Precalculus

3.3B Evaluating logarithms using properties

Name Key

Period_____ Date_____

Use the properties of logarithms to write the logarithm in terms of $\log_3 5$ and $\log_3 7$.

1. $\log_3 35$ $\log_3 5 + \log_3 7$	2. $\log_3 \frac{5}{7}$ $\log_3 5 - \log_3 7$
3. $\log_3 \frac{7}{25}$ $\log_3 7 - 2\log_3 5$	4. $\log_3 175$ $2\log_3 5 + \log_3 7$
5. $\log_3 \frac{21}{5}$ $1 + \log_3 7 - \log_3 5$	6. $\log_3 \frac{45}{49}$ $2 + \log_3 5 - 2\log_3 7$

Approximate the logarithm using the properties of logarithms, given $\log_b 2 \approx 0.3562$, $\log_b 3 \approx 0.5646$, and $\log_b 5 \approx 0.8271$.

7. $\log_b 10$ $\log_b(2 \cdot 5)$ $\log_b 2 + \log_b 5$ $.3562 + .8271 \approx 1.1833$	8. $\log_b \frac{3}{5}$ $-.2625$
9. $\log_b 0.04$ $\log_b \frac{4}{100} = \log_b \frac{2^2}{5^2 2^2} = \log_b \frac{1}{5^2}$ $\log_b 1 - 2\log_5 b =$ $-2\log_b 5 = -1.6542$	10. $\log_b \sqrt{2}$ $.1781$

Approximate the logarithm using the properties of logarithms, given $\log_b 2 \approx 0.3562$, $\log_b 3 \approx 0.5646$, and $\log_b 5 \approx 0.8271$.

11. $\log_b 45$ 1.9563	12. $\log_b(3b^2)$ 2.5646
13. $\log_b(2b)^{-2}$ $-2\log_b 2 - 2\log_b b =$ $-2(.3562) - 2 =$ -2.7124	14. $\log_b \sqrt[3]{3b}$ .5215

Use the properties of logarithm and the values below to find the logarithm indicated. Do not use a calculator to evaluate the logs.

15. $\log 7 \approx 0.8$ $\log 8 \approx 0.9$ $\log 12 \approx 1.1$ Find: $\log \frac{1}{49}$ $\log \frac{1}{7^2} =$ $\log 1 - 2\log 7 =$ $0 - 2(.8) =$ -1.6	16. $\log 7 \approx 0.8$ $\log 8 \approx 0.9$ $\log 12 \approx 1.1$ Find: $\log \frac{1}{64}$ -1.8
17. $\log 7 \approx 0.8$ $\log 8 \approx 0.9$ $\log 12 \approx 1.1$ Find: $\log 64$ 1.8	18. $\log 7 \approx 0.8$ $\log 8 \approx 0.9$ $\log 12 \approx 1.1$ Find: $\log 84$ 1.9

Use the properties of logarithm and the values below to find the logarithm indicated. Do not use a calculator to evaluate the logs.

19. $\log_4 9 \approx 1.6$ $\log_4 6 \approx 1.3$ $\log_4 7 \approx 1.4$ Find: $\log_4 \frac{2}{27}$ -1.9	20. $\log_5 6 \approx 1.1$ $\log_5 7 \approx 1.2$ $\log_5 9 \approx 1.4$ Find: $\log_5 \frac{1}{4}$ $-.8$
21. $\log_7 11 \approx 1.2$ $\log_7 8 \approx 1.1$ $\log_7 12 \approx 1.3$ Find: $\log_7 \frac{12}{121}$ -1.1	22. $\log_7 6 \approx 0.9$ $\log_7 8 \approx 1.1$ $\log_7 10 \approx 1.2$ Find: $\log_7 \frac{7}{36}$ $-.8$

Use the properties of logarithm and the logarithms provided below to rewrite each logarithm in terms of the variables given.

23. $\log_4 6 = X$ $\log_4 7 = Y$ $\log_4 10 = Z$ Find: $\log_4 \frac{500}{3}$ (2) (2) $\log_4 \frac{1000}{6}$ $\log_4 10^3 - \log_4 6$ $3\log_4 10 - \log_4 6$ $3Z - X$ $3Z - X$	24. $\log_8 6 = R$ $\log_8 9 = S$ $\log_8 10 = T$ Find: $\log_8 \frac{1}{800}$ $-1-2T$

Use the properties of logarithm and the logarithms provided below to rewrite each logarithm in terms of the variables given.

25. $\log_8 6 = M$ $\log_8 10 = P$ $\log_8 9 = Q$ Find: $\log_8 \frac{1}{125}$ (9) (8) 1-3P	26. $\log_5 7 = X$ $\log_5 8 = Y$ $\log_5 12 = Z$ Find: $\log_5 \frac{5}{18}$ 1 + Y - 2Z