

(4) Logarithms

1. Solve $\log_{81}[\log_3(26 + x)] = \frac{\log_{25} 5}{2}$
2. Solve $\log_{\frac{x}{4}} x + \log_{4x} x = -1$
3. Solve $\log_3 e^x - \log_3 \left(\frac{1}{2}\right) - \log_9(4e^x + 3) = 0$
4. Show that $(\log_2 3)(\log_9 16) = 2$
5. Prove that $e^{\ln x} = x$
6. Solve $\log_2(\log_2(\log_2 x)) = 1$
7. Given that $x^2 + y^2 = 14xy$, show that $2 \lg \left(\frac{x+y}{4}\right) = \lg x + \lg y$
8. Given that $\log_k a = x$ and $\log_k b = y$, express the following in terms of x and y .
 - i) $\log_{ab} k^2$
 - ii) $\log_b \left(\frac{ab^2}{k}\right)$
9. Without using a calculator, evaluate $(\lg 5)^2 + \lg 2 \lg 50$
10. If $a = \log_x 99$ and $b = \log_x 363$, express the following in terms of a and b .
 - i) $\log_x 9$
 - ii) $\log_x 33$
11. Solve the equation $\ln(2xe - e) = 1 + \frac{1}{\log_x e}$.