

October 17 |

## Solve Exponential Equations with Binomial Exponents

Ex1 Solve:  $7^{x+3} = 41$   
 $\ln 7^{x+3} = \ln 41$

$$\frac{(x+3) \cdot \ln 7}{\ln 7} = \frac{\ln 41}{\ln 7}$$

$$\begin{array}{r} x+3 = 1.91 \\ -3 \quad -3 \end{array}$$

$$\boxed{x = -1.09}$$

Ex2 Solve:  $12 = 36^{3x-7}$   
 $\ln 12 = \ln 36^{3x-7}$

$$\frac{\ln 12}{\ln 36} = \frac{(3x-7) \cdot \ln 36}{\ln 36}$$

$$\begin{array}{r} .69 = 3x - 7 \\ +7 \quad +7 \end{array}$$

$$\frac{7.69 = 3x}{3 \quad 3}$$

$$\boxed{2.56 = x}$$

Ex3

Solve:  $\frac{8e^{5x+6}}{8} = \frac{20}{8}$  ← Get alone

$$e^{5x+6} = 2.5$$

$$\ln e^{5x+6} = \ln 2.5$$

$$\frac{(5x+6) \cdot \ln e}{\ln e} = \frac{\ln 2.5}{\ln e}$$

$$\frac{5x+6}{-6} = \frac{.92}{-6}$$

$$\frac{5x}{5} = \frac{-5.08}{5}$$

$$\boxed{x = -1.02}$$

Ex4

Solve:  $20^{6x-7} = 2^{x+4}$

$$\ln 20^{6x-7} = \ln 2^{x+4}$$

$$\frac{(6x-7) \cdot \ln 20}{\ln 2} = \frac{(x+4) \cdot \ln 2}{\ln 2}$$

$$(6x-7) \cdot (4.32) = x+4$$

$$25.92x - 30.24 = x + 4$$

$$\frac{24.92x - 30.24}{+30.24} = \frac{4}{+30.24}$$

$$\frac{24.92x}{24.92} = \frac{34.24}{24.92}$$

$$\boxed{x = 1.37}$$

\* If x is on both sides, divide by ln of smaller number.