Name Key

Period _____

Math 3: 7.3 Properties of Logarithms Homework

Match the expression with the logarithm that has the same value.

D **1.** $\log 4 + \log 3$

$\log(4)(3)$

$\log(12)$

A **2.** $\log 3 - \log 4$

$\log \frac{3}{4}$

C **3.** $3 \log 4$

$\log 4^3$

$\log 64$

B **4.** $4 \log 3$

$\log 3^4$

$\log 81$

A. $\log \frac{3}{4}$ **B.** $\log 81$ **C.** $\log 64$ **D.** $\log 12$

Use $\log A \approx 0.477$ and $\log B \approx 0.699$ to evaluate each logarithm. Show your work!

5. $\log AB$

$\log A + \log B$

$.477 + .699$

1.176

6. $\log B^2$

$2 \log B$

$2(.699)$

1.398

7. $\log \frac{A}{B}$

$\log A - \log B$

$.477 - .699$

$-.222$

Expand each expression.

8. $\log 7x$

$\log 7 + \log x$

9. $\ln x^2$

$2 \ln x$

10. $\log_2 \frac{x}{3}$

$\log_2 x - \log_2 3$

11. $\ln x^{-2}$

$-2 \ln x$

12. $\log 12x^2y^3$

$\log 12 + \log x^2 + \log y^3$

$\log 12 + 2 \log x + 3 \log y$

13. $\ln \frac{4}{x^2}$

$\ln 4 - \ln x^2$

$\ln 4 - 2 \ln x$

Condense each expression.

14. $\ln 4 + \ln 7$

$\ln(4 \cdot 7)$

$\ln(28)$

15. $\log 3 + \log x - \log y$

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

16. $\log x + \log (x + 2)$

$\log[x(x+2)]$ or

$\log(x^2+2x)$

17. $2 \ln x - \ln 5$

$\ln x^2 - \ln 5$

$\ln \frac{x^2}{5}$

18. $2 \log x + 5 \log y$

$\log x^2 + \log y^5$

$\log x^2y^5$

19. $\ln xy - 2\ln x$

$\ln xy - \ln x^2$

$\ln \frac{xy}{x^2}$

Use the change-of-base formula to evaluate the logarithm. Give the exact solution (in terms of base 10 logs), and the approximate decimal solution, rounded to three decimal places.

20. $\log_7 5$

$\frac{\log 5}{\log 7} \approx .827$

21. $\log_3 14$

$\frac{\log 14}{\log 3} \approx 2.402$

22. $\log_5 7$

$\frac{\log 7}{\log 5} \approx 1.209$

23. $\log_8 200$

$\frac{\log 200}{\log 8} \approx 2.548$

24. $\log_6 0.5$

$\frac{\log .5}{\log 6} \approx -.387$

25. $\log_{20} 42$

$\frac{\log 42}{\log 20} \approx 1.248$

Use $\log_b r = 2$, $\log_b s = -3$, and $\log_b t = 5$ to evaluate each expression. **(Hint: expand, then substitute)**

26. $\log_b \frac{rs^2}{t}$ (hint: answer is not 3.6 or 18/5)

$\log_b r + \log_b s^2 - \log_b t$

$\log_b r + 2\log_b s - \log_b t$

$2 + 2(-3) - 5$

$2 - 6 - 5 = -9$

27. $\log_b \frac{rt}{s}$ (hint: answer is not -3.33 or -10/3)

$\log_b r + \log_b t - \log_b s$

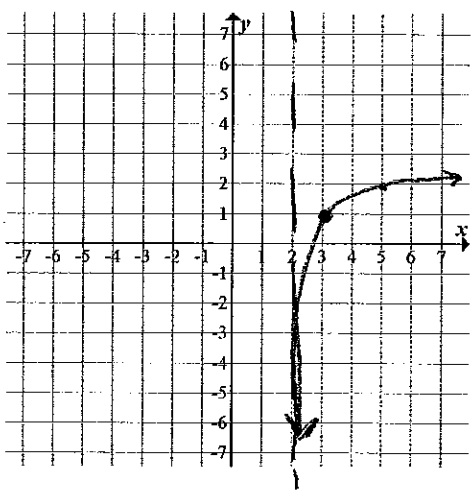
$2 + 5 - (-3)$

$2 + 5 + 3$

10

Graph each function. Be sure to show the asymptote. State the domain and range.

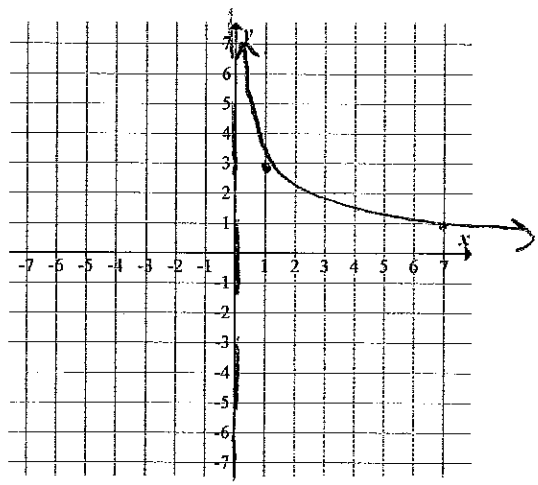
28. $f(x) = \ln(x-2) + 1$



Domain: $(2, \infty)$

Range: $\mathbb{R}$

29. $f(x) = -\ln x + 3$



Domain: $(0, \infty)$

Range: $\mathbb{R}$

Answers: 1) D 2) A 3) C 4) B 5) 1.176 6) 1.398 7) – 0.222 8) log 7 + log x 9) 2 ln x 10) $\log_2 x - \log_2 3$ 11) – 2 ln x 12) log 12 + 2 log x + 3 log y 13) ln 4 – 2 ln x 14) ln (4/7) 15) log (3x/y) 16) log (x^2 + 2x) 17) ln (x^2/5) 18) log x^2y^5 19) ln (y/x) 20) 0.827 21) 2.402 22) 1.209 23) 2.548 24) – 0.387 25) 1.248 26) – 9 27) 10 28) D: (2,∞) R: (-∞,∞) 29) D: (0,∞) R: (-∞,∞)