Common Algebra Mistakes
Example: Solving a Logarithm Equation

The Goal

Solve the following equation for y:

$$\ln(x) = -4y\ln\left(\frac{1}{2}\right)$$

The Mistake

Find the algebra mistake:

$$\ln(x) = -4y\ln\left(\frac{1}{2}\right) \implies \ln(x)+4 = y\ln\left(\frac{1}{2}\right)$$

Need a hint? Look carefully at the red part of the algebra:

$$\ln(x) = -4y\ln\left(\frac{1}{2}\right) \implies \ln(x)+4 = y\ln\left(\frac{1}{2}\right)$$

The Correction

$$\ln(x) = -4y\ln\left(\frac{1}{2}\right) \implies -\frac{\ln(x)}{4} = y\ln\left(\frac{1}{2}\right)$$

An Explanation

Instead of *dividing* by -4 the student *added* 4 to both sides. The mistake has nothing to do with logarithms. The correct step is:

$$\ln(x) = -4y\ln\left(\frac{1}{2}\right) \implies y = -\frac{\ln(x)}{4\ln\left(\frac{1}{2}\right)}$$

Check the following complete solution (use the logarithm rules ln(a/b) = ln(a) - ln(b) and ln(1) = 0):

$$\ln(x) = -4y\ln\left(\frac{1}{2}\right) \implies y = -\frac{\ln(x)}{4\ln\left(\frac{1}{2}\right)} = -\frac{\ln(x)}{4(\ln(1)-\ln(2))} = \frac{\ln(x)}{4\ln(2)}$$