

Reteaching 8-3

Logarithmic Functions as Inverses

OBJECTIVE: Evaluating logarithmic expressions

MATERIALS: None

- A logarithmic function is the inverse or opposite of an exponential function.
- To evaluate logarithmic expressions, use the fact that $x = \log_b y$ means the same as $y = b^x$. Keep in mind that $x = \log y$ means $x = \log_{10} y$.

Example

Evaluate $\log_4 32$.

$$x = \log_4 32 \quad \leftarrow \text{Write the equation in logarithmic form } x = \log_b y.$$

$$32 = 4^x \quad \leftarrow \text{Rewrite in exponential form } y = b^x.$$

$$2^5 = (2^2)^x \quad \leftarrow \text{Rewrite each side of the equation with like bases in order to solve the equation.}$$

$$2^5 = 2^{2x} \quad \leftarrow \text{Simplify.}$$

$$5 = 2x \quad \leftarrow \text{Set the exponents equal to each other.}$$

$$x = \frac{5}{2} \quad \leftarrow \text{Solve for } x.$$

$$\log_4 32 = \frac{5}{2}$$

Exercises

Evaluate the logarithm.

1. $\log_2 64$

2. $\log_4 64$

3. $\log_3 3^4$

4. $\log 10$

5. $\log 0.1$

6. $\log 1$

7. $\log_8 2$

8. $\log_{32} 2$

9. $\log_9 3$

Write each equation in exponential form.

10. $x = \log_3 8$

11. $2 = \log_5 25$

12. $\log 0.1 = -1$

13. $\log 7 = 0.845$

14. $\log 1000 = 3$

15. $-2 = \log 0.01$

16. $\log_3 81 = 4$

17. $\log_{49} 7 = \frac{1}{2}$

18. $\log_8 \frac{1}{4} = -\frac{2}{3}$

19. $\log_2 128 = 7$

20. $\log_5 \frac{1}{625} = -4$

21. $\log_6 36 = 2$