

14.5) Laws of logarithms

Worked example

Write as a single logarithm:

a) $\log_2 9 + \log_2 6$

b) $\log_3 48 - \log_3 6$

c) $3 \log_4 2 + 2 \log_4 5$

d) $\log_6 7 - 3 \log_{10} \left(\frac{1}{4}\right)$

Your turn

Write as a single logarithm:

a) $\log_3 6 + \log_3 7$

b) $\log_2 15 - \log_2 3$

c) $2 \log_5 3 + 3 \log_5 2$

d) $\log_{10} 3 - 4 \log_{10} \left(\frac{1}{2}\right)$

a) $\log_3 42$

b) $\log_2 5$

c) $\log^5 72$

d) $\log_{10} 48$

Worked example

Write as a single logarithm:

a) $\log_a(x^4 y^5 z)$

b) $\log_a\left(\frac{x^3}{y^2}\right)$

c) $\log_a\left(\frac{x^3 \sqrt{y}}{z^2}\right)$

d) $\log_a\left(\frac{x^2}{a^5}\right)$

Your turn

Write as a single logarithm:

a) $\log_a(x^2 y z^3)$

b) $\log_a\left(\frac{x}{y^3}\right)$

c) $\log_a\left(\frac{x\sqrt{y}}{z}\right)$

d) $\log_a\left(\frac{x}{a^4}\right)$

a) $2 \log_a x + \log_a y + 3 \log_a z$

b) $\log_a x - 3 \log_a y$

c) $\log_a x + \frac{1}{2} \log_a(y) - \log_a z$

d) $\log_a x - 4$

Worked example

Solve the equation:

$$\log_{10} 2 + 4 \log_{10} x = 2.209515015$$

Your turn

Solve the equation:

$$\log_{10} 4 + 2 \log_{10} x = 2$$

$$x = 5$$

Worked example

Solve the equation:

$$\log_2(x + 5) - \log_2(x - 11) = 3$$

Your turn

Solve the equation:

$$\log_3(x + 11) - \log_3(x - 5) = 2$$

$$x = 7$$

Worked example

Solve the equation:

$$2 \log_4(x + 3) - \log_4 x = 2$$

Your turn

Solve the equation:

$$2 \log_2(x + 15) - \log_2 x = 6$$

$$x = 25, x = 9$$