



Math Virtual Learning

Algebra IIB

April 16th, 2020



Lesson: April 16th, 2020

Objective/Learning Target:

Introduction to Solving Logarithmic Equations

Bell Ringer

Solve this exponential equation:

$$2^{4x+5} = 2^{6x-9}$$

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Solve this exponential equation: $2^{4x+5} = 2^{6x-9}$

Solution

$4x + 5 = 6x - 9$ When the bases are the same then the powers have to be equal. This creates a linear equation to solve, which is now much easier.

$5 = 2x - 9$ Subtract $4x$ from both sides

$14 = 2x$ Add 9 to both sides

$7 = x$ Divide by 2

Lesson

In this lesson we will start working with logarithmic equations and solving them. As the next few lessons go on, we will get into more difficult logarithmic equations, but we will start with easier ones today.

Solving a logarithmic equation is no different than solving any other equation in the fact that the goal is to isolate the variable and to do so we will do inverse operations to undo operations happening to the variable.

Example:

$$\log_3(x + 4) = \log_3(4x - 5)$$

$x + 4 = 4x - 5$ Here we can do the same concept as we did in the warm up but with the logarithms. Because we have logarithms on both sides with the same bases, then we know that $x + 4$ must equal $4x - 5$. We now have a linear equation and thus way more comfortable to solve for x .

$$4 = 3x - 5 \text{ Subtract } x \text{ from both sides.}$$

$$9 = 3x \text{ Add } 5 \text{ to both sides.}$$

$$3 = x \text{ Divide by } 3.$$

Practice:

1) $\log 5x = \log (2x + 9)$

2) $\log (10 - 4x) = \log (10 - 3x)$

3) $\log (4p - 2) = \log (-5p + 5)$

4) $\log (4k - 5) = \log (2k - 1)$

5) $\log (-2a + 9) = \log (7 - 4a)$

Answers to Practice

1) $\log 5x = \log (2x + 9)$

$\{3\}$

2) $\log (10 - 4x) = \log (10 - 3x)$

$\{0\}$

3) $\log (4p - 2) = \log (-5p + 5)$

$\left\{\frac{7}{9}\right\}$

4) $\log (4k - 5) = \log (2k - 1)$

$\{2\}$

5) $\log (-2a + 9) = \log (7 - 4a)$

$\{-1\}$

Additional Resources

Here is a [video](#) doing problems very similar to problems 3 and 4 on the practice assignment. Use this video for assistance if needed.