

Precalculus Logarithms 1 HW9

Key

Write each equation in exponential form.

- ① $\log_4 16 = 2$ 2. $\log_4 64 = 3$ 3. $\log_6 \left(\frac{1}{36}\right) = -2$ 4. $\log_4 8 = 1.5$
 $4^2 = 16$ $4^3 = 64$ $6^{-2} = \frac{1}{36}$ $4^{1.5} = 8$
- ⑤ $\log 1000 = 3$ 6. $\log 40 \approx 1.6$ ⑦ $\ln 8 \approx 2.1$ 8. $\ln 0.2 \approx -1.6$
 $10^3 = 1000$ $10^{1.6} = 40$ $e^{2.1} \approx 8$ $e^{-1.6} = .2$

Solve for x without using a calculator. Leave answers in terms of e , if necessary.

9. $\log x = 3$
 $10^3 = x$
 $1000 = x$

~~10.~~ $\log |x-1| = 3$
 $10^3 = |x-1|$
 $1000 = |x-1|$
 $1001 \text{ or } -999$

11. $\log_6 x = 2$
 $6^2 = x$
 $36 = x$

12. $\ln x = 2$
 $e^2 = x$

~~13.~~ $\ln |x| = 2$
 $e^2 = |x|$
 $\pm e^2 = x$

14. $\ln x = 1.5$
 $e^{1.5} = x$

15. $\log(x^2 - 1) = 2$
 $10^2 = x^2 - 1$
 $100 = x^2 - 1$
 $101 = x^2$

16. $\ln(x^2 - 1) = 2$
 $e^2 = x^2 - 1$
 $\pm \sqrt{e^2 + 1} = x$

17. $\log(\log x) = 1$
 $10 = \log x$
 $10^{10} = x$

18. $\log_5(\log_3 x) = 0$
 $5^0 = \log_3 x$
 $1 = \log_3 x$
 $3^1 = x$
 $3 = x$

19. $\log_6(\log_2 x) = 1$
 $6 = \log_2 x$
 $2^6 = x$
 $64 = x$

20. $\ln(x-2) = 1$
 $e^1 = x-2$
 $e+2 = x$

Precalculus Logarithms 2

Key

Find each logarithm. (Do not use a calculator.)

1. $\log 100 = X$
 $10^X = 100 = 10^2$
 $X = 2$

2. $\log 10000 = X$
 $10^X = 10000 = 10^4$
 $X = 4$

3. $\log 0.0001 = X$
 $10^X = \frac{1}{10000} = \frac{1}{10^4}$
 $10^X = 10^{-4}$
 $X = -4$

4. $\log_2 4 = X$
 $2^X = 4 = 2^2$
 $X = 2$

5. $\log_2 64 = X$
 $2^X = 64 = 2^6$
 $X = 6$

6. $\log_2 2^{10} = X$
 $2^X = 2^{10}$
 $X = 10$

7. $\log_3 9 = X$
 $3^X = 9 = 3^2$
 $X = 2$

8. $\log_3 243 = X$
 $3^X = 243 = 3^5$
 $X = 5$

9. $\log_3 27 = X$
 $3^X = 27 = 3^3$
 $X = 3$

10. $\log_5 .2 = X$
 $5^X = .2 = \frac{1}{5} = 5^{-1}$
 $X = -1$

11. $\log_5 \frac{1}{125} = X$
 $5^X = \frac{1}{125} = \frac{1}{5^3} = 5^{-3}$
 $X = -3$

12. $\log_5 \sqrt[3]{5} = X$
 $5^X = \sqrt[3]{5} = 5^{1/3}$
 $X = 1/3$

13. $\log_4 64 = X$
 $4^X = 64 = 4^3$
 $X = 3$

14. $\log_4 \sqrt[4]{4} = X$
 $4^X = \sqrt[4]{4} = 4^{1/4}$
 $X = 1/4$

15. $\log_4 1 = X$
 $4^X = 1 = 4^0$
 $X = 0$

16. $\ln e = X$
 $e^X = e^1$
 $X = 1$

17. $\ln \frac{1}{e} = X$
 $e^X = \frac{1}{e} = e^{-1}$
 $X = -1$

18. $\ln \sqrt{e} = X$
 $e^X = \sqrt{e} = e^{1/2}$
 $X = 1/2$

Precalculus Logarithms 3

Key

Write each expression as a rational number or as a single logarithm.

