Logs 2 : Answers

5i) a) Book work

b) $\frac{1}{2}\log_a 324 + \log_a 56 - 2\log_a 12$

$= \log_a 324^{1/2} + \log_a 56 - \log_a 12^2$

$= \log_a 18 + \log_a 56 - \log_a 144$

$= \log_a \left(\frac{18 \times 56}{144}\right)$

$= \log_a 7$ $\quad \therefore b = 7$

c) (i) $3^x = 2^{x+1}$

$3^x = 2^1(2^x)$

$\frac{3^x}{2^x} = 2$

$\left(\frac{3}{2}\right)^x = 2$ $\quad c = \frac{3}{2}$ $\quad d = 2$

(ii) $3^x = 2^{x+1}$

$\left(\frac{3}{2}\right)^x = 2$

$\ln\left(\frac{3}{2}\right)^x = \ln 2$

$x \ln \frac{3}{2} = \ln 2$

$x = \frac{\ln 2}{\ln 3/2}$

$x = 1.71$ to 2 d.p.

52) a) Book work

b) $6^{2y-1} = 4$

$\ln 6^{2y-1} = \ln 4$

$(2y-1)\ln 6 = \ln 4$

$2y-1 = \frac{\ln 4}{\ln 6}$

$2y-1 = 0.7737$

$2y = 1.7737$

$y = 0.89$ to 2 d.p.

c) $\log_a 4 = \frac{1}{2}$

$a^{1/2} = 4$

$\sqrt{a} = 4$

$a = 16$

53) a) $\log_a(6x^2+11) - \log_a x = 2\log_a 5$

$\log_a\left(\frac{6x^2+11}{x}\right) = \log_a 5^2$

$\frac{6x^2+11}{x} = 25$

$6x^2+11 = 25x$

$6x^2 - 25x + 11 = 0$

$(3x-11)(2x-1) = 0$

either

$3x-11=0$ or $2x-1=0$

$x = 11/3$ $\quad$ $x = \frac{1}{2}$

a) Book work

b) $\frac{1}{2}\log_a x^8 - \log_a 4x + 3\log_a \frac{2}{x}$

$= \log_a (x^8)^{1/2} - \log_a 4x + \log_a\left(\frac{2}{x}\right)^3$

$= \log_a x^4 - \log_a 4x + \log_a \frac{8}{x^3}$

$= \log_a\left(\frac{x^4 \times 8/x^3}{4x}\right) = \log_a\left(\frac{8x}{4x}\right)$

$= \log_a 2$