

The equation contains an unknown variable, x , inside a quotient that is raised to a decimal power (1.35). Logarithms provide an elegant way to isolate variables locked under exponential terms.

Step 1: Taking the Logarithm of Both Sides

To begin isolating x , we apply a common logarithm (base 10) to both sides of the equation. This mathematical operation preserves equality while allowing us to utilize logarithmic properties to simplify the exponents.

$$\log(1.5) = \log\left[\left(\frac{0.0520}{x}\right)^{1.35}\right]$$

Step 2: Applying the Power Rule

According to the **Power Rule of Logarithms** ($\log_a(M^N) = N \log_a M$), any exponent on the argument of a logarithm can be moved to the front as a multiplier. Applying this property allows us to bring the exponent 1.35 down:

$$\log(1.5) = 1.35 \log\left(\frac{0.0520}{x}\right)$$

Step 3: Applying the Quotient Rule

Next, we simplify the logarithmic term containing the fraction using the **Quotient Rule of Logarithms** $\log_a\left(\frac{M}{N}\right) = \log_a M - \log_a N$. This expands the expression, separating our constant numerator from our variable denominator:

$$\log(1.5) = 1.35 [\log(0.0520) - \log(x)]$$

$$\log x = -1.4144$$

Step 3: Converting Back to Exponential Form

To solve for x , we apply the fundamental **definition of a logarithm** ($\log_a M = N \Leftrightarrow a^N = M$). Since we used a common logarithm, the base is implicitly 10:

$$x = 10^{-1.4144}$$

Using a calculator to compute this value:

$$x = 0.03851$$

CALCULATOR TIPS: SOLVE Function

For maximum speed, input the raw equation directly into your scientific calculator:

1. Type: $1.5 = (0.0520 / X)^{1.35}$ (Use the alpha key to type X and use the solid block $=$ sign, not the bottom-right execute key).
2. Press **SHIFT** → **CALC** (to activate **SOLVE**).
3. Press **=** to execute. The calculator will output $X = 0.0385115...$ almost instantly.

