Warm Up

a) Express as a single logarithm: $3log_6 3 + log_6 8 - 2log_6 6$

$log_6 3^3 + log_6 8 - log_6 6^2$

$log_6 27 + log_6 8 - log_6 36$

$log_6 27 \cdot 8 - log_6 36$

$log_6 \frac{216}{36}$

$= log_6 6$

b) solve:

$3^2 = 9$

i) $5^{log_3 9} = x$

$5^2 = x$

$25 = x$

ii) $log_{\textcircled{\scriptsize 8}} 1 = 0$

$\textcircled{\scriptsize 8}^0 = 1$

iii) $log_x \sqrt[3]{x} = y$

$log_x (x)^{1/3}$

$y = 1/3$

Express the following as a single logarithm in simplest form:

$$\frac{4}{5}\left[15\log_b \sqrt{b} - \frac{1}{2}\left(20\log_b \sqrt[8]{b} - 10\log_b b^{-2}\right)\right]$$

$12\log_b(b)^{\frac{1}{2}} - \frac{2}{5}(20\log_b(b)^{\frac{1}{8}} - 10\log_b b^{-2})$

$12\log_b(b)^{\frac{1}{2}} - 8\log_b(b)^{\frac{1}{8}} + 4\log_b b^{-2}$

$(\frac{1}{2})12\log_b b - (\frac{1}{5})(\frac{1}{2})(20)\log_b b + (\frac{1}{5})(\frac{1}{2})(-10)(-2)\log_b b$

$6\log_b b - \log_b b + -8\log_b b$

$= -3\log_b b$

$\log_b b^{-3}$

$12\log_b(b)^{\frac{1}{2}} - 8\log_b(b)^{\frac{1}{8}} + 4\log_b b^{-2}$

$\frac{1}{2}$) $12\log_b b - (1)\log_b$

$\log_b b^6 - \log_b(b) + \log_b b^{-8}$

$\log\left(\frac{b^6 \cdot b^{-8}}{b^1}\right)$

$\log b^{-3}$ or $-3\log_b b$

Refresher: Laws of Logarithms

Product Law:

$$\log_b(MN) = \log_b M + \log_b N$$

Quotient Law:

$$\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b(N)$$

Law of Logarithms for Powers:

$$\log_b M^P = P \log_b M$$

④ $\log_x A - \log_x B - \log_x C + \log_x D$

↳ Single logarithm:

$$\log_x\left(\frac{AD}{BC}\right)$$