

Exponential and logarithmic operations undo each other since they are inverse operations.

Inverse Properties of Logarithms and Exponents

For any base b such that b > 0 and  $b \ne 1$ ,

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Iog<sub>b</sub> $b^x = x$ Iog<sub>10</sub> $10^7 = 7$   $b^{\log_9 x} = x$   $10^{\log_{10} 2} = 2$ 

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Simplify each	expression.		
a. log₃3¹¹	b. log₃81	C. 5 <sup>log₅10</sup>	

a. Simplify log10<sup>0.9</sup> b. Simplify 2<sup>log<sub>2</sub>(8x)</sup>

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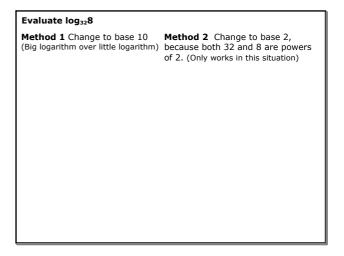
Most calculators calculate logarithms only in base 10 or base e (see Lesson 7-6). You can change a logarithm in one base to a logarithm in another base with the following formula.

Change of Base Formula

For a > 0 and  $a \ne 1$  and any base b such that b > 0 and  $b \ne 1$ ,

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EXAMPLE  $\log_b x = \frac{\log_a x}{\log_a b}$   $\log_a 8 = \frac{\log_2 8}{\log_2 4}$ 



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Evaluate log₀27.		]
Evaluate log <sub>9</sub> 27.  Method 1 Change to base 10.	<b>Method 2</b> Change to base 3, because both 27 and 9 are powers of 3.	

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