① $\log 2 + \log 3 + \log 4$
 $\log(2 \cdot 3 \cdot 4) = \log 24$

3. $\frac{1}{2} \log_6 9 + \log_6 5$
 $\log_6 9^{1/2} + \log_6 5$
 $\log_6 15$

⑤ $2 \ln 6 - \ln 3$
 $\ln 6^2 = \ln 36$
 $\ln \frac{36}{3} = \ln 12$

7. $\log M - 3 \log N$
 $\log \frac{M}{N^3}$

★ 8. $4 \log M + \frac{1}{2} \log N$
 $\log M^4 + \log N^{1/2} = \log M^4 N^{1/2}$
 $M^4 N^{1/2} = \log M^4(N)$

⑨ $\log A + 2 \log B - 3 \log C$
 $\log A + \log B^2 - \log C^3$
 $\log(A B^2) - \log C^3$
 $\log \frac{A B^2}{C^3}$

⑩ $\frac{1}{2} (\log_b M + \log_b N - \log_b P)$
 $\frac{1}{2} \log_b \frac{MN}{P} = \log_b \sqrt{\frac{MN}{P}}$

11. $\frac{1}{3} (2 \log_b M - \log_b N - \log_b P)$
 $\frac{1}{3} (\log_b \frac{M^2}{N P}) = \log_b \sqrt[3]{\frac{M^2}{N P}}$

12. $5 (\log_b A + \log_b B) - 2 \log_b C$
 $\log_b \frac{A^5 B^5}{C^2} = \log_b \frac{(AB)^5}{C^2}$

13. $\log \pi + 2 \log r$
 $\log \pi r^2$

14. $\log 4 - \log 3 + \log \pi + 3 \log r$
 $\log \frac{4 \pi r^3}{3}$

15. $\ln 2 + \ln 6 - \frac{1}{2} \ln 9$
 $\ln \frac{2 \cdot 6}{3} = \ln 4$

16. $\ln 10 - \ln 5 - \frac{1}{3} \ln 8$
 $\ln \frac{10}{5 \cdot 2} = \ln 1 = 0$

Precalculus Logarithms 4

Express y in terms of x ($y = \#x$)

1. $\log y = 2 \log x$
 $y = x^2$

2. $\log y = 3 \log x + \log 5$
 $\log y = \log 5x^3$
 $y = 5x^3$

3. $\ln y - \ln x = 2 \ln 7$
 $\ln y = \ln 7^2 + \ln x$
 $y = 49x$

4. $\ln y = 2 \ln x - \ln 4$
 $\ln y = \ln x^2 - \ln 4$
 $y = \frac{x^2}{4}$ or $\frac{1}{4}x^2$

5. $\log y = -\log x$
 $y = \frac{1}{x}$

6. $\log y = 2 \log x + \log 2$
 $y = 2x^2$

7. $\log y + \frac{1}{2} \log x = \log 3$
 $\log y = \log 3 - \log \sqrt{x}$
 $\log y = \log \frac{3}{\sqrt{x}}$
 $y = \frac{3}{\sqrt{x}}$ or $y = \frac{3\sqrt{x}}{x}$

8. $\ln y = \frac{1}{3} (\ln 4 + \ln x)$
 $\ln y = \ln (4x)^{1/3}$
 $y = \sqrt[3]{4x}$

9. $\log y = 1.2x - 1$
 $y = 10^{1.2x - 1}$

10. $\ln y = 1.2x - 1$
 $y = e^{1.2x - 1}$

Simplify each expression.

