Laws of Logarithms

Specification: AQA 7357: F3, F4 · Edexcel 9MA0: 6.3, 6.4

HOMEWORK Consolidation

1 Write $\log_4 12 + \log_4 5 - \log_4 15$ as a single logarithm and find its value.
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2 Find the value of $\log_2 80 - \log_2 5$.
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3 Write $4\log_3 2 - \frac{1}{2}\log_3 16$ as a single logarithm.
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4 Write $\log_a\left(\frac{x^3\sqrt{y}}{z^2}\right)$ in terms of $\log_a x$, $\log_a y$ and $\log_a z$.
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5 Given $\log_a 5 = p$ and $\log_a 2 = q$, write in terms of p and q:
(a) $\log_a 50$
(b) $\log_a 0.4$
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6 Show that $\log_9 3 + \log_9 27 = 2$.
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7 Solve $\log_5 x + \log_5 (x + 4) = 1$.
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8 Solve $\log_3 (2x + 7) - \log_3 (x - 1) = 2$.
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9 A pupil says $\log_2 8 + \log_2 8 = \log_2 16$. Are they right? Give the correct value.
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10 Given $\log_2 x = a$, write $\log_2 (8x^2)$ in terms of a.
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11 *Edexcel-style*. Given that $\log_3 (x + 1) - 2\log_3 x = 1$, where $x > 0$:
(a) show that $3x^2 - x - 1 = 0$ [4 marks]
(b) hence find x, to 3 significant figures (calculator allowed). [3 marks]
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12 *AQA-style*. Let $p = \log_4 x$.
(a) Write $\log_4 16x$ in terms of p. [2 marks]
(b) Write $\log_4 \frac{x^3}{4}$ in terms of p. [2 marks]
(c) Hence solve $\log_4 16x = \log_4 \frac{x^3}{4}$. [3 marks]
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