

Name _____ Class _____ Date _____

Logarithms and their functions

Write each equation in logarithmic form.

1. $9^2 = 81$

2. $\frac{1}{64} = \left(\frac{1}{4}\right)^3$

3. $8^3 = 512$

4. $\left(\frac{1}{3}\right)^{-2} = 9$

5. $2^9 = 512$

6. $4^5 = 1024$

7. $5^4 = 625$

8. $10^{23} = 0.001$

Evaluate each logarithm.

9. $\log_2 128$

10. $\log_4 32$

11. $\log_9 (27)$

12. $\log_2 (32)$

In 2004, an earthquake of magnitude 7.0 shook Papua, Indonesia. Compare the intensity level of that earthquake to the intensity level of each earthquake below.

13. magnitude 6.1 in Costa Rica, in 2009

14. magnitude 5.1 in Greece, in 2008

15. magnitude 7.8 in the Fiji Islands, in 2007

16. magnitude 8.3 in the Kuril Islands, in 2006

Graph each logarithmic function.

17. $y = \log x$

18. $y = \log_3 x$

Describe how the graph of each function compares with the graph of the parent function, $y = \log_b x$.

19. $y = \log_3 x - 2$

20. $y = \log_8 (x - 2)$

21. $y = \log_6 (x + 1) - 5$

22. $y = \log_2 (x - 4) + 1$

Write each equation in exponential form.

23. $\log_4 256 = 4$

24. $\log_7 1 = 0$

25. $\log_2 32 = 5$

26. $\log 10 = 1$

27. $\log_5 5 = 1$

28. $\log_8 \frac{1}{64} = -2$

29. $\log_9 59,049 = 5$

30. $\log_{17} 289 = 2$

31. $\log_{56} 1 = 0$

32. A single-celled bacterium divides every hour. The number N of bacteria after t hours is given by the formula $\log_2 N = t$. After how many hours will there be 32 bacteria?

Find the inverse of each function.

33. $y = \log_2 x$

34. $y = \log_{0.7} x$

35. $y = \log_{100} x$

36. $y = \log_8 x$

37. $y = \log_2(4x)$

38. $y = \log(x + 4)$