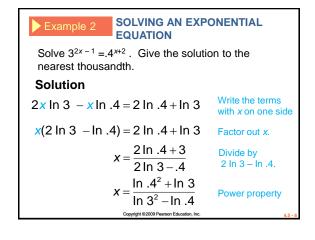


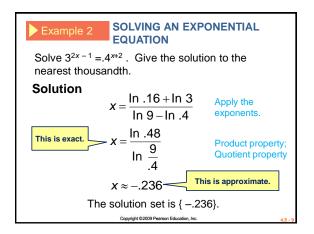
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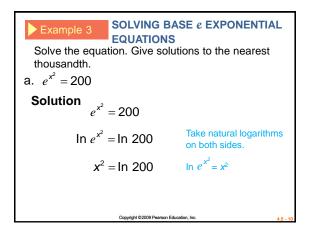
Example 1 SOLVING AN EXPONENTIAL EQUATION Solve 7 ^x = 12. Give the solution to the nearest thousandth.		
Solution $7^{x} = 12$		
$\ln 7^{x} = \ln 12$	Property of logarithms	
<mark>x</mark> ln 7 = ln 12	Power of logarithms	
$x = \frac{\ln 12}{\ln 7}$	Divide by In 7.	
<i>x</i> ≈ 1.277	Use a calculator.	
The solution set is {1.277}.		

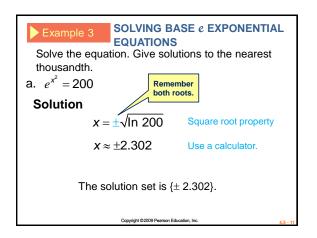
quotient like	n Be careful when evaluating a $e^{\frac{\ln 12}{\ln 7}}$ in Example 1. Do not
quotient like $\frac{\ln 12}{\ln 7}$ in Example 1. Do not confuse this quotient with $\ln \frac{12}{7}$, which can be written as $\ln 12 - \ln 7$.	
oganning	-
	$\frac{\ln 12}{\ln 7} \neq \ln \frac{12}{7}$
	≠ In

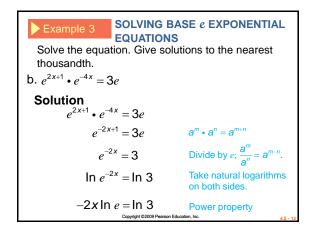
Example 2 SOLVING AN EXPONENTIAL EQUATION		
Solve $3^{2x-1} = .4^{x+2}$. Give the solution to the nearest thousandth.		
Solution		
$3^{2x-1} =$ In $3^{2x-1} =$		Take natural logarithms on both sides.
$(2x-1) \ln 3 =$	(<i>x</i> +2) ln .4	Property power
$2x \ln 3 - \ln 3 =$	<i>x</i> ln .4+2 ln .4	Distributive property
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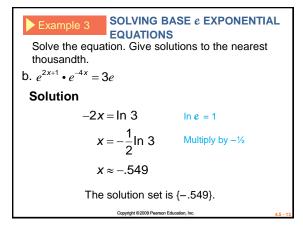


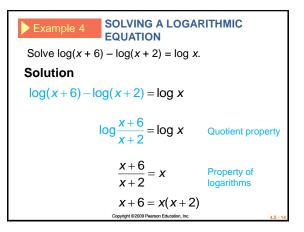




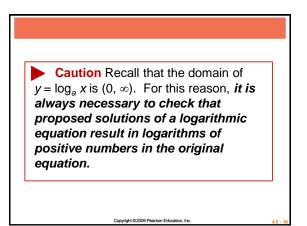






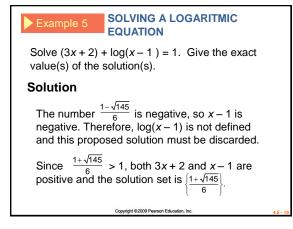


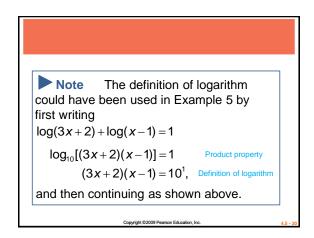
Example 4 SOLVING A LOGARITHMIC EQUATION		
Solve $\log(x + 6) - \log(x + 2) = \log x$.		
Solution		
$x+6=x^2+2x$	Distributive property	
$x^2 + x - 6 = 0$	Standard form	
(x+3)(x-2)=0	Factor.	
x = -3 or $x = 2$	Zero-factor property	
The proposed negative solution $(x = -3)$ is not in the domain of the log x in the original equation, so the only valid solution is the positive number 2, giving the solution set {2}.		