11. $\ln e^3$
3

12. $\ln \frac{1}{e}$
-1

13. $\ln \sqrt{e}$
 $\frac{1}{2}$

14. $e^{\ln x}$
x

15. $e^{3 \ln x}$
 x^3
 $(\ln x)^3$

16. $e^{\ln \sqrt{x}}$
 \sqrt{x}
 $\ln \sqrt{x} = \frac{1}{2} \ln x$

17. $10^{2 \log 6}$
36
 $(\log 6)^2$

18. $10^{3 + \log 4}$
 $10^3 \cdot 10^{\log 4}$
 $1000 \cdot 4$
4000

Precalculus Logarithms 5

Key

Solve each equation.

① $\log_2 (x+2) + \log_2 5 = 4$

$\log_2 (x+2)(5) = 4$

$\log_2 (5x+10) = 4$

$2^4 = 5x+10$

$6 = 5x$

$6/5 = x$

3. $\log_6 (x+1) + \log_6 x = 1$

$\log_6 (x+1)(x) = 1$

$\log_6 (x^2+x) = 1$

$6 = x^2+x$

$0 = x^2+x-6$

$0 = (x+3)(x-2)$

$x = -3, 2$

5. $\log_4 (x-4) + \log_4 x = \log_4 5$

$\log_4 (x-4)(x) = \log_4 5$

$(x^2-4/x) = 5$

$x^2-4/x-5 = 0$

$(x-5)(x+1) = 0$

$x = 5, -1$

7. $\ln (x^2) = 16$

$(e^{16})^{1/2} = (x^2)^{1/2}$

$e^8 = x$

9. $\log_{10} x^2 = 6$

$(10^6)^{1/2} = (x^2)^{1/2}$

$10^3 = x$

$1000 = x$

② $\log_4 (2x+1) - \log_4 (x-2) = 1$

$\log_4 \frac{(2x+1)}{(x-2)} = 1$

$4 = \frac{2x+1}{x-2}$

$4(x-2) = 2x+1$

$2x = 9$

$x = 9/2$

4. $\log_3 x + \log_3 (x-2) = 1$

$\log_3 (x)(x-2) = 1$

$\log_3 (x^2-2x) = 1$

$3 = x^2-2x$

$0 = x^2-2x-3$

$0 = (x-3)(x+1)$

$x = 3, -1$

⑥ $\log_2 (x^2+8) = \log_2 x + \log_2 6$

$\log_2 (x^2+8) = \log_2 (6x)$

$x^2-6x+8 = 0$

$(x-4)(x-2) = 0$

$x = 4, 2$

8. $\ln \frac{1}{x} = -5$

$e^{-5} = \frac{1}{x}$

$(e^{-5}) = (x^{-1})$

$e^5 = x$

10. $\log_3 x + \log_3 (x^2-8) = \log_3 8x$

$\log_3 (x)(x^2-8) = \log_3 (8x)$

$\log_3 (x^3-8x) = \log_3 (8x)$

$x^3-8x = 8x$

$x(x^2-16) = 0$

$x^3-16x = 0$ $x(x-4)(x+4) = 0$

11. $\ln x = -3$

$e^{-3} = x$

$\frac{1}{e^3} = x$

12. $\ln x = 2$

$e^2 = x$

13. $\log_{10}(x+4) - \log_{10} x = \log_{10}(x+2)$

$\frac{\log_{10}(x+4)}{x} = \frac{\log_{10}(x+2)}{x}$

$(x+4) = (x)(x+2)$

$(x+4) = (x^2 + 2x)$

$x^2 + x - 4 = 0$

$\frac{-1 \pm \sqrt{1^2 - (4)(1)(-4)}}{2(1)} = \frac{-1 \pm \sqrt{17}}{2}$

no neg
so only $\frac{-1 + \sqrt{17}}{2}$

14. $\log_4 x - \log_4(x-1) = \frac{1}{2}$

$\log_4 \frac{x}{x-1} = \frac{1}{2}$

$2(x-1) = x$

$(x-1) 4^{1/2} = \frac{x}{x-1} \cdot 2(x-1)$
 $2x - 2 = x$
 $x = 2$

15. $\log_2 8 + \log_2 3 = \log_2 x$

$\log_2(8)(3) = \log_2 x$

$\log_2 24 = \log_2 x$
 $24 = x$

16. $\log x + 2 \log x - 5 \log x = \log \frac{1}{81}$

$\frac{\log(x)(x^2)}{(x^5)} = \log \frac{1}{81}$

$\log x^{3-5} = \log \frac{1}{81}$

$\log x^{-2} = \log \frac{1}{81}$
 $(x^{-2})^{-1/2} = (81)^{1/2}$
 $x = 9$

17. $2 \log_5 x = \frac{1}{2} \log_5 16 + \frac{1}{3} \log_5 64 + \frac{1}{4} \log_5 256$

