

Worksheet: Basics of Logarithms

This worksheet has questions about using the logarithmic transformation to move between the exponential and logarithmic forms of an equation. It also offers a chance to practise solving exponential equations using logarithms and changing the base of a logarithm.

Basics of
Logarithms
study guide



Model Answers
to this sheet



1. Use the logarithmic transformation to convert between the logarithmic and exponential forms of the following equivalences.

(a) $8 = 2^3$ (b) $10^6 = 1000000$ (c) $64 = 8^2$ (d) $0.04 = 5^{-2}$
(e) $\log_3 81 = 4$ (f) $\log_{10} 0.001 = -3$ (g) $0 = \log_7 1$ (h) $1 = \log_7 7$

2. Convert these exponential equations to logarithmic form. Which of the conversions help you to solve the particular equation?

(a) $9 = 3^x$ (b) $x = 9^3$ (c) $3 = 9^x$ (d) $9 = x^3$
(e) $x = 3^9$ (f) $3 = x^9$ (g) $x = 3^0$ (h) $1 = x^0$
(i) $3 = 3^x$ (j) $x^3 = \frac{1}{27}$ (k) $\frac{1}{27} = 3^x$ (l) $3^x = -3$

3. Solve the following equations. (You will need to use a calculator for this question.)

(a) $6^x = 3$ (b) $10^x = 20$ (c) $3^{4x} = 21$ (d) $e^{7x} = 9.2$

(e) $7^{t+1} = 14$ (f) $2^{3-x} = 20$ (g) $e^{x^2} = 21$ (h) $(5^t)(5^{t-1}) = 10$

4. Solve the following logarithmic equations. What do you notice?

(a) $\log_{10} x = 2$ (b) $\log_{10} x = 20$ (c) $\log_{10} x = 200$ (d) $\log_{10} x = 2000$

5. Solve the following equations without using a calculator.

(a) $\ln(x+4) = \ln 6$ (b) $\log_{10}(3-x) = \log_{10} x$ (c) $\ln(3-x) = \ln x$

(d) $\ln(x^2 + 3x + 3) = 0$ (e) $7 = \ln e^x$ (f) $\log_{10}(10^{x+2}) = 5$

(g) $e^{x+4} = e^6$ (h) $10^{3-x} = 10^x$ (i) $e^{3-x} = e^x$

(j) $(e^3)^2 = e^x$ (k) $10^{3x}10^4 = 10^{2x}10^3$ (l) $\frac{e^x}{e^2} = \frac{e^4}{e^{2x}}$



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