SOLVING EXPONENTIAL AND LOGARITHMIC EQUATIONS

There are five rules for logarithms you need to solve any exponential or logarithmic equation.

<u>**Logarithmic Form**</u>   <u>**Exponential Form**</u>

$$\log_a b = c$$ $$a^c = b$$

$$\text{Base Change Formula: } \log_a b = \frac{\log b}{\log a}$$

PROPERTIES OF EXPANDING AND CONDENSING LOGS

1) $\log_a uv = \log_a u + \log_a v$ or $\ln uv = \ln u + \ln v$

2) $\log_a \dfrac{u}{v} = \log_a u - \log_a v$ or $\ln \dfrac{u}{v} = \ln u - \ln v$

3) $\log_a u^v = v \log_a u$ or $\ln u^v = v \ln u$

SAMPLE PROBLEMS

EXPONENTIAL EQUATIONS

1. Solve for x: $8^{2x-4} = 16^{x+5}$

2. Solve for x: $3^{2x-5} = 12$

3. Solve for x: $2^{x-4} = 10^x$

4. Solve for x: $3^{2x-5} = 7^{x+2}$

5. Solve for x:

$$6^{2x-4} = 3^{4x+5}$$

6. Solve for x: $1000e^{-5x} = 75$

7. Solve for x: $\dfrac{119}{e^{6x} - 14} = 7$

LOGARITHMIC EQUATIONS

1. Solve for x: $\log_3(x-3) = 4$

2. Solve for x: $\log_4(x+5) = \log_4 18$

3. Solve for x: $\log_6 7 + \log_6 (x-3) = 2$

4. Solve for x: $\log_7 (x-1) - \log_7 x = 1$

5. Solve for x: $\log_9(x+1) + \log_9 x = \log_9 2$

6. Solve for x: $2 - 6\ln x = 10$

7. Solve for x: $\log(x+4) - \log x = \log(x+2)$

8. Solve for x: $\ln x + \ln(x-2) = 1$