The *One-to-One Property* of Logarithms

If $\log_b x = \log_b y$, then $x = y$

Case2: Use this property to solve logarithmic equations with a logarithmic equation on_____ sides of the equation.

EX 1: $\log_5 4x = \log_5 8$
EX 2: $\log_7 36 - \log_7 x = \log_7 4$
EX 3: $\log(3x+10) = \log x^2$

- Condense each side of the equation (if needed) into a single logarithm
- Equate the arguments
- Solve
- Check for extraneous solutions

EX 4: $\log_3 x = \frac{1}{2}\log_3 25 - 5\log_3 2$
EX 5: $\ln(x+5) + \ln(x-2) = \ln 18$
You try: $\log_5 24 - \log_5 x + \log_5 3 = 7\log_5 2$
You try: $\log 2x = \log(2x-8)$

Remember the inverse property of logarithms!

$\log_b y = x$ if and only if $b^x = y$

Case I: Use the inverse property of logarithms (BOB) to solve equations which contain a _____ logarithm or which can be _____ to a single logarithm on one side of the equation.

EX 1: $\log_2(3x-1) = 5$

EX 2: $4 - \ln 7x = 2$

EX 3: $\log(x^2 + 36) = 2$

The _____ of a logarithmic expression must be _____ than zero. For that reason, you must always check for _____ solutions!

EX 4: $\log_3 x + \log_3(x-6) = 3$

EX 5: $\log_2(7x-8) - \log_2 x = 3$

You try: $\log_2(x+1) + \log_2(x-5) = 4$

Advanced Algebra Name _____
Solving logarithmic and exponential equations

Solve using properties of logarithms.

1. $\log_2 3 - \log_2 7 = \log_2 x$

2. $\log_3 14 + \log_3 y = \log_3 42$

3. $\log_9 x = \frac{1}{2}\log_9 144 - \frac{1}{3}\log_9 8$

4. $\log_3 56 - \log_3 8 = \log_3 x$

5. $\log 7 + \log(n-2) = \log 6n$

6. $3\log x = \log 27$

7. $\ln(m+3) - \ln m = \ln 4$

8. $3\log_5 x - \log_5 4 = \log_5 16$

9. $\log_2 15 + \log_2 14 - \log_2 105 = \log_2 x$

10. $\log_4(x+3) + \log_4(x-3) = 2$

11. $\log_8(n+1) - \log_8 n = \log_8 4$

12. $\log_2(y+2) - 1 = \log_2(y-2)$

13. $\log_3(4x+5) - \log_3(3-2x) = 2$

14. $\ln(x+2) + \ln 5 = 4$