Answer key

The method: Solving logarithmic equations

Combine the logs into one, rewrite without logs, and solve. Check each answer: you cannot take the log of 0 or a negative number.

$\log_3 x + \log_3 (x + 26) = 3 \quad x = 1$

$x(x + 26) = 27$ adding logs: multiply inside; then $3^3 = 27$

$x^2 + 26x - 27 = 0$ move every term to one side

$(x - 1)(x + 27) = 0$ factor

$x = 1$ or $x = -27$ set each factor equal to 0

$x = -27$ would take the log of a negative number, so it is not a solution. check each answer

$x = 1$

$\log_3 (x + 10) - \log_3 x = \log_3 3 \quad x = 5$

$\frac{x + 10}{x} = 3$ subtracting logs: divide inside; then the insides are equal

$x + 10 = 3x$ multiply by x

$10 = 2x$

$x = 5$ divide by 2

Answer key

Problems 1 and 2 worked out · Version 0A

$\log_2 x + \log_2 (x + 30) = 6 \quad x = 2$

$x(x + 30) = 64$ adding logs: multiply inside; then $2^6 = 64$

$x^2 + 30x - 64 = 0$ move every term to one side

$(x - 2)(x + 32) = 0$ factor

$x = 2$ or $x = -32$ set each factor equal to 0

$x = -32$ would take the log of a negative number, so it is not a solution.
check each answer

$x = 2$

$\log_3 x + \log_3 (x + 8) = 2 \quad x = 1$

$x(x + 8) = 9$ adding logs: multiply inside; then $3^2 = 9$

$x^2 + 8x - 9 = 0$ move every term to one side

$(x - 1)(x + 9) = 0$ factor

$x = 1$ or $x = -9$ set each factor equal to 0

$x = -9$ would take the log of a negative number, so it is not a solution.
check each answer

$x = 1$

Solving logarithmic equations · Version 0A

1) $x = 2$ 2) $x = 1$ 3) $x = 1$ 4) $x = 8$ 5) $x = 9$
6) $x = 2$ 7) $x = 4$ 8) $x = 9$