$\log_5 x^2 = \log_5 (16^{1/2})(64^{1/3})(256^{1/4})$

$\log_5 x^2 = \log_5 (4)(4)(4)$

$x^2 = 64 \quad x = \pm 8 \rightarrow$ no neg. so only +8

18. $\ln 7x = \ln 9 + \ln(x-6)$

$\ln 7x = \ln 9(x-6)$

$\ln 7x = \ln 9x - 521$

$7x = 9x - 521$

$-2x = -521$

$x = 27$

Solve each equation

$$\begin{aligned} \textcircled{1} \quad 2^x &= 46 \\ \log 2^x &= \log 46 \\ x \log 2 &= \log 46 \\ x &= \frac{\log 46}{\log 2} \end{aligned}$$

$$\begin{aligned} 2. \quad 3^x &= 72 \\ x \log 3 &= \log 72 \\ \log 3 & \quad \log 3 \\ x &\approx \underline{\underline{3.89279}} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad 6^{2x} &= 63 \\ \frac{2x \log 6}{\log 6} &= \frac{\log 63}{\log 6} \\ 2x &= \frac{2.3123}{2} \end{aligned}$$

$$4. \quad 5^{3x} = 128$$

$$\begin{aligned} \textcircled{5} \quad x &= \log_5 121 \\ 5^x &= 121 \\ x \log 5 &= \log 121 \\ \log 5 & \quad \log 5 \\ x &\approx \underline{\underline{2.979792}} \end{aligned}$$

$$\begin{aligned} 6. \quad \frac{x \log 6}{\log 6} &= \frac{\log 63}{\log 6} \\ x &= \log_4 75 \\ 4^x &= 75 \\ x \log 4 &= \log 75 \\ \log 4 & \quad \log 4 \\ x &\approx \underline{\underline{3.11441}} \end{aligned}$$

$$\begin{aligned} 3x \log 5 &= \log 128 \\ \log 5 & \quad \log 5 \\ 3x &= \underline{\underline{3.0147359}} \\ x &\approx \underline{\underline{1.004912}} \end{aligned}$$

$$7. \quad x = \log_3 16$$

$$8. \quad x = \log_4 35$$

$$\textcircled{9} \quad 2^{-x} = 10$$

$$\begin{aligned} 3^x &= 16 \\ x \log 3 &= \log 16 \\ \log 3 & \quad \log 3 \\ x &\approx \underline{\underline{2.52372}} \end{aligned}$$

$$\begin{aligned} 4^x &= 35 \\ x \log 4 &= \log 35 \\ \log 4 & \quad \log 4 \\ x &\approx \underline{\underline{2.526464}} \end{aligned}$$

$$\begin{aligned} -x \log 2 &= \log 10 \\ \log 2 & \quad \log 2 \\ -x &= 3.3219 \\ x &= \underline{\underline{-3.3219}} \end{aligned}$$

$$10. \quad 3^{-x} = 18$$

$$11. \quad 2^x = 14$$

$$12. \quad 3^x = 3\sqrt{2}$$

$$\begin{aligned} -x \log 3 &= \log 18 \\ \log 3 & \quad \log 3 \\ -x &= 2.63093 \\ x &\approx \underline{\underline{-2.63093}} \end{aligned}$$

$$\begin{aligned} x \log 2 &= \log 14 \\ \log 2 & \quad \log 2 \\ x &\approx \underline{\underline{3.80735}} \end{aligned}$$

