Solving Exponential and Logarithmic Equations

College Algebra

Main Ideas

- Our exponential and logarithmic equations are sloved like peeling layers of an onion.
- The middle layer is the exponential or logarithmic function step.
- The outer and inner layers are algebra steps related to solving linear equations.

Inverse Properties of Logarithms and Exponential Functions

Inverse Properties

For all x, $\log_b b^x = x$.

For $x > 0$, $b^{\log_b x} = x$.

Exponential Equations

How To – Solve Exponential Equations

To solve an equation containing an exponential expression:

1. Isolate the exponential expression.
2. Take the logarithm of both sides. Use the same base for the logarithm as the exponential expression.
3. Cancel the logarithm and exponential expression using the Inverse Property.
4. Solve the resulting equation

Note: Be careful with negative numbers. Logarithms are not defined for negative numbers. If you need to take the logarithm of a negative number while solving, the equation does not have any solutions.

Logarithmic Equations

How To – Solve Logarithmic Equations

To solve an equation containing a logarithm:

1. Isolate the logarithmic expression.
2. Use both sides as an exponent in an exponential expression. Use the same base for the exponential expression as the logarithm.
3. Cancel the exponential expression and logarithm using the Inverse Property.
4. Solve the resulting equation.