 7 / \ln 2$ |
| 5. $e^{2x} = 16$ $\ln e^{2x} = \ln 16$ $2x = \ln 16$ $2x = \ln 2^4$ $2x = 4 \ln 2$ 2 $x = 2 \ln 2$ |

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

Solving Exponential & Logarithmic Equations

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 |
| $\log_4 (6x - 4) = \log_4 5$ | | $2, 4, 5x + 5 = 4x + 1$ | | |
| $x = 3$ Red | $x = 8$ Pink | $x = 1$ Purple | $x = 1/4$ Green | |
| $6, \log_2 (4x + 8) = 6$ | | | | |

Answer key included

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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 _____

Exponential Growth: $f(x) = e^x$

Exponential Decay: $f(x) = e^{-x}$

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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