Name: _____ Date: _____ Period: _____

7.3-7.4 Review

Write each of the following in logarithmic form.

1. $9^2 = 81$

$\log_9 81 = 2$

2. $\frac{1}{64} = \left(\frac{1}{4}\right)^3$

$\log_{1/4} \frac{1}{64} = 3$

3. $8^3 = 512$

$\log_8 512 = 3$

4. $\left(\frac{1}{3}\right)^{-2} = 9$

$\log_{1/3} 9 = -2$

Evaluate each logarithm.

5. $\log_4 64$

$4^x = 64$

$x = 3$

6. $\log_9 81$

$9^x = 81$

$x = 2$

7. $\log_7 7^6$

$7^x = 7^6$

$x = 6$

8. $\log_3 \frac{1}{81}$

$3^x = \frac{1}{81}$

$x = -4$

Graph each logarithmic function. State the domain, range, asymptotes and the x-intercept.

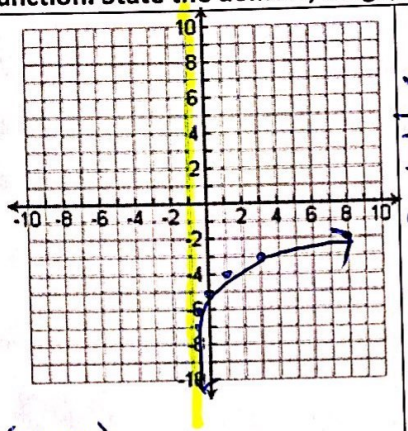
9. $y = \log_2(x+1) - 5$

x	2^x
-2	.25
-1	.5
0	1
1	2
2	4

x	$\log_2 x$
.25	-2
.5	-1
1	0
2	1
4	2

left 1, down 5

x	y
-.75	-7
-.5	-6
0	-5
1	-4
3	-3



D: $(-1, \infty)$
R: $\mathbb{R}$
asy: $x = -1$
x-int = $(31, 0)$

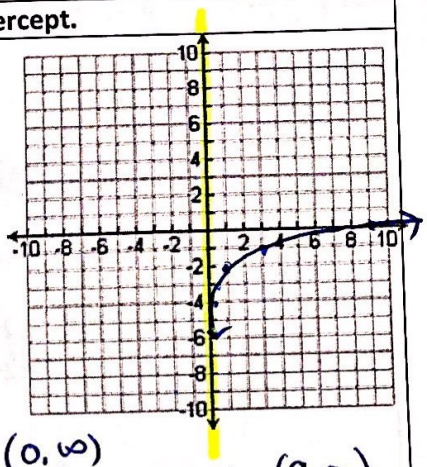
10. $y = \log_3 x - 2$

x	3^x
-2	$\frac{1}{9}$
-1	$\frac{1}{3}$
0	1
1	3
2	9

x	$\log_3 x$
$\frac{1}{9}$	-2
$\frac{1}{3}$	-1
1	0
3	1
9	2

down 2

x	y
$\frac{1}{9}$	-4
$\frac{1}{3}$	-3
1	-2
3	-1
9	0



D: $(0, \infty)$
R: $\mathbb{R}$
asy: $x = 0$
x-int $(9, 0)$

Describe the transformations for the following graphs.

11. $y = 2\log_6(x+1) - 5$

Stretch, left 1, down 5

12. $y = \log_2(x-4) + 1$

right 4, up 1

Write each equation in exponential form.

13. $\log_4 256 = 4$

$4^4 = 256$

14. $\log_7 1 = 0$

$7^0 = 1$

15. $\log_8 \frac{1}{64} = -2$

$8^{-2} = \frac{1}{64}$

Find the inverse of each function.

16. $y = \log_8 x$

$x = \log_8 y$

$8^x = y^{-1}$

17. $y = \log_2 4x$

$x = \log_2 4y$

$2^x = 4y$

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

18. $y = \log(x+4)$

$x = \log(y+4)$

$10^x = y+4$

$10^x - 4 = y^{-1}$

Write each expression as a single logarithm.

19. $\log_5 4 + \log_5 3$

$\log_5(4 \cdot 3)$

$\log_5 12$

20. $(\log 3 - \log 4) - \log 2$

$\log\left(\frac{3}{4}\right) - \log 2$

$\log\left(\frac{3}{4} \div 2\right) \rightarrow \log\left(\frac{3}{4} \cdot \frac{1}{2}\right)$

$\log \frac{3}{8}$

21. $2\log x - 3\log y$

$\log x^2 - \log y^3$

$\log \frac{x^2}{y^3}$

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

$\log x^{1/2} + \log y^{1/3} - \log z^2$

$\log \frac{x^{1/2} \cdot y^{1/3}}{z^2}$

23. $\frac{1}{2}\log r + \frac{1}{3}\log s - \frac{1}{4}\log t$

$\log r^{1/2} + \log s^{1/3} - \log t^{1/4}$

$\log \frac{r^{1/2} s^{1/3}}{t^{1/4}}$

24. $\log_5 y - 4(\log_5 r + 2\log_5 t)$

$\log_5 y - 4(\log_5 r + \log_5 t^2)$

$\log_5 y - 4\log_5 rt^2$

$\log_5 y - \log_5 (rt^2)^4$

$\log_5 \frac{y}{(rt^2)^4} = \log_5 \frac{y}{r^4 t^8}$

Expand each logarithm. Simplify if possible.

25. $\log 7(3x-2)^2$

$\log 7 + \log(3x-2)^2$

$\log 7 + 2\log(3x-2)$

26. $\log_5 5x^{-5}$

$\log_5 5x + \log_5 x^{-5}$

$\log_5 5 - 5\log_5 x$

$1 - 5\log_5 x$

27. $\log 6x^3 y$

$\log 6 + \log x^3 + \log y$

$\log 6 + 3\log x + \log y$

28. $\log \frac{5x}{4y}$

$\log 5x - \log 4y$

$(\log 5 + \log x) - (\log 4 + \log y)$

Use change of base formula to evaluate each expression. Round to the nearest thousandth.

29. $\log_3 5$ $\frac{\log 5}{\log 3} = 1.465$

30. $\log_2 15$ $\frac{\log 15}{\log 2} = 3.907$

31. $\log_6 17$ $\frac{\log 17}{\log 6} = 1.581$

Determine if each statement is true or false. Justify your answer with your work.

32. $\log 12 = \log 4 + \log 3$

$\log 12 = \log(4 \cdot 3)$

$\log 12 = \log 12$ ✓ True!

33. $\log \frac{3}{5} = \frac{\log 3}{\log 5}$

$\log 3 - \log 5 = \frac{\log 3}{\log 5}$ X False

Use the properties of logarithms to evaluate each expression.

34. $\log_2 8 + \log_2 4$

$\log_2 32$

$2^x = 32 \quad x = 5$

35. $\log_2 160 - \log_2 5$

$\log_2 32$

$2^x = 32 \quad x = 5$

36. $\log_6 27 + \log_6 8$

$\log_6 216$

$6^x = 216 \quad x = 3$