# Exponential Equations

Nov 15-12:41 PM

Ditto 4.1

1) $1.16 Million

2) a) $C(t) = 150(1.08)^t$
b) $277.64

$25,600 : 25(2)^{t/2}$
$1024 = 2^{t/2}$

3) 9.1%

4) 20 days

5) a) 23 years 22.5
b) 22 1/4 years 22.1

Nov 16-3:36 PM

Exponential Equations PreCalc
Unit 4 Day 7

An exponential equation is an equation in which the variable is in the exponent.

When bases are not the same, follow these steps:

Steps:

1. Express each side of the equation in terms of the same base.
2. Set the exponents equal.
3. Solve.

Example:

$2^{x-3} = 64$

$2^{x-3} = 2^6$

$x - 3 = 6$

$x = 9$

Nov 14-5:44 PM

Solve.

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

$2x - 3 = x + 1$
$-x \quad -x$
$x = 4$ {4}

2. $5^{1-3x} = 25^x$

$5^{1-3x} = 5^{2x}$
$1 - 3x = 2x$
$+3x \quad +3x$
$1 = 5x$
$x = \frac{1}{5}$ $\{\frac{1}{5}\}$

3. $9^x = 27^{x-1}$

$3^{2x} = 3^{3(x-1)}$
$2x = 3x - 3$
$-3x \quad -3x$
$-x = -3$
$x = 3$ {3}

4. $81^{3x+3} = 9$

$9^{2(3x+3)} = 9^1$
$6x + 6 = 1$
$6x = -5$
$x = -\frac{5}{6}$ $\{-\frac{5}{6}\}$

Nov 14-5:45 PM

5. $125^{-2x} = 25^{x+1}$

$5^{3(-2x)} = 5^{2(x+1)}$
$-6x = 2x + 2$
$-2x \quad -2x$
$-8x = 2$
$\frac{-8x}{-8} = \frac{2}{-8}$
$x = -\frac{1}{4}$ $\{-\frac{1}{4}\}$

6. $\left(\frac{1}{16}\right)^x = 64^{1-x}$

$\left(\frac{1}{4^2}\right)^x$

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

Nov 14-5:46 PM

**If you can't get a common base...**

**Steps:**

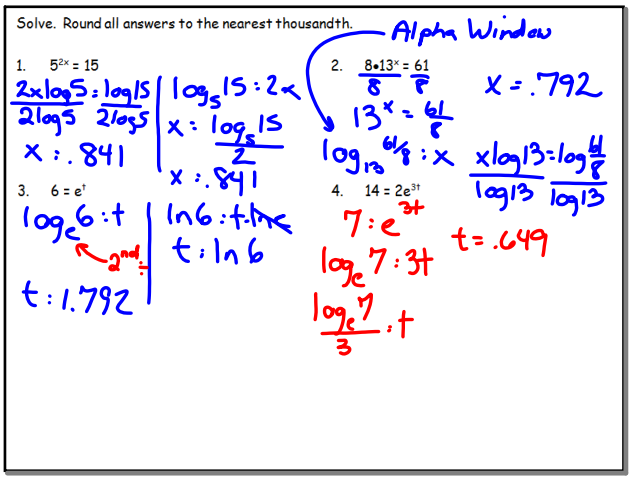
1. Isolate the exponential term
2. Take the log of both sides. (ln if e)
3. Use the power rule.
4. Isolate the variable.
5. Use calculator!

$9^x = 43$

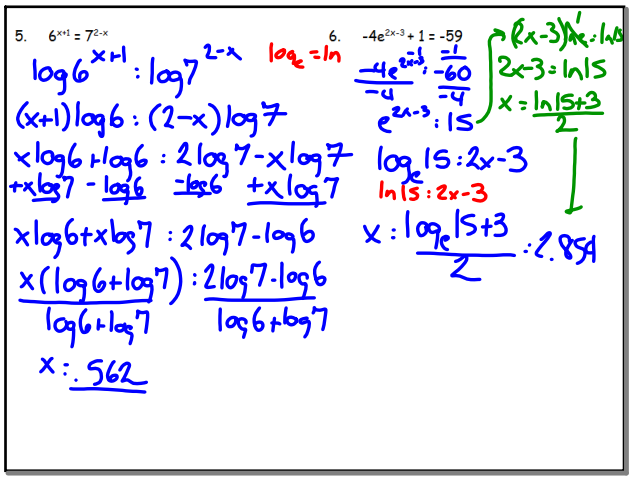
$\log 9^x = \log 43$
$x \log 9 = \log 43$
$\frac{x \log 9}{\log 9} = \frac{\log 43}{\log 9}$
$x \approx 1.712$

$9^x = 43 \rightarrow \log_9 43 = x$

Nov 14-5:46 PM




Nov 14-5:46 PM




Nov 14-5:47 PM

Nov 14-5:48 PM