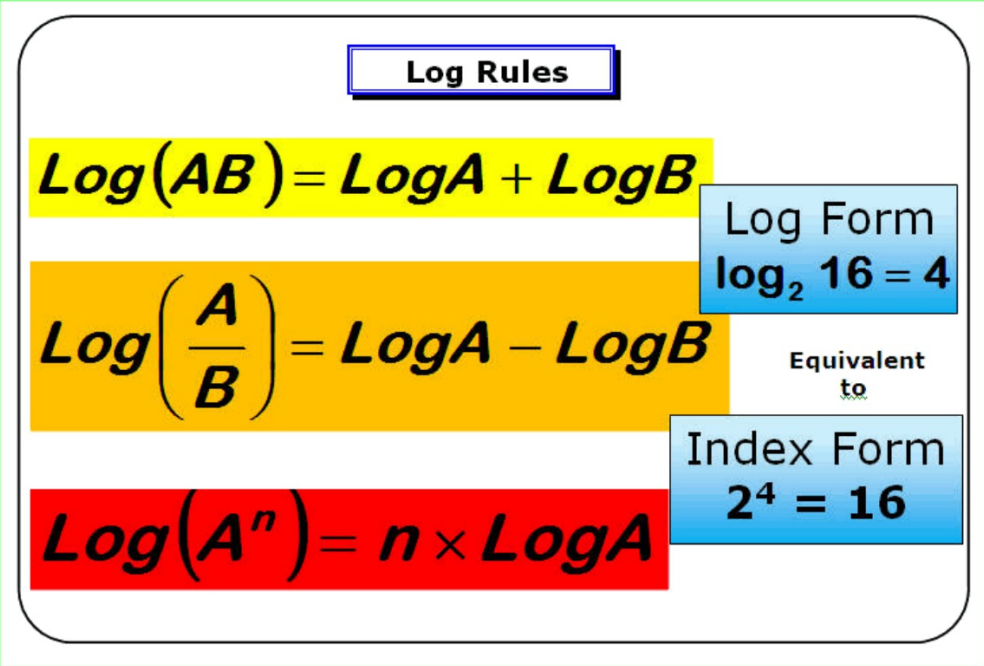
Sec 4.3 Logarithms
~Expanding~



Completely expand-

$\log_4 7(5)$

$$\log_4 7 + \log_4 5$$

log 10x

$$\log 10 + \log x$$

$$1 + \log x$$

$\log_7(19/x)$

$\log_7\left(\frac{19}{x}\right)$

$\log_7 19 - \log_7 x$

$\ln(e^3/7)$

$\ln e^3 - \ln 7$

$3\ln e - \ln 7$

$3 - \ln 7$

. .

$\log_5 7^4$

$4 \log_5 7$

$\ln \sqrt{x}$ ooo $x^{1/2}$

$\frac{1}{2} \ln x$

$\log (4x)^5$

$5 \log 4x \rightarrow 5(\log 4 + \log x)$

or

$5 \log 4 + 5 \log x$

$\log_b x^2 y$

$\log_b x^2 + \log_b y$

$2\log_b x + \log_b y$

$\log_6 \dfrac{\sqrt[3]{x}}{36y^4}$

$\log_6 \sqrt[3]{x} - \log_6 36y^4$

$\frac{1}{3}\log_6 x - \left[\log_6 36 + \log_6 y^4\right]$

$\frac{1}{3}\log_6 x - 2 - \log_6 y^4$

$\frac{1}{3}\log_6 x - 2 - 4\log_6 y$

$$\log \frac{100x^3\sqrt[3]{5-x}}{3(x+7)^2}$$

$$\log 100x^3\sqrt[3]{5-x} - \log 3(x+7)^2$$

$$\log 100 + \log x^3 + \log(5-x)^{1/3} \qquad \log 3 + \log(x+7)^2$$

$$2 + 3\log x + \frac{1}{3}\log(5-x) - \log 3 - 2\log(x+$$

Suggested Practice
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left column

1. $\log_5 7 + \log_5 3$

4. $1 + \log_9 x$

7. $1 - \log_7 x$

10. $\log x - 3$

13. $2 - \ln 5$

16. $7 \log_b x$

19. $\frac{1}{5} \ln x$

22. $\log_b + 3 \log_b y$

25. $2 - \frac{1}{2}\log(x+1)$

28. $3\log_b x + \log_b y - 2\log_b 7$

31. $\frac{1}{3}(\log x - \log y)$

34. $\frac{1}{3}\log_b x + 4\log_b y - 5\log_b z$

37. $3\ln x + \frac{1}{2}\ln(x^2+1) - 4\ln(x+1)$

39. $1 + 2\log x + \frac{1}{3}\log(1-x) - \log 7 - 2\log_{(1+x)}$