

Logs invert exponentials  
Base stays on Bottom

Rewrite each equation in exponential form:

1.  $\log_{15} 225 = 2$   
~~15~~ ~~15~~  
 $225 = 15^2$

3.  $\log_3 243 = 5$   
~~3~~ ~~3~~  
 $243 = 3^5$

2.  $\log_{11} 121 = 2$   
~~11~~ ~~11~~  
 $121 = 11^2$

4.  $\log_{216} 6 = \frac{1}{3}$   
~~216~~ ~~216~~  
 $6 = 216^{1/3}$

Rewrite each equation in logarithmic form:

5.  $8^2 = 9$   
~~log<sub>3</sub>~~ ~~log<sub>3</sub>~~  
 $2 = \log_3 9$

7.  $8^3 = 512$   
~~log<sub>8</sub>~~ ~~log<sub>8</sub>~~  
 $3 = \log_8 512$

6.  $49^{1/2} = 7$   
~~log<sub>49</sub>~~ ~~log<sub>49</sub>~~  
 $\frac{1}{2} = \log_{49} 7$

8.  $10^5 = 10000$  ← should have 5 zeros  
~~log<sub>10</sub>~~ ~~log<sub>10</sub>~~  
 $5 = \log_{10} 100000$

Rewrite in exponential form and solve for x, y, or b, if possible:

9.  $\log_2 32 = y$   
~~2~~ ~~2~~  
 $32 = 2^y$   
 $y = 5$

12.  $\log_{82} x = -5$   
~~2~~ ~~2~~  
 $x = 2^{-5}$   
 $x = 1/32$

10.  $\log_{2^2} \frac{1}{2} = y$   
~~2~~ ~~2~~  
 $\frac{1}{2} = 2^y$   
 $-1 = y$

13.  $\log_b 49 = 2$   
~~b~~ ~~b~~  
 $\sqrt{49} = \sqrt{b^2}$   
 $7 = b$

11.  $\log_{2^2} x = 0$   
~~2~~ ~~2~~  
 $x = 2^0$   
 $x = 1$

14.  $\log_b \frac{1}{27} = -3$   
~~b~~ ~~b~~  
 $(\frac{1}{27})^{1/3} = (b^{-3})^{-1/3}$   
 $3 = b$

Evaluate each expression:

$$15. \log_4 64 = 3$$

$$16. \log_6 216 = 3$$

$$17. \log_4 16 = 2$$

$$18. \log_3 \frac{1}{243} = -5$$

$$19. \log_5 125 = 3$$

$$20. \log_2 4 = 2$$

$$21. \log_{343} 7 = \frac{1}{3}$$

$$22. \log_2 16 = 4$$

$$23. \log_{64} 4 = \frac{1}{4}$$

$$24. \log_6 \frac{1}{216} = -3$$

Solve each equation:

$$25. 19^{10x} = 84$$

$$\log_{19} \log_{19}$$

$$10x = \log_{19} 84$$

$$10x = \frac{\log(84)}{\log(19)}$$

$$10x = 1.5 \rightarrow x = 0.15$$

$$26. 6^{x+8} = 32$$

$$\log_6 \log_6$$

$$x+8 = \log_6 32$$

$$x+8 = \frac{\log 32}{\log 6}$$

$$x = -6.07$$

$$27. 2(3^x) = \frac{120}{2}$$

$$\log_3 \log_3$$

$$x = \log_3 60$$

$$x = 3.73$$

$$28. 10(2^x) + 15 = 315$$

$$\frac{-15}{10} \quad \frac{-15}{10}$$

$$\frac{\log(2)}{10} = \frac{300}{10}$$

$$\log_2 2^x = 30$$

$$x = \log_2 30 = 4.91$$

$$29. 10 \log(6x) = -10$$

$$\frac{10}{10} \log(6x) = \frac{-10}{10}$$

$$\frac{6x}{6} = \frac{1}{10}$$

$$x = \frac{1}{60}$$

$$30. -4 \log(-7x) = -12$$

$$\frac{-4}{-4} \log(-7x) = \frac{-12}{-4}$$

$$-\log(-7x) = 3$$

$$x = -142.86$$