$$\begin{aligned} x \log 3 &= \log 3\sqrt{2} \\ \log 3 & \quad \log 3 \\ x &\approx \underline{\underline{1.31546}} \end{aligned}$$

$$\textcircled{13} \quad 2.2^{x-5} = 9.32$$

$$14. \quad 9^{x-5} = 6.38$$

$$\begin{aligned} (x-5) \log 2.2 &= \log 9.32 \\ \log 2.2 & \quad \log 2.2 \\ x-5 &= \underline{\underline{2.8311}} \\ x &\approx \underline{\underline{7.8311}} \end{aligned}$$

$$\begin{aligned} (x-5) \log 9 &= \log 6.38 \\ \log 9 & \quad \log 9 \\ x-5 &= \underline{\underline{.84341}} \\ \frac{+5}{+5} & \quad \frac{+5}{+5} \\ x &\approx \underline{\underline{5.84341}} \end{aligned}$$

$$15. \quad x = \log_7 43.5$$

$$7^x = 43.5$$

$$\frac{x \log 7}{\log 7} = \frac{\log 43.5}{\log 7}$$

$$x \approx \underline{1.93882}$$

$$16. \quad x = \log_8 28.3$$

$$8^x = 28.3$$

$$\frac{x \log 8}{\log 8} = \frac{\log 28.3}{\log 8}$$

$$x \approx \underline{1.60758}$$

$$17. \quad x^{2/3} = 27.6 \text{ OR } (x^{2/3})^{3/2} = 27.6^{3/2}$$

$$\frac{2}{3} \log x = \log 27.6$$

$$\frac{2}{3} \log x = 1.44090908 \left(\frac{3}{2}\right)$$

$$\log x = 2.16136$$

$$10^{2.16136} = x$$

$$19. \quad 6^{x-2} = 3^x \quad x \approx 144.9973$$

$$(x-2) \log 6 = x \log 3$$

$$x \log 6 - 2 \log 6 = x \log 3$$

$$x \log 6 - x \log 3 = 2 \log 6$$

$$x \left(\log \frac{6}{3}\right) = \log 6^2$$

$$21. \quad 5^{2x} = 7^{x-2}$$

$$2x \log 5 = (x-2) \log 7$$

$$2x \log 5 = x \log 7 - 2 \log 7$$

$$2x \log 5 - x \log 7 = -2 \log 7$$

$$x (\log 25 - \log 7) = \log(7^2)$$

$$.5528x = 7.690196 \quad x \approx \underline{3.057297}$$

$$23. \quad \log_{27} \frac{1}{3} = x$$

$$27^x = \frac{1}{3}$$

$$3^{3x} = 3^{-1}$$

$$x = \underline{-1/3}$$

$$18. \quad x^{3/4} = 89.8$$

$$\frac{3}{4} \log x = \log 89.8$$

$$\log x = 1.953276 \left(\frac{4}{3}\right)$$

$$\log x = 2.604368$$

$$10^{2.604368} = x$$

$$x \approx \underline{402.131413}$$

$$20. \quad 11^{x-3} = 4^{x-2}$$

$$(x-3) \log 11 = (x-2) \log 4$$

$$x \log 11 - 3 \log 11 = x \log 4 - 2 \log 4$$

$$x \log 11 - x \log 4 = 3 \log 11 - 2 \log 4$$

$$x (\log 11 - \log 4) = \log 11^3 - \log 4^2$$

$$4.39332(x) = 1.920058$$

$$\log_x 6 = 1$$

$$x^1 = 6$$

$$\log x = \log 6$$

$$x = \underline{6}$$

$$x \log \left(\frac{11}{4}\right) = \frac{\log 11^3 - \log 4^2}{\log 11 - \log 4}$$

$$\log \frac{11}{4}$$

$$24. \quad \log_3 \sqrt[4]{5} = x$$

$$3^x = 5^{1/4}$$

$$\frac{x \log 3}{\log 3} = \frac{1/4 \log 5}{\log 3}$$

$$x \approx \underline{0.3662433}$$

Simplify.

