Write the equation in its equivalent logarithmic form.

1. $5^3 = 125$

$$\log_5 125 = 3$$

2. $\sqrt{16} = 4$

$$16^{1/2} = 4$$

$$\log_{16} 4 = \frac{1}{2}$$

Write the equation in its equivalent exponential form.

3. $2 = \log_7(49)$

$$7^2 = 49$$

4. $-1 = \log_4\left(\frac{1}{4}\right)$

$$4^{-1} = \frac{1}{4}$$

5. Find the domain of the logarithmic functions.

a. $f(x) = \log(x-7)$

$$x - 7 > 0$$
$$+7 \quad +7$$
$$x > 7 \quad (7, \infty)$$

b. $g(x) = \log_2(9-x)$

$$9 - x > 0$$
$$-9 \quad -9$$
$$-x > -9$$
$$x < 9$$

$$(-\infty, 9)$$

c. $h(x) = \ln(x+2)^2$

Since $(x+2)^2$ is never negative we only need to worry about $=0$

$$x + 2 = 0$$
$$x = 2 \qquad \{x \mid x \neq -2\}$$

e. $p(x) = \log_2\left(\frac{x+3}{x-6}\right)$

$$\frac{x+3}{x-6} > 0$$

$$\xleftarrow{\quad + \quad | \quad - \quad | \quad + \quad}\rightarrow$$
$$-3 \qquad 6$$
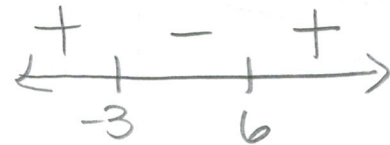
$$(-\infty, -3) \cup (6, \infty)$$

Evaluate the expressions without using a calculator.

6. $\log_9 1 = 0$

$$9^0 = 1$$

7. $\log_7 343 = 3$

$$7^3 = 343$$

8. $\log 1{,}000{,}000 = 6$

$$10^6 = 1{,}000{,}000$$

9. $\log_{81} 3 = \frac{1}{4}$

$$\sqrt[4]{81} = 3$$

10. $\log_5\left(\frac{1}{125}\right) = -3$

$$5^{-3} = \frac{1}{125}$$

11. $\log_7 7 = 1$

$$7^1 = 7$$

Solve the following logarithmic equations.

12. $\log_3(x+5)=4$

$3^4 = x+5$
$81 = x+5$
$\underline{-5 \qquad -5}$
$76 = x$

13. $\log_x 16 = 4$

$x^4 = 16$
$x = 2$

Solve the following exponential equations using logarithms.

14. $10^x = 19$

$\log_{10} 19 = x$
$\log 19 = x$

15. $e^{3x} = 2$

$\dfrac{\ln 2}{3} = \dfrac{3x}{3}$

$\dfrac{\ln 2}{3} = x$

Matching: Match the logarithmic function with the graph of its equation.

$f(x)=\log_2 x$ $g(x)=\log_2(-x)$ $h(x)=\log_2(x-1)$ $p(x)=(\log_2 x)-1$

$q(x)=-\log_2 x$ $F(x)=-\log_2(-x)$ $G(x)=1-\log_2 x$ $H(x)=\log_2(1-x)$

Find First

then look @ transformation

F   q   H   G

g   P   h   f