C12 - 8.4 - $\log_b m + \log_b n = \log_b mn$ $log_b m - log_b n = log_b \frac{m}{n}$ $\log_{b^n} a^n$ *Notes*

$\log_2 4 + \log_2 8 =$ $\boxed{2 + 3 = 5}$
$\log_2 4 \times 8 =$
$\log_2 32 = \textcircled{5}$ Add-Multiply

Exponential Form
$32 = 2^5$

$\log_2 4 = 2$
$\log_2 8 = 3$

$\boxed{logA + \log B = logAB}$

$log1 + log5 + log7 =$
$log1 \times 5 \times 7 = \textcircled{\log 35}$

$\boxed{logA + \log B + \log C = logABC}$

$\log_3 27 - \log_3 3 =$
$\log_3 \frac{27}{3} =$
$\log_3 9 = \textcircled{2}$

$\boxed{3 - 1 = 2}$

Subtract-Divide

$\boxed{LogA - LogB = \log\left(\frac{A}{B}\right)}$

Rearrange $\boxed{\begin{matrix} -logA + logB \\ logB - logA \\ \log\left(\frac{B}{A}\right) \end{matrix}}$

$log4 + log20 - log10 =$
$log \frac{4 \times 20}{10} = \textcircled{log\, 8}$

$log5 - log2 + log10 =$
$log \frac{5 \times 10}{2} = \textcircled{log25}$

$log5 - log2 - log10 =$
$log \frac{5}{2 \times 10} = \textcircled{\log \frac{1}{4}}$

Positives on top,
Negatives on Bottom
Vice Versa

$\boxed{\begin{matrix} LogA + LogB - LogC = \log\left(\frac{AB}{C}\right) \\ LogA - LogB - LogC = Log\left(\frac{A}{BC}\right) \\ Log\left(\frac{A}{BC}\right) = LogA - LogBC \\ Log\left(\frac{A}{BC}\right) = LogA - (LogB + LogC) \\ Log\left(\frac{A}{BC}\right) = LogA - LogB - LogC \end{matrix}}$

$logx + \log x =$
$\log x \times x = \textcircled{\log x^2}$

$\log 3 + \log(x + 1) =$
$log3(x + 1) = \textcircled{\log(3x + 3)}$

$\log(x - 2) + \log(x + 1) =$
$\log(x - 2)\,(x + 1) = \textcircled{\log(x^2 - x - 2)}$

Add Multiply

$\log x^3 - \log x^2 =$
$\log \frac{x^3}{x^2} = \textcircled{logx}$

$\log(x^2 - 1) - \log(x + 1) =$
$\log \frac{x^2 - 1}{x + 1} =$
$\log \frac{(x + 1)(x - 1)}{(x + 1)} = \textcircled{\log(x - 1)}$

Subtract
Divide
Factor
Simplify

$\log_2 8 =$
$\log_{2^2} 8^2 =$
$\log_4 64 = \textcircled{3}$

Take the base and the log to any exponent you like!

Exponential Form
$64 = 4^3$

$\log_2 8 = 3$
$8 = 2^3$

$\log_4 16 =$
$\log_{\sqrt{4}} \sqrt{16} =$
$\log_2 4 = \textcircled{2}$

$\log_{\frac{1}{2}} 4 =$
$\log_{(\frac{1}{2})^{-1}} 4^{-1} =$
$\log_2 4^{-1} =$
$-1 \log_2 4 = \textcircled{-2}$

$\left(\frac{1}{2}\right)^{-1} = 2$
$\log_2 4 = 2$
$-1 \times 2 = -2$

$\log_2 4 + \log_4 2 =$
$\log_{2^2} 4^2 + \log_4 2 =$
$\log_4 16 + \log_4 2 =$
$\log_4 32 \times 2 =$
$\log_4 64 = \textcircled{3}$

Take the base and the thing you are logging to an exponent to get like bases.

C12 - 8.4 - $log5 = m, log7 = n, Notes$

Given: $log5 = m$ $log7 = n$ *Solve in terms of* m *and* n:

$log25 = log5^2$
$= 2log5$
$= 2m$

$log35 = log5 + log7$
$= m + n$

$log350 = log5 + log7 + log10$
$= m + n + 1$

$log5x = log5 + logx$
$= m + logx$

$log0.49 = \log\frac{49}{100}$
$= log49 - log100$
$= log7^2 - 2$
$= 2log7 - 2$
$= 2n - 2$

$\log_5 7 = \frac{log7}{log5}$
$= \frac{n}{m}$

Given: $log4 = a$ $log6 = b$ *Solve in terms of* a *and* b:

$log16 =$
$log4^2 =$
$2log4 =$
$2a$

$log16 =$
$log2^4 =$
$4log2 =$
$4a$

$log24 =$
$log6 + log4 =$
$\frac{b}{2} + \frac{a}{2}$

$log2 =$
$log\sqrt{4} =$
$log4^{\frac{1}{2}} =$
$\frac{1}{2}log4 =$
$\frac{1}{2}a$

$log3 =$
$\log\frac{6}{2} =$
$log6 - log2 =$
$b - \frac{1}{2}a$

$\log\frac{3}{2} =$
$log3 - log2 =$
$b - \frac{1}{2}a - \frac{1}{2}a =$
$b - a$

$log0.4 =$
$\log\left(\frac{4}{10}\right) =$
$log4 - log10 =$
$a - 1$