$$1. \log_3 \frac{1}{27} = 3^x = \frac{1}{27}$$

$$3^x = 3^{-3}$$

$$\underline{\underline{x = -3}}$$

$$2. \log_{10} 100000 = 10^x = 10^5$$

$$\underline{\underline{x = 5}}$$

$$3. \ln e^{\sqrt{2}} = x \ln e^{\sqrt{2}} = 2^{\sqrt{2}}$$

$$\underline{\underline{x = \sqrt{2}}}$$

$$4. 10^{4 + \log 3}$$

$$10^4 \cdot 10^{\log 3}$$

$$10000 \cdot 3$$

$$\underline{\underline{30,000}}$$

$$5. e^{\ln 2}$$

$$\underline{\underline{2}}$$

$$6. \log_5 .04$$

$$\frac{\log .04}{\log 5}$$

$$\underline{\underline{-2}}$$

$$7. \log_6 27 + \log_6 8$$

$$\log_6 (27)(8)$$

$$\log_6 216$$

$$\log_6 6^3 = \underline{\underline{3}}$$

$$8. \log_5 4 - \log_5 100$$

$$\log_5 \frac{4}{100}$$

$$\log_5 5^{-2} = \underline{\underline{-2}}$$

$$9. 2 \log_8 2 + 2 \log_8 4$$

$$\log_8 (2^2)(4^2)$$

$$\log_8 (4)(16)$$

$$\log_8 64 = \log_8 8^2 = \underline{\underline{2}}$$

$$10. \ln e^{-3} - 2 \ln e$$

$$-3 \ln e - 2 \ln e = \ln e^{-3} - \ln e^2$$

$$= \ln e^{-3-2} = \underline{\underline{-5}}$$

Solve for x.

$$11. \log x + \log (x+2) = \log 15$$

$$\log (x)(x+2) = \log 15$$

$$x^2 + 2x - 15 = 0$$

$$(x+5)(x-3) = 0$$

$$\underline{\underline{x = -5, 3}}$$

$$12. \log_5 (x+8) - \log_5 (x+3) = \log_5 x$$

$$\log_5 \frac{(x+8)}{(x+3)} = \log_5 x$$

$$x+8 = x(x+3)$$

$$x+8 = x^2 + 3x$$

$$0 = x^2 + 2x - 8$$

$$(x+4)(x-2)$$

$$\underline{\underline{x = -4, 2}}$$

$$13. \log_5 x = 3$$

$$5^3 = x$$

$$\underline{\underline{125 = x}}$$

$$14. \log x = -4$$

$$10^{-4} = x$$

$$\underline{\underline{\frac{1}{10000} = x}}$$

15. $3^x = 27.5$
 $x \log 3 = \log 27.5$
 $x = \frac{\log 27.5}{\log 3}$

16. $2^{x-1} = 15.2$
 $(x-1) \log 2 = \log 15.2$
 $x-1 = \frac{\log 15.2}{\log 2}$
 $x-1 = 1.7035$
 $x = 4.92599$

17. $\log_3 25.4 = x$
 $3^x = 25.4$
 $x \log 3 = \log 25.4$
 $x = \frac{\log 25.4}{\log 3} = 2.944$

18. $\log_7 58 = x$
 $7^x = 58$
 $x \log 7 = \log 58$
 $x = \frac{\log 58}{\log 7} = 2.066$

19. $\log_4(x-3) + \log_4(x+3) = 2$
 $\log_4(x-3)(x+3) = 2$
 $4^2 = (x-3)(x+3)$
 $16 = x^2 - 9$
 $25 = x^2$
 $x = 5$

20. $\log(x+2) + \log(x-7) = 1$
 $\log(x+2)(x-7) = 1$
 $10^1 = (x+2)(x-7)$
 $10 = x^2 - 5x - 14$
 $0 = x^2 - 5x - 24$
 $(x-8)(x+3)$
 $x = 8, -3$

21. $4^{x+7} = 8^{x-2}$

22. $\log_5 90 = x$
 $5^x = 90$
 $x \log 5 = \log 90$
 $x = \frac{\log 90}{\log 5} = 2.79$

