

(S.B.H.S) YEAR 11 EXTENSION 1 LOGARITHMS TEST**JULY 2004****NAME** _____**SHOW ALL WORKING**

1. Write in log form:

(a) $4^3 = 64$

(b) $2^{-3} = \frac{1}{8}$

(c) $\sqrt[3]{27} = 3^{\frac{3}{2}}$ (write in the form $a \log_b x = c$)

2. Write in index form:

(a) $\log_3 81 = 4$

(b) $\log_5 \frac{1}{125} = -3$

3. Solve for x : Show working.

(a) $\log_3 81 = x$

(b) $\log_2 \sqrt{8} = x$

(c) $\log_x \left(\frac{1}{49} \right) = -2$

(d) $\log_4 x = \frac{3}{2}$

4. Evaluate:

(a) $\log_3 3\sqrt{3}$

(b) $\log_7(\log_7 7)$

5. Evaluate, correct to 2 decimal places: Show working.

(a) $5^x = 3$

(b) $12^{2x+1} = 0.95$

6. Solve for x: Show working

(a) $\log_2(x+1) + \log_2(x+3) = 3$

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Logarithms

1. a. $4^3 = 64$

$\log_4 64 = 3$

b. $2^{-3} = \frac{1}{8}$

$\log_2 \frac{1}{8} = -3$

c. $\sqrt[3]{27} = 3$

$\log_3 \sqrt[3]{27} = \frac{3}{3} = 1$

$27 \log_3 \frac{1}{3} = \frac{3}{3} = 1$

$\sqrt[3]{27} \log_3 3 = \frac{3}{3} = 1$

2. a. $\log_3 81 = 4$
 $= 3^4 = 81$

b. $\log_5 \frac{1}{125} = -3$
 $= \frac{1}{5^3} = \frac{1}{125}$

3. a. $\log_3 81 = x$

$3^x = 81$

$3^x = 3^4$

$\therefore x = 4$

b. $\log_2 \sqrt{8} = x$

$2^x = \sqrt{8}$

$2^x = 2^{3/2}$

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

c. $\log_x \left(\frac{1}{49}\right) = -2$

$-2 = \frac{1}{49}$

$x^{-2} = 7^{-2}$

$\therefore x = 7$

d. $\log_4 x = \frac{3}{2}$

$4^{3/2} = x$

$4^{3/2} = 8$

$\therefore x = 8$

4. a. $\log_3 3\sqrt{3}$

$= \log_3 3^1 + \log_3 3^{1/2}$

$= \log_3 (3^1 + 3^{1/2})$

$= \log_3 (3^{3/2})$

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

b. $\log_7 (\log_7 7)$

$\log_7 1 + \log_7 7$

$= \log_7 7$

$7^x = 7$

$\therefore x = 1$

$\log_7 (\log_7 7)$

$\log_7 (1)$

$\log_7 1$

$= \frac{\log_7 1}{\log_7 7}$

$= 0$

5. a. $5^x = 3$

$x = \frac{\log 3}{\log 5}$

$x = 0.68$ (2dp)

b. $12^{2x+1} = 0.45$

$2x+1 = \frac{\log 0.45}{\log 12}$

$= -0.02$

$2x = -1.02$

$x = -0.51$ (2dp)

6. a. $\log_2 (x+1) + \log_2 (x+3) = 3$

$\log_2 [(x+1)(x+3)] = 3$

$\log_2 (x^2 + 4x + 3) = 3$

$2^3 = x^2 + 4x + 3$

$8 = x^2 + 4x + 3$

8. $x^2 + 4x - 5$

$(x-1)(x+5)$

$\therefore x = 1$

or $x = -5$

no soln