Algebra 2: Converting and Evaluating Logs

Name: _____ Hour: _____

Convert the following exponential equations to logarithmic equations.

Ex 1: $144 = 12^2$. This would convert to: $\log_{12} 144 = 2$. The base of the log is the base of the exponential. The answer is always an exponent.

Ex 2: $\left(\frac{1}{4}\right)^2 = \left(\frac{1}{16}\right)$. This converts to: $\log_{\frac{1}{4}} \left(\frac{1}{16}\right) = 2$. Everything still goes in the same place as it did in example 1. The base became the base. The exponent is the answer.

Ex 3: $13^{\log_4 7} = x$. This converts to: $\log_{13} x = \log_4 7$. The base of the log is 13, since it's the base of the exponential. Then the answer is always the exponent, which in this case is $\log_4 7$.

1. $y = 3^x$ _____

2. $6859 = 19^3$ _____

3. $12^2 = 144$ _____

4. $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$ _____

5. $\left(\frac{3}{7}\right)^3 = \frac{27}{343}$ _____

6. $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$ _____

7. $\left(\frac{5}{8}\right)^4 = \frac{625}{4096}$ _____

8. $\left(\frac{2}{3}\right)^4 = \frac{16}{81}$ _____

9. $\left(\frac{7}{12}\right)^3 = y$ _____

10. $\left(\frac{4}{5}\right)^2 = \frac{16}{25}$ _____

11. $e^x = y$ _____

12. $e^{\frac{1}{2}} = x$ _____

13. $61^x = y$ _____

14. $22^{43} = y$ _____

15. $11^{\log_{11} 5} = x$ _____

16. $y = 9^{\log_9 x}$ _____

17. $64 = 4^x$ _____

18. $343 = 7^3$ _____

19. $71^x = 14.5$ _____

20. $9^{\log_2 8} = x$ _____

Convert the following Logarithmic Equations to Exponential Equations.

To do this, remember the circle trick we learned. The base of the log turns into the base of the exponential. The answer to the logarithmic equation is an exponent.

Ex 1: $\log_{105} 11025 = 2$ … Converts to $105^2 = 11025$

Ex 2: $\log_8 4096 = 4$ … Converts to $8^4 = 4096$

21. $\log_2 32 = 5$ _____

22. $\log_5 1 = 0$ _____

23. $\log_{10} 10 = 1$ _____

24. $\log_{10} 0.1 = -1$ _____

25. $\log_{\frac{1}{2}} 2 = -1$ _____

26. $\log_3 81 = 4$ _____

27. $\log_5 0.04 = -2$ _____

28. $\log_{\frac{1}{2}} 8 = -3$ _____

29. $\log_9 3 = 2$ _____

30. $\log_4 1024 = 5$ _____

31. $\log_5 \left(\frac{1}{5}\right) = -1$ _____

32. $\log_{36} \left(\frac{1}{6}\right) = -\frac{1}{2}$ _____

33. $\log_8 512 = 3$ _____

34. $\log_{14} 196 = 2$ _____

Evaluating Log Expressions.

To evaluate log expressions, you have to think about the expression as an exponential expression.

Ex 1: $\log_2 8 = 3$ This converts to $2^x = 8$. This equals 3. Since 2 raised to the 3rd power gives you 8.

35. $\log_5 125 =$ _____

36. $\log_7 343 =$ _____

37. $\log_8 1 =$ _____

38. $\log_{12} 12 =$ _____

39. $\log_6 36 =$ _____

40. $\log_4 16 =$ _____

41. $\log_9 729 =$ _____

42. $\log_7 2401 =$ _____

43. $\log_{\frac{1}{4}} \frac{1}{4} =$ _____

44. $\log_6 1 =$_____

45. $\log 100 =$_____

46. $\log_e 1 =$_____