

Students will identify extraneous solutions when solving logarithmic equations.

Students will be able to solve exponential and logarithmic equations by applying properties of logarithms.

1. Solve for x. $5^{x-2} = 3^{3x+2}$

$$5^{x-2} = 3^{3x+2}$$

$$\log 5^{x-2} = \log 3^{3x+2}$$

$$(x-2)\log 5 = (3x+2)\log 3$$

$$x\log 5 - 2\log 5 = 3x\log 3 + 2\log 3$$

$$x\log 5 - 3x\log 3 = 2\log 3 + 2\log 5$$

$$x(\log 5 - 3\log 3) = \frac{2\log 3 + 2\log 5}{\log 5 - 3\log 3}$$

$$x = \frac{2\log 3 + 2\log 5}{\log 5 - 3\log 3}$$

Step

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What we did:

1

Take the log of both sides.

2

Bring the exponents out front.

3

Distribute the logs.

4

Move terms with an 'x' to one side.

5

Factor out an 'x' and divide.

6

Write your answer down. Although this could be simplified by condensing the logarithm into one, I'm okay with you leaving your answer in this form.

2. Now you try!

Solve for x.

$$7^{4x-3} = 4^{x+8}$$

$$\log 7^{4x-3} = \log 4^{x+8}$$

$$(4x-3)\log 7 = (x+8)\log 4$$

$$4x\log 7 - 3\log 7 = x\log 4 + 8\log 4$$

$$4x\log 7 - x\log 4 = 8\log 4 + 3\log 7$$

$$x(4\log 7 - \log 4) = 8\log 4 + 3\log 7$$

$$x = \frac{8\log 4 + 3\log 7}{4\log 7 - \log 4}$$