8 ❦ Logarithms (cont.)

1 Simplify each of the following

a) $\sqrt{2} \times \sqrt[3]{4} \div \sqrt[6]{2} =$

b) $2^{\frac{1}{3}} \div 4^{\frac{1}{4}} \times 32^{-\frac{1}{6}} =$

c) $\sqrt[3]{a^2} \times \sqrt[4]{a} \div \sqrt[6]{a\sqrt{a}} =$

d) $\log_4 12 + \log_4 32 - \log_4 6$

$=$

e) $\frac{2}{3} \log_3 8 + 2 \log_3 \sqrt{5} - \log_3 180$

$=$

f) $4 \log_8 \sqrt{2} + \frac{1}{2} \log_8 3 - \log_8 \frac{\sqrt{3}}{2}$

$=$

2 Assuming $\log_{10} 2 = a$ and $\log_{10} 3 = b$, express each of the following in terms of a and b.

a) $\log_{10} 72 =$

b) $\log_{10} 1.5 =$

c) $\log_3 4 =$

3 Arrange each of the following three numbers in ascending order.

a) -1, $\log_2 0.25$, $\log_2 \frac{1}{3}$.

b) 1, $\log_{\frac{1}{2}} 5$, $\log_{\frac{1}{2}} \frac{1}{3}$

4 Solve each of the following equations for x

a) $4^x = 8\sqrt{2}$

b) $\log_2 (5 - x) = \log_2 (x^2 - 1)$

c) $27^x \geqq 3(\sqrt{3})^x$

d) $\log_2 (3x - 1) < 3$

e) $\log_6 x + \log_6 (x - 1) \leqq 1$

5 At which place the first non-zero number appears in 0.6^{30}. Use $\log_{10} 2 = 0.3010$ and $\log_{10} 3 = 0.4771$ if necessary.

6 As a clearance sale, a store decided to sell products that did not sell on that day for an additional 10% OFF on the next day. How many days does the price of a product fall below $\frac{1}{3}$ of the original when it remains unsold? Use $\log_{10} 3 = 0.4771$ if necessary.