Solving Logarithmic Equations

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Solving Logarithmic Equations

To solve a logarithmic equation, it needs to be written in one of the following forms:

$$\log_b a = c$$

*Once the equation is in this form, you may need to convert to exponential form.

$$\log_b a = \log_b c$$

*Once the equation is in this form, a and c must be equal. Therefore, you may remove the logarithms and solve.

Solving Logarithmic Equations

Before we solve, should we write this equation as a logarithm on one side or a logarithm on both sides?

$$\log_6(x+2)+\log_6(3)=2$$

Answer

Solving Logarithmic Equations

Solve: $\log_9(r+3) - \log_9(r) = \log_9(r-1)$

Answer

Solving Logarithmic Equations

Caution!

Extraneous Solutions: Remember you cannot take a log of *m* when *m* ≤ 0. ALWAYS check to see if your solution(s) satisfy the original equation.

Substitute the solutions $r = 3$ and $r = -1$ into the equation to check for extraneous solutions:

$$\log_9(r+3) - \log_9 r = \log_9(r-1)$$

r = 3 yields a true equation
r = -1 yields the log of a negative number, and is therefore extraneous

Teacher Notes

86 Solve the following equation:

$$2\log_3(m) = 4$$

Answer

87 Solve the following equation:

$$\log_6(m) + \log_6(m-5) = 2$$

Answer

88 Solve the following equation:

$$\log_m(18) + \log_m(6) = 4$$

Answer

89 Solve the following equation:

$$\log_8(n^2+n)-\log_8(n)=\log_8(3n-1)$$

Answer

90 Solve the following equation:

$$\log_8(27) - 2\log_8(p) = \log_8(p)$$

Answer

91 Solve the following equation:

$$\log_6(t) - \frac{1}{3}\log_6(27) + \log_6(4t) = 0$$

Answer

Solving Logarithmic Equations

How can we use these concepts to solve this equation?

$$5^{a^2} = 60^a$$

Teacher Notes

Solving Logarithmic Equations

Try solving for *b*: $4^{b-2} = 27^{b}$

Teacher Notes

92 Solve: $2^{3m-2} = 16^{m+3}$

Answer

93 Solve: $5^{2x-3} = 3^{6x}$

Answer

94 Solve: $3^x = 5^{5x-3}$

Answer