

Write each equation in its inverse form.

LOGARITHMIC FORM

EXPONENTIAL FORM

1.) $\log_{\frac{1}{5}} 125 = -3$	$125 = \frac{1}{5}^{-3}$
2.) $\log_{18} 324 = 2$	$324 = 18^2$
3.) $4 = \log_4 256$	$4^4 = 256$
4.) $\frac{3}{2} = \log_{121} 1331$	$121^{\left(\frac{3}{2}\right)} = 1331$
5.) $\log_9 \frac{1}{81} = -2$	$\frac{1}{81} = 9^{-2}$
6.) $3 = \log_{\frac{1}{8}} \frac{1}{512}$	$\left(\frac{1}{8}\right)^3 = \frac{1}{512}$
7.) $\log_{\left(\frac{1}{12}\right)} 1728 = -3$	$1728 = \frac{1}{12}^{-3}$

Evaluate the expression using the change of base formula. If necessary, round to four decimal places.

8.) $\log_{14} 196$

$$\frac{\log 196}{\log 14}$$

$$\boxed{2}$$

9.) $\log_7 \frac{1}{343}$

$$\frac{\log \frac{1}{343}}{\log 7}$$

$$\boxed{-3}$$

10.) $\log_{36} 216$

$$\frac{\log 216}{\log 36}$$

$$\boxed{1.5}$$

Expand or condense each logarithm.

11.) $\frac{1}{3} [2\log_4 4 - 2\log_4 5 - 5\log_4 x]$

$$\frac{1}{3} [\log_4 4^2 - \log_4 5^2 - \log_4 x^5]$$

$$\frac{1}{3} [\log_4 \frac{16}{25x^5}]$$

$$\log_4 \sqrt[3]{\frac{16}{25x^5}}$$

or: $\log_4 (\frac{16}{25x^5})^{1/3}$

13.) $\frac{1}{2} (\ln 7 + \ln x) - 3 \ln y$

$$\frac{1}{2} (\ln 7x) - \ln y^3$$

$$\ln \sqrt{7x} - \ln y^3$$

$$\ln \frac{\sqrt{7x}}{y^3}$$

or: $\ln \frac{(7x)^{1/2}}{y^3}$

15.) $\log \frac{7x^2}{\sqrt{yz^3}}$

$$\log 7 + 2 \log x - \frac{1}{2} \log y - 3 \log z$$

12.) $\log_8 8a^5\sqrt{3}$

$$\log_8 8 + \log_8 a^5 + \log_8 \sqrt{3}$$

$$\log_8 8 + 5 \log_8 a + \frac{1}{2} \log_8 3$$

14.) $\ln \frac{a^2 b^3}{c^4}$

$$2 \ln a + 3 \ln b - 4 \ln c$$

16.) $2 \ln x + \ln(x-5) - 3 \ln y$

$$\ln \frac{x^2(x-5)}{y^3}$$

Solve. If necessary, round to 4 decimal places. Don't forget to check your answers!

17.) $49^{2x-3} = 343^{2x-6}$

$$7^{2(2x-3)} = 7^{3(2x-6)}$$

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

$$4x-6 = 6x-18$$

$$12 = 2x$$

$$\boxed{6=x}$$

$$\log 49 = \log 343$$

$$(2x-3) \frac{\log 49}{\log 49} = (2x-6) \frac{\log 343}{\log 49}$$

$$(2x-3) = (2x-6)(1.5)$$

$$2x-3 = 3x-9$$

$$\boxed{6=x}$$

18.) $2^x + 13 = 35$

$$2^x = 22$$

$$\log 2^x = \log 22$$

$$x \frac{\log 2}{\log 2} = \frac{\log 22}{\log 2}$$

$$\boxed{x = 4.4594}$$

$$19.) 7e^{2x} = 17.5$$

$$e^{2x} = 2.5$$

$$\ln e^{2x} = \ln 2.5$$

$$2x = \ln 2.5$$

$$2x = .9163$$

$$\boxed{x = .4582}$$

$$21.) \log_6 3x = 2$$

$$3x = 6^2$$

$$3x = 36$$

$$\boxed{x = 12}$$

$$23.) -2e^{9x-1} + 6 = -58$$

$$-2e^{9x-1} = -64$$

$$e^{9x-1} = 32$$

$$9x-1 = \ln 32$$

$$9x-1 = 3.4657$$

$$\boxed{x = .4962}$$

$$25.) \log(-11x+2) = \log(x^2+30)$$

$$-11x+2 = x^2+30$$

$$x^2+11x+28=0$$

$$(x+7)(x+4)=0$$

$$\boxed{x = -7, -4}$$

$$20.) \log_2(x) + \log_2(2x+3) = \log_2 9$$

$$\log_2 x(2x+3) = \log_2 9$$

$$2x^2+3x=9$$

$$2x^2+3x-9=0$$

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

$$\boxed{x = 3/2, -3}$$

$$22.) 4^{2x^2+3x} = \left(\frac{1}{32}\right)^{3x+1}$$

$$(2x^2+3x) \frac{\log 4}{\log 4} = (3x+1) \frac{\log \frac{1}{32}}{\log 4}$$

$$(2x^2+3x) = (3x+1)(-2.5)$$

$$2x^2+3x = -7.5x-2.5$$

$$2x^2+10.5x+2.5=0$$

$$4x^2+21x+5=0$$

$$24.) \ln(1-3x) = 5$$

$$(4x+1)=0$$

$$(x+5)=0$$

$$1-3x = e^5$$

$$\boxed{x = -1/4, -5}$$

$$1-3x = 148.4132$$

$$-3x = 147.4132$$

$$\boxed{x = -49.1377}$$

$$26.) 5^{3x+7} = 30$$

$$(3x+7) \frac{\log 5}{\log 5} = \frac{\log 30}{\log 5}$$

$$3x+7 = 2.1133$$

$$3x = -4.8867$$

$$\boxed{x = -1.6289}$$

27.) $2\log_4 x = 5$

$$\log_4 X = 2.5$$

$$X = 4^{2.5}$$

$$\boxed{X = 32}$$

28.) $\log_3 2x - \log_3(x-3) = 1$

$$\log_3 \frac{2x}{x-3} = 1$$

$$\frac{2x}{x-3} = 3$$

$$\frac{2x}{x-3} = \frac{3}{1}$$

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

$$2x = 3x - 9$$

$$\boxed{X = 9}$$

29.) Describe the transformation of $f(x) = -\ln(x+5)$ compared to the parent function $f(x) = \ln x$.

- a. Reflected over the x - axis, left 5
- b. Reflected over the y - axis, right 5
- c. Reflected over the x - axis, right 5
- d. Reflected over the y - axis, left 5

30.) Describe the transformation of $f(x) = \log(2-x)$ compared to the parent function $f(x) = \ln x$.

$$\log - (x-2)$$

- a. Reflected over the x - axis, left 2
- b. Reflected over the y - axis, right 2
- c. Reflected over the x - axis, right 2
- d. Reflected over the y - axis, left 2