

## 6.4 Introduction to Logarithms

## Solutions

Write the following exponential equations in logarithmic form.	
1. $5^3 = 125$ $\log_5 125 = 3$	2. $10^3 = 1000$
3. $4^{\frac{1}{2}} = 2$ $\log_4 2 = \frac{1}{2}$	4. $2^{-1} = \frac{1}{2}$
5. $2^x = 16$ $\log_2 16 = x$	6. $3^x = 9$
7. $a^0 = 1$ $\log_a 1 = 0$	8. $e^1 = e$
Answers: 1. $\log_5 125 = 3$ ; 3. $\log_4 2 = \frac{1}{2}$ ; 5. $\log_2 16 = x$ ; 7. $\log_a 1 = 0$ ;	

Evaluate.

9.  $\log_6 36 = x$

$$6^x = 36$$

$$6^x = 6^2$$

$$x = 2$$

$$\log_6 36 = \boxed{2}$$

10.  $\log_4 64$

11.  $\log_3 81 = x$

$$3^x = 81$$

$$3^x = 3^4$$

$$x = 4$$

$$\log_3 81 = \boxed{4}$$

12.  $\log_5 125$

13.  $\log_7 \sqrt{7} = x$

$$7^x = \sqrt{7}$$

$$7^x = 7^{\frac{1}{2}}$$

$$x = \frac{1}{2}$$

$$\log_7 \sqrt{7} = \boxed{\frac{1}{2}}$$

14.  $\log_2 \sqrt[3]{2}$

15.  $\log 1,000 = x$

$$10^x = 1000$$

$$10^x = 10^3$$

$$x = 3$$

$$\log 1000 = \boxed{3}$$

16.  $\log 0.001$

Answers: 9. 2; 11. 4; 13.  $\frac{1}{2}$ ; 15. 3

Use a calculator to evaluate to two decimal places (x.xx). Some problems will require the change of base formula.

17.  $\log 20 \approx 1.301029996$   
 $\approx 1.30$

18.  $\log 0.06$

19.  $\ln 2 \approx 0.6931471806$   
 $\approx 0.69$

20.  $\ln 10$

21.  $\log 0.01 = -2$

22.  $\log 100,000$

23.  $\ln e^2 = 2$

24.  $\ln \frac{1}{e}$

25.  $\log_2 100 = \frac{\log 100}{\log 2}$   
 $= \frac{2}{\log 2}$   
 $\approx 6.64385619$   
 $\approx 6.64$

26.  $\log_3 79$

27.  $\log_\pi 0.0001 = \frac{\log 0.0001}{\log \pi}$   
 $= \frac{-4}{\log \pi}$   
 $\approx -8.04586347$   
 $\approx -8.05$

28.  $\log_{100} e$

Answers: 17. 1.30; 19. 0.69; 21. -2; 23. 2; 25. 6.64; 27. -8.05