

10.1 Log Properties

$$\log_b a = c$$

argument  
base  
answer

$$b^c = a$$

Apr 6-1:08 PM

Properties of Logarithms Day 1

Re-write logs in exponential form...

①  $\log_4 1 = 0$   
 $4^0 = 1$

②  $\log_9 \frac{1}{81} = -2$   
 $9^{-2} = \frac{1}{81}$

③  $\log_7 \frac{1}{343} = -3$   
 $7^{-3} = \frac{1}{343}$

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Re-write exponents in log form...

⑩  $10^{-3} = \frac{1}{1,000}$      $\log_{10} \frac{1}{1,000} = -3$

⑫  $6^{-1} = \frac{1}{6}$      $\log_6 \frac{1}{6} = -1$   
 ~~$\log_6 \frac{1}{6} = -1$~~

⑭  $7^1 = 7$   
 $\log_7 7 = 1$

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Use properties to evaluate...

⑮  $\log_8 8 = 1$   
 $8^? = 8$      $? = 1$

⑲  $\log_9 9 = 1$

⑳  $5^{\log_5 27} = 27$

㉒  $\log_4 \frac{?}{4} = \log_4 2x$   
 ~~$\log_4 \frac{?}{4} = \log_4 2x$~~   
 $4^{\cancel{0}} = 2x$   
 $\log_4 2x$

$? = 2x$

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㉓  $\log_5 5^{3-x} = 3-x$   
 ~~$\log_5 5^{3-x} = 3-x$~~

$? = 3-x$

㉔  $\log_6 1 = 0$   
 $6^x = 1$

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Evaluate, no calculator...

㉙  $\log_5 \sqrt[3]{25} = ?$   
 $5^? = \sqrt[3]{25}$   
 $5^? = (25)^{1/3}$   
 $5^? = (5^2)^{1/3}$      $\frac{2 \cdot 1}{3} = \frac{2}{3}$   
 ~~$5^? = (5^2)^{1/3}$~~   
 ~~$5^? = 5^{2/3}$~~   
 $? = 5^{2/3}$   
 $? = 2/3$

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(31)  $\ln \frac{1}{e} = ?$

$e^? = \frac{1}{e}$

$? = -1$

$\frac{1}{2} = 2^{-1}$

$2^{-2} = \frac{1}{4} = \frac{1}{2^2}$

$3^{-3} = \frac{1}{27} = \frac{1}{3^3}$

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Solve...

(37)  $\log_x \frac{1}{225} = -2$

$x^{-2} = \frac{1}{225}$

$x^{-2} = \frac{1}{15^2}$

$x^{-2} = 15^{-2}$

$x = 15$

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(39)  $\log_3 \frac{1}{243} = X$

$3^X = \frac{1}{243}$

$3^X = \frac{1}{3^5}$

$3^X = 3^{-5}$

$X = -5$

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(40)  $4^3 = 8^{3-X}$

$(2^2)^3 = (2^3)^{3-X}$

$6 = 9 - 3X$

$-9 = -9 - 3X$

$-\frac{3}{-3} = \frac{-9}{-3}$

$X = 1$

Jan 26-8:48 AM

(43)  $\log_7 (10x+3) = 3$

$7^3 = 10x+3$

$343 = 10x+3$

$\frac{343-3}{10} = \frac{10x}{10}$

$X = 34$

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