

## Solving Exponential Equation

$$16^{3x} = 8$$

- Common Base

$$(2^4)^{3x} = 2^3$$

← #1) Find a Common Base

$$2^{12x} = 2^3$$

#2) Eliminate the Base

$$\frac{12x}{12} = \frac{3}{12}$$

$$x = \frac{1}{4}$$

Set Exponents Equal

Possible Bases

2	2
3	9, 27, 81, 243
5	125, 625
10	10, 100, 1000

Different Bases

$$15^{3x} = 285$$

$$\text{Log } 15^{3x} = \text{Log } 285$$

#1) Take the Log of Both sides

$$\frac{3x \log 15}{3 \log 15} = \frac{\text{Log } 285}{3 \text{Log } 15}$$

#2) use the Power Property

#3) Divide to Isolate "X"

$$X = \frac{\text{Log } 285}{3 \text{Log } 15}$$

$$\boxed{\text{Log}} \ 285 \ \boxed{)} \ \boxed{\div} \ 3 \ \boxed{\div} \ \boxed{\text{Log}} \ 15 \ \boxed{)}$$

$$0.6958$$

Forest with 1,200,000 trees.

You plan to <sup>log</sup>harvest 7% of the trees each year. How many years to Log half the trees.

$$T(m) = a(1+r)^m \leftarrow \# \text{ of time periods}$$

Total Amount/Value after "m" time periods      Initial Amount      Grows or Decays

$$600,000 = 1,200,000 \left( \frac{0.93}{1.07} \right)^m$$

$$\frac{600,000}{1,200,000} = \frac{1,200,000 \left( \frac{0.93}{1.07} \right)^m}{1,200,000}$$

$$0.5 = \left( \frac{0.93}{1.07} \right)^m$$

$$\log(0.5) = \log \left( \frac{0.93}{1.07} \right)^m$$

$$\log(0.5) = m \log \frac{0.93}{1.07}$$

$$\log(0.5) = m \log 0.93$$

$$\frac{-0.3}{(-0.031)} = m \frac{(-0.031)}{(-0.031)}$$

$$9.68 = m$$

$$9 \text{ yrs } 8 \text{ mos.} = m$$

$$1^{\text{st}} \text{ yr } 84,000$$

$$\begin{array}{r} 1200000 \\ - 84000 \\ \hline 1116000 \end{array}$$

$$2^9 = 78,120$$