

**Learning Targets – 7.5 Exponential and Logarithmic Equations**

- a.) I can solve exponential equations (common and uncommon bases).  
 b.) I can solve logarithmic equations using exponent and logarithmic properties.

**Scenario 1: Common Bases**

Solve each equation. If necessary, round to 4 decimal places.

1.)  $2^x = 2^4$   
 $x = 4$

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

3.)  $4^{3x-2} = 4^{13}$   
 $3x-2 = 13$   
 $3x = 15$   
 $x = 5$

4.)  $2^{x-2} = 8$   
 $2^{x-2} = 2^3$   
 $x-2 = 3$   
 $x = 5$

5.)  $3^{2x-3} = 27^{x+4}$   
 $3^{2x-3} = 3^{3(x+4)}$   
 $2x-3 = 3(x+4)$   
 $2x-3 = 3x+12$   
 $-3 = x+12$   
 $-15 = x$

6.)  $9^{2x-1} = 27^{3x+2}$   
 $3^{2(2x-1)} = 3^{3(3x+2)}$   
 $4x-2 = 9x+6$   
 $-2 = 5x+6$   
 $-8 = 5x$   
 $x = -8/5$

7.)  $\log_3 x = \log_3 6$   
 $x = 6$

8.)  $\ln(x-2) = \ln(4x+7)$   
 $x-2 = 4x+7$   
 $-2 = 3x+7$   
 $-9 = 3x$   
 $x = -3$

EXTRANEUS

9.)  $\log_6(x^2 - 2x) = \log_6(x + 4)$   
 $x^2 - 2x = x + 4$   
 $x^2 - 3x - 4 = 0$   
 $(x-4)(x+1) = 0$   
 $x = 4 \quad x = -1$

10.)  $\log(5x + 2) = \log(2x^2 + 2x)$   
 $5x+2 = 2x^2+2x$   
 $0 = 2x^2-3x-2$   
 $0 = (x-2)(2x+1)$   
 $x = 2 \quad x = -1/2$

~~$\frac{-4}{2} = -2$   
 $\frac{-1}{-3} = 1/3$~~

EXTRANEUS

**Learning Targets – 7.5 Exponential and Logarithmic Equations**

- a.) I can solve exponential equations (common and uncommon bases).  
 b.) I can solve logarithmic equations using exponent and logarithmic properties.

Solve each equation. If necessary, round to 4 decimal places.

1.)  $81^{x-3} = 27^{3x-2}$   
 $3^{4(x-3)} = 3^{3(3x-2)}$   
 $4x - 12 = 9x - 6$   
 $4x - 6 = 9x$   
 $-6 = 5x$   
 $x = -6/5$

2.)  $\log_3(2x - 1) = \log_3(6x + 11)$   
 $2x - 1 = 6x + 11$   
 $-1 = 4x + 11$   
 $-12 = 4x$   
 $x = -3$   
 EXTRANEUS

3.)  $\ln(3x^2 + 10x) = \ln(2x - 4)$   
 $3x^2 + 10x = 2x - 4$   
 $3x^2 + 8x + 4 = 0$   
 $(x+2)(3x+2) = 0$   
 $x = -2 \quad x = -2/3$   
 EXTRANEUS

~~$\frac{12}{3} \frac{2}{8}$~~

4.)  $16^{2x+1} = 4^{x-4}$   
 $4^{2(2x+1)} = 4^{x-4}$   
 $4x + 2 = x - 4$   
 $3x + 2 = -4$   
 $3x = -6$   
 $x = -2$

5.)  $(\frac{1}{10})^{2x+1} = 100^{3x+2}$   
 $10^{-1(2x+1)} = 10^{2(3x+2)}$   
 $-2x - 1 = 6x + 4$   
 $-1 = 8x + 4$   
 $-5 = 8x$   
 $x = -5/8$

6.)  $\log_5(x^2 - 1) = \log_5(x + 5)$   
 $x^2 - 1 = x + 5$   
 $x^2 - x - 6 = 0$   
 $(x-3)(x+2) = 0$   
 $x = 3 \quad x = -2$

7.)  $\ln(2x + 3) = \ln(4x - 7)$   
 $2x + 3 = 4x - 7$   
 $2x + 10 = 4x$   
 $10 = 2x$   
 $5 = x$

8.)  $8^{x-1} = 64^{2x+5}$   
 $8^{x-1} = 8^{2(2x+5)}$   
 $x-1 = 4x + 10$   
 $-1 = 3x + 10$   
 $-11 = 3x$   
 $x = -11/3$