

Name: Homework Guide ☺

Per: _____

Date: _____

Use the properties of logarithms to rewrite the expression in terms of $\log 2$ and $\log 7$.

Then use $\log 2 \approx 0.301$ and $\log 7 \approx 0.845$ to approximate the expression.

1. $\log 4$

$$\left. \begin{array}{l} \log(2 \cdot 2) \\ \log 2 + \log 2 \\ .301 + .301 \end{array} \right\} \begin{array}{l} \log(2^2) \\ 2 \cdot \log(2) \\ 2(.301) \\ .602 \end{array}$$

2. $\log 14$

1.146

3. $\log\left(\frac{7}{2}\right)$

$$\begin{array}{l} \log(7) - \log(2) \\ .845 - .301 \\ .544 \end{array}$$

4. $\log\left(\frac{2}{7}\right)$

$-.544$

5. $\log 7^{-3}$

$$\begin{array}{l} -3 \cdot \log(7) \\ -3(.845) \\ -2.535 \end{array}$$

6. $\log 49$

1.69

Expand the following expressions:

7. $\log_2(3x)$

$\log_2 3 + \log_2 x$

8. $\log_3(9x)$

$\log_3 9 + \log_3 x$

9. $\log_2(x^3\sqrt{x-1})$

$$\begin{array}{l} \log_2 x^3 + \log_2 (x-1)^{1/2} \\ 3 \cdot \log_2 x + \frac{1}{2} \log_2 (x-1) \end{array}$$

10. $\log_3 3x^{\frac{2}{3}}y^5$

$\log_3 3 + \frac{2}{3} \log_3 x + 5 \log_3 y$

11. $\log_3 x^5$

$5 \cdot \log_3 x$

12. $\log_4 2y^2\sqrt{x}$

$\log_4 2 + 2 \log_4 y + \frac{1}{2} \log_4 x$

13. $\log x^{\frac{1}{2}}y^4$

$$\begin{array}{l} \log x^{1/2} + \log y^4 \\ \frac{1}{2} \log x + 4 \cdot \log y \end{array}$$

14. $\log\left(\frac{6}{x}\right)$

$\log 6 - \log x$

15. $\log\left(\frac{x}{5}\right)$

$\log x - \log 5$

16. $\log \frac{x^2}{yz^3}$

17. $\log x^{-3}$

18. $\log_2(x\sqrt[4]{x+1})$

$-3 \cdot \log x$

$\log_2 x + \frac{1}{4} \log_2(x+1)$

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

Convert Log to Exponential:

19. $\log_3(x-2) = 4$

20. $\log_x \frac{1}{81} = -4$

21. $\log a = z$

$3^4 = x-2$

$10^z = a$

$x^{-4} = \frac{1}{81}$

Convert Exponential to Log

22. $x^{-3} = \frac{1}{64}$

23. $9^x = w$

24. $b^1 = k$

$\log_x \left(\frac{1}{64}\right) = -3$

$\log_9 w = x$

$\log_b k = 1$

Solve:

25. $3^{x-2} = 81$

26. $5^{x+18} = 625^{2x}$
 $5^{x+18} = (5^4)^{2x}$
 $x+18 = 4(2x)$
 $x+18 = 8x$

27. $\log_4(x+3) = 3$

$x=6$

$\frac{7x}{7} = \frac{18}{7}$ $x = \frac{18}{7}$

$x=61$