**Logarithms Exercises**

These exercises have been written to consolidate your understanding of the *Logarithms* workshop.

**Question 1**

Write the following exponential equations in logarithmic form.

(a) \(2^5 = 32\)  
(b) \(2^3 = 8\)  
(c) \(2^0 = 1\)  
(d) \(7^1 = 7\)  
(e) \(6^{-1} = \frac{1}{6}\)  
(f) \(10^3 = 1000\)  
(g) \(3^x = 81\)  
(h) \(25^x = 5\)  
(i) \(10^x = 0.01\)

**Question 2**

Evaluate each of the following logarithms (if possible).

(a) \(\log_{10} 100\)  
(b) \(\log_{10} 100,000\)  
(c) \(\log_4 16\)  
(d) \(\log_7 7\)  
(e) \(\log_7 1\)  
(f) \(\log_4 \frac{1}{16}\)  
(g) \(\log_4 \frac{1}{4}\)  
(h) \(\log_4 0\)  
(i) \(\log_4 (-1)\)
Question 3

Write each of the following as a single log.

(a) \( \log 5 + \log 2 \)  
(b) \( \log 6 - \log 3 \)  
(c) \( \log 3 - \log 6 \)  
(d) \( 3 \log 3 + 2 \log 2 \)  
(e) \( 1 + \log_3 7 \)  
(f) \( 1 - \log_3 3 \)  
(g) \( \log_2 8 - \log_2 4 + \log_2 3 \)  
(h) \( 2 \log_5 2 + \log_5 4 - 3 \log_5 3 \)

Question 4

Let \( a = \log 4 \) and \( b = \log 5 \). Express the following in terms of \( a \) and \( b \).

(a) \( \log 20 \)  
(b) \( \log 80 \)  
(c) \( \log 0.4 \)  
(d) \( \log 40 \)  
(e) \( \log \left( \frac{1}{2} \right) \)

Question 5

Solve the following equations for \( x \).

(a) \( \log_3 x + \log_3(2x) = \log_3 8 \)  
(b) \( 3 \log_8 x = 1 \)  
(c) \( \log_5(x - 2) + \log_5(x + 2) = 1 \)  
(d) \( \log_3(18x) - \log_3 6 = 1 \)  
(e) \( \log_4 x + \log_4(x + 3) = 1 \)  
(f) \( \log_2 4 + \log_2(x - 1) - \log_2(3x - 4) = 2 \)  
(g) \( \log_2(-x) + \log_2(x + 10) = 4 \)

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