Practice

Exponential and Logarithmic Equations

Solve each equation.

7-5

To start, rewrite each side with a common base.

1.
$$125^{2x} = 25$$

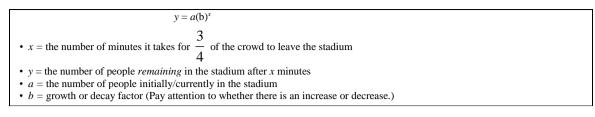
 $(5^3)^{2x} = 5^2$
 $5^{6x} = 5^2$
 $6x = 2$
2. $2^{3x-3} = 64$
 $2^{3x-3} = 2^6$
3. $81^{3x} = 27$

x =

Solve each equation. Round to the nearest ten-thousandth. Check your answers. To start, take the logarithm of each side.

4. $6^{4x} = 234$ **5.** $3^{5x} = 375$ 6. $7^{3x} - 24 = 184$ $\log 3^{5x} = \log 375$ $\log 6^{4x} = \log 234$ $4x\log 6 = \log 234$ $x = \frac{\log 234}{\log 234}$ $4\log 6$ $x \approx$

7. $3^{6x} = 2000$ **9.** $12^{4x} = 4600$ **8.** $8^{3x} = 154$



10. There are currently 100,000 people in a stadium watching a soccer game. When the game ends, about 3% of the crowd will leave the stadium each minute. At this rate, how many minutes will it take for $\frac{3}{4}$ of the crowd to leave the stadium?

Convert from Logarithmic Form to Exponential Form to solve each equation.

Exponential and Logarithmic Form				
Logarithmic Form	Exponential Form			
$\log_b x = y$	$b^y = x$			

11. $\log (2x + 4) = 3$ $2x + 4 = 10^{3}$ x = **12.** $\log 4z - 3 = 2$ $\log 4z = 5$ $\log 4z = 5$

Use the properties of logarithms to solve each equation.

	Product Property		Quotient Property		Power Property
	$\log_b mn = \log_b m + \log_b n$		$\log_b \frac{m}{n} = \log_b m - \log_b n$		$\log_b m^n = n \log_b m$
14. $2 \log x + \log 4 = 3$ 15. $\log y$		$-\log 4 = 2$	16. log 1	$0 + \log 2x = 3$	
$\log x^2$	$^{2}+\log 4=3$		$\log \frac{y}{4} = 2$		

17. Error Analysis Your friend used the following steps to solve the equation $\log x + \log 6 = 4$. What error did he make? What is the correct answer?

 $\log x + \log 6 = 4$ $\log \frac{x}{6} = 4$ $\frac{x}{6} = 10^{4}$ x = 6000

 $\log 4x^2 = 3$

 $4x^2 = 10^3$ $x^2 = 250$ $x \approx$