

Logarithmic Functions

Name: _____

Date: _____ Period: _____

1. Find the domain and range of the function. Use interval notation.

$$f(x) = 4 \log(x + 2) - 5$$

2. Find the domain and range of the function. Use inequality notation.

$$f(x) = -2 \log(x + 4) + 6$$

Rewrite each equation in exponential form.

1) $\log_{16} 256 = 2$

2) $\log_9 81 = 2$

3) $\log_2 \frac{1}{8} = -3$

4) $\log_5 25 = 2$

5) $\log_{20} 400 = 2$

6) $\log_{17} 289 = 2$

7) $\log_{13} 169 = 2$

8) $\log_5 125 = 3$

9) $\log_9 \frac{1}{81} = -2$

10) $\log_{169} 13 = \frac{1}{2}$

11) $\log_y x = \frac{2}{3}$

12) $\log_y 76 = x$

13) $\log_n 117 = 11$

14) $\log_5 a = b$

Rewrite each equation in logarithmic form.

21) $4^{\frac{1}{2}} = 2$

22) $3^5 = 243$

23) $14^{-2} = \frac{1}{196}$

24) $18^2 = 324$

25) $3^3 = 27$

26) $\left(\frac{1}{6}\right)^3 = \frac{1}{216}$

27) $14^2 = 196$

28) $36^{-\frac{1}{2}} = \frac{1}{6}$

29) $6^3 = 216$

30) $17^2 = 289$

31) $x^y = 101$

32) $v^u = 74$

33) $3^n = 125$

34) $x^y = 130$

Solve each equation. Give an exact solution.

1. $\log_{49} x = -\frac{1}{2}$

2. $3^{4x+1} - 5 = 22$

3. $\log_5 (x + 1) - \log_5 x = 2$

4. $8^{x+2} = 16$

5. $\log_4 (3x - 2) = 2$

6. $\log (2x - 1) + \log x = 1$

Expand each logarithm.

1) $\log(6 \cdot 11)$

2) $\log(5 \cdot 3)$

3) $\log\left(\frac{6}{11}\right)^5$

4) $\log(3 \cdot 2^3)$

5) $\log \frac{2^4}{5}$

6) $\log\left(\frac{6}{5}\right)^6$

7) $\log \frac{x}{y^6}$

8) $\log(a \cdot b)^2$

9) $\log \frac{u^4}{v}$

10) $\log \frac{x}{y^5}$

Property Name	Property
Log of 1	$\log_a 1 = 0$
Log of the same number as base	$\log_a a = 1$
Product Rule	$\log_a(mn) = \log_a m + \log_a n$
Quotient Rule	$\log_a\left(\frac{m}{n}\right) = \log_a m - \log_a n$
Power Rule	$\log_a m^n = n \log_a m$
Change of Base Rule	$\log_b a = \frac{\log_c a}{\log_c b}$ (OR) $\log_b a \cdot \log_c b = \log_c a$
Equality Rule	$\log_b a = \log_c a \Rightarrow a = c$
Number Raised to Log	$a^{\log_a x} = x$
Other Rules	$\log_b a^m = \frac{m}{n} \log_b a$ $-\log_b a = \log_b \frac{1}{a}$ (OR) $= \log_{\frac{1}{b}} a$

Solve each equation.

1) $\log 5x = \log(2x + 9)$

2) $\log(10 - 4x) = \log(10 - 3x)$

3) $\log(4p - 2) = \log(-5p + 5)$

4) $\log(4k - 5) = \log(2k - 1)$

5) $\log(-2a + 9) = \log(7 - 4a)$

6) $2 \log_7 -2r = 0$