Exponential Equations

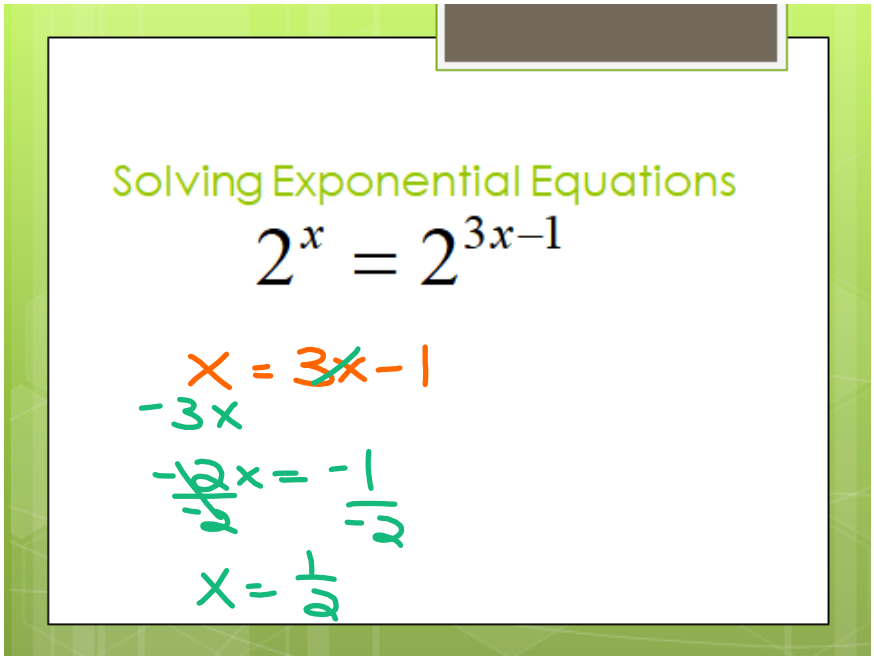
Like Bases

Solving Exponential Equations

$$2^x = 2^4$$

$x = 4$

If the bases are the same, then the exponents are equal


Solving Exponential Equations
$2^x = 2^{3x-1}$
$x = 3x - 1$
$-3x$
$-2x = -1$
$\frac{-2x}{-2} = \frac{-1}{-2}$
$x = \frac{1}{2}$

Solve: $2^{3x+2} = 8$

$2^{3x+2} = 2^{3}$

$3x + 2 = 3$

$-2 \quad -2$

$\frac{3x}{3} = \frac{1}{3}$

$x = \frac{1}{3}$

① Rewrite so that the bases are the same

② Set the exponents equal to each other and solve

Solve: $27^{x+9} = 3^{2x-4}$

$(3^3)^{x+9} = 3^{2x-4}$

$3^{3x+27} = 3^{2x-4}$

$3x+27 = 2x-4$

$-2x \quad -2x$

$x+27 = -4$

$-27 \quad -27$

$x = -31$

Solve: $27^{x-7} = 9^{2x-5}$

$(3^3)^{x-7} = (3^2)^{2x-5}$

$3^{3x-21} = 3^{4x-10}$

$3x - 21 = 4x - 10$

$-3x \quad -3x$

$-21 = x - 10$

$+10 \quad +10$

$-11 = x$

Solve: $32^{5x+7} = 64^{2x-9}$

$(2^5)^{5x+7} = (2^6)^{2x-9}$

$2^{25x+35} = 2^{12x-54}$

$25x + 35 = 12x - 54$

$-12x$

$13x + 35 = -54$

-35

$13x = -89$

$x = -\frac{89}{13}$

Solve: $\left(\frac{1}{2}\right)^{x+4} = 8$

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

$2^{-x-4} = 2^3$

$-x-4 = 3$

$+4 \quad +4$

$\frac{-x}{-1} = \frac{7}{-1}$

$x = -7$

$$4^{x}=1$$

$x=0$

Solve: $\left(\frac{1}{9}\right)^{6x+2} = 27$

$\left(\frac{1}{3^2}\right)^{6x+2} = 3^3$

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

$3^{-12x-4} = 3^3$

$-12x - 4 = 3$

$+4 \quad +4$

$-12x = \frac{7}{-12}$

$x = -\frac{7}{12}$