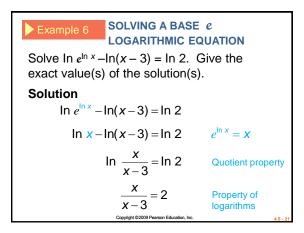


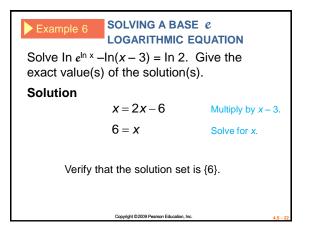
Example 5 SOLVING A LOGARITHMIC EQUATION		
Solve $log(3x + 2) + log(x - 1) = 1$. Give the exact value(s) of the solution(s).		
Solution		
$\log(3x+2) + \log(x-1) = 1$		
$\log(3x+2) + \log(x-1) = \log(10)$	Substitute.	
$\log[(3x+2)(x-1)] = \log 10$	Product property	
(3x+2)(x-1) = 10	Property of logarithms	
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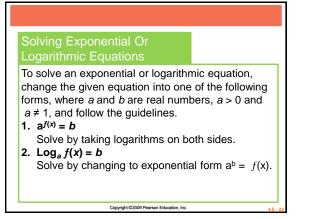
Example :	5 SOLVING A LOGA EQUATION	RITMIC
Solve $(3x + 2) + \log(x - 1) = 1$. Give the exact value(s) of the solution(s).		
Solution		
	$3x^2 - x - 2 = 10$	Multiply.
	$3x^2 - x - 12 = 0$	Subtract 10.
	$x = \frac{1 \pm \sqrt{1 + 144}}{6}$	Quadratic formula
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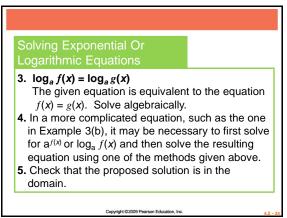


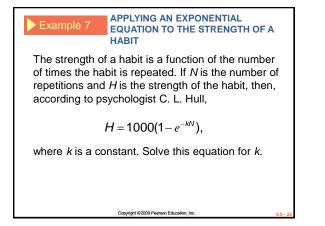


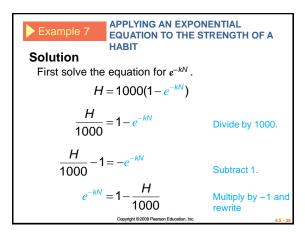


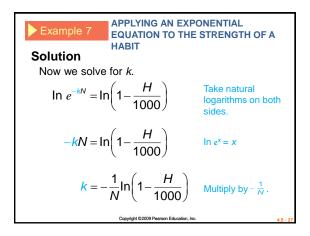


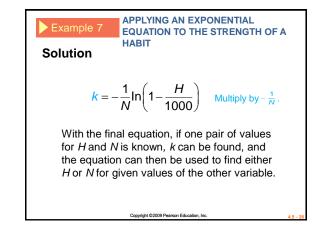




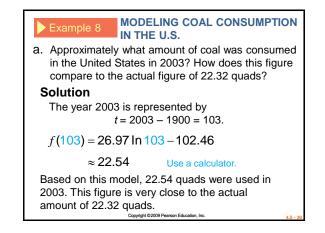








Example 8 MODELING COAL CONSUMPTION IN THE U.S. The table gives U.S. coal consumption (in quadrillions of British thermal units, or <i>quads</i>) for several years. The data can be modeled with the function defined by $f(t) = 26.97 \ln t - 102.46, t \ge 80,$			
Year	Coal Consumption (in quads)		
1980	15.42	where <i>t</i> is the number	
1985	17.48	of years after 1900,	
1990	19.17	and $f(t)$ is in quads.	
1995	20.09		
2000	22.58		
2005	22.39		
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 Example 8 MODELING COAL CONSUMPTION IN THE U.S. b. Let f(t) = 25, and solve for t. 		
Solution $25 = 26.97 \ln t - 102.46$		
127.46 = 26.97 ln <i>t</i>	Add 102.46	
$\ln t = \frac{127.46}{26.97}$	Divide by 26.97; rewrite.	
$t = e^{127.46/26.97}$	Write in exponential form.	
<i>t</i> ≈ 113	Use a calculator.	
Add 113 to 1900 to get 2013. Annual consumption will reach 25 quads in approximately 2013. Copyright G2009 Persons Education, Inc. 4.5-33		