

P5-3: The Meaning of Logarithms

Honors Advanced Algebra

Name: _____

Period: _____ Date: _____

Rewrite each equation in exponential form.

1. $\log_6 36 = 2 \Leftrightarrow 6^2 = 36$

2. $\log_{289} 17 = \frac{1}{2} \Leftrightarrow 289^{\frac{1}{2}} = 17$

3. $\log_{14} \frac{1}{196} = -2 \Leftrightarrow 14^{-2} = \frac{1}{196}$

4. $\log_3 81 = 4 \Leftrightarrow 3^4 = 81$

5. $\log_u \frac{15}{16} = v \Leftrightarrow u^v = \frac{15}{16}$

6. $\log_x y = 4 \Leftrightarrow x^4 = y$

Rewrite each equation in logarithmic form.

7. $64^{\frac{1}{2}} = 8 \Leftrightarrow \log_{64} 8 = \frac{1}{2}$

8. $12^2 = 144 \Leftrightarrow \log_{12} 144 = 2$

9. $9^{-2} = \frac{1}{81} \Leftrightarrow \log_9 \frac{1}{81} = -2$

10. $\left(\frac{1}{12}\right)^2 = \frac{1}{144} \Leftrightarrow \log_{\frac{1}{12}} \frac{1}{144} = 2$

11. $8^b = a \Leftrightarrow \log_8 a = b$

12. $x^w = 123 \Leftrightarrow \log_x 123 = w$

Evaluate each expression.

13. $\log_4 64 = r$
 $4^r = 64$
 $4^r = 4^4$
 $\therefore r = 4$
So, $\log_4 64 = 4$

14. $\log_{343} 7 = r$
 $343^r = 7$
 $(7^3)^r = 7^1$
 $7^{3r} = 7^1$
 $\therefore 3r = 1$
 $r = \frac{1}{3}$
So, $\log_{343} 7 = \frac{1}{3}$

15. $\log_6 \frac{1}{216} = r$
 $6^r = \frac{1}{216}$
 $6^r = \frac{1}{6^3}$
 $6^r = 6^{-3}$
 $\therefore r = -3$
So, $\log_6 \frac{1}{216} = -3$

16. $\log_3 \frac{1}{243} = r$
 $3^r = \frac{1}{243}$
 $3^r = \frac{1}{3^5}$
 $3^r = 3^{-5}$
 $\therefore r = -5$
So $\log_3 \frac{1}{243} = -5$

Simplify each expression.

17. $12^{\log_{12} 144} = 144$

18. $5^{\log_5 17} = 17$

19. $\log_3 3^4 = 4$

20. $\log_7 7^a = a$