$(x+7) \log 4 = (x-2) \log 8$
 $x \log 4 + 7 \log 4 = x \log 8 - 2 \log 8$
 $x \log 4 - x \log 8 = -2 \log 8 - 7 \log 4$
 $x(\log 4 - \log 8) = -2 \log 8 - 7 \log 4$
 $x(\log .5) = \log \frac{1}{64}$
 $x \log .5 = -6.020599913$
 $\log .5 = -0.30102999566$
 $x = 20$

23. $5^{x-5} = 65$
 $(x-5) \log 5 = \log 65$
 $(x-5) = \frac{\log 65}{\log 5}$
 $x = 1.9685 + 5$
 $x = 7.5936$

24. $9^{x-2} = 5^x$
 $(x-2) \log 9 = x \log 5$
 $x \log 9 - 2 \log 9 = x \log 5$
 $x(\log 9 - \log 5) = 2 \log 9$
 $x = \frac{2 \log 9}{\log 9 - \log 5} = 7.475$

25. $12^{x-3} = 5^{x-1}$
 $(x-3) \log 12 = (x-1) \log 5$
 $x \log 12 - 3 \log 12 = x \log 5 - 1 \log 5$
 $(\log 12 - \log 5) = \frac{3 \log 12 - 1 \log 5}{\log 12 - \log 5}$
 $x = \frac{3.2375 - .69897}{1.07918 - .69897} = 6.6767$

Set-up a table of values

26. $\log_3 x = y$ $3^y = x$

27. $\log_5(x+4) = y$
 $5^y = x+4$

x	y
1	0
3	1
9	2
27	3
x	y
-3	0
1	1
21	2
121	3

Precalculus Logarithm Review #2

Key

Simplify

1. $\log .001$
 $\log_{10} 10^{-3}$
 -3

2. $\ln e^{4/5}$
 $4/5$

3. $\log_7 \frac{1}{49}$
 $\log_7 7^{-2}$

4. $10^{\log 2 + 3}$
 $10^{\log 2} \cdot 10^3$
 $2 \cdot 1000$

5. $\log_4 256$
 $\log_4 4^4$
 4

6. $e^{\ln 2\sqrt{2}}$

7. $\log_6 24 + \log_6 9$
 $\log_6 (24)(9)$
 $\log_6 216 = \log_6 6^3$

8. $3 \ln e - 8 \ln e$
 $\frac{\ln e^3}{\ln e} = \ln e^{3-8}$

9. $2 \log_6 3 + 2 \log_6 2$
 $\log_6 9(4)$
 $\log_6 36 = 2$

10. $\log_4 128 - \log_4 2$
 $\log_4 \frac{128}{2}$
 $\log_4 64$
 $\log_4 4^3$

Solve for x.

11. $\log_3 (x+7) + \log_3 x = \log_3 (-12)$
 $\log_3 (x+7)(x) = \log_3 (-12)$
 $x^2 + 7x + 12 = 0 \quad (x+4)(x+3)$

12. $2 \log x - \log 5 = \log (x-10)$
 $\log \frac{x^2}{5} = \log (x-10)$
 $\frac{x^2}{5} = x-10$
 $x^2 - 5x + 50 = 0$
 $\frac{5 \pm \sqrt{25 - 4(1)(50)}}{2} = \frac{5 \pm \sqrt{-175}}{2}$

13. $\log_6 x = -2$
 $6^{-2} = x$
 $\frac{1}{36} = x$

14. $\ln x = 3$
 $e^3 = x$

- 1. -3
- 2. 4/5
- 3. -2
- 4. 2000
- 5. 4
- 6. 2√2
- 7. 3
- 8. -5
- 9. 2
- 10. 3

- 11. -4, -3
 or No Solution
 can't take log of a neg. number
- 12. $\frac{5 \pm 5i\sqrt{7}}{2}$
 $\frac{5 \pm i\sqrt{175}}{2} = \frac{5 \pm 5i\sqrt{7}}{2}$
- 13. 1/36
- 14. e^3 or 20.09