Exponentials and Logarithms 2 – Worksheet Part 1 – Laws of Logs

'Warm Up'

1) Rewrite as a single logarithm:

(a) $\log_2 7 + \log_2 3$
(b) $\log_2 36 - \log_2 4$
(c) $\log_a 9 - \log_a \frac{1}{3}$

'Aerobics'

2) Solve and simplify without using your calculator **(you must show your method)**:

(a) $x = \log_2 40 - \log_2 5$
(b) $x = \log_6 4 + \log_6 9$
(c) $x = 2\ \log_{12} 3 + 4 \log_{12} 2$

3) Rewrite as a single logarithm:

(a) $4\ \log_2 3 - \log_2 9$
(b) $1 + \log 11$
(c) $\frac{1}{2}\ \log_a 16 - \frac{1}{5}\log_a 32$

4) Write in terms of $\log_a x$, $\log_a y$ and $\log_a z$:

(a) $\log_a(x^3y^4z)$
(b) $\log_a\left(\frac{x\sqrt{y}}{z}\right)$
(c) $\log_a a^2x^2$
(d) $\log_a \sqrt{ax}$

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5) Solve $2\log_3 y - \log_3(y+4) = 2$

6) Given that p = $\log_q 16$, express in terms of p:
(a) $\log_q 2$
(b) $\log_q(8q)$

Exponentials and Logarithms 2 –Worksheet Part 2 - Change of Base

'Aerobics'

7) Using the change of base formula, prove that $\log_a b = \frac{1}{\log_b a}$

8) Using your answer to (7) above, and an appropriate substitution, solve to 3 S.F.:

$\log_2 x = 8 + 9\log_x 2$

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9) Solve, giving an **exact** answer:

$\log_2 x + \log_4 x = 2$

10) If xy = 64 and $\log_x y + \log_y x = \frac{5}{2}$, find x and y