

Precalculus - Logarithms and Their Properties - Worksheet

Common Core F-LE.A.4, F-IF.C.7e, F-BF.B.5 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice logarithms and their properties (Common Core F-LE.A.4, F-IF.C.7e and F-BF.B.5). You will convert between forms, evaluate logs, use the product, quotient and power rules, graph logarithms and use change of base.

Precalculus · Common Core State Standards: **F-LE.A.4, F-IF.C.7e, F-BF.B.5**

Exercise 1 - Exponential to log form

Write $2^5 = 32$ in logarithmic form.

Exercise 2 - Log to exponential form

Write $\log_3 81 = 4$ and $\log_5 \frac{1}{25} = -2$ in exponential form.

Exercise 3 - Evaluate a log

Evaluate $\log_4 64$.

Exercise 4 - Log of a fraction

x	1/4	1/2	1	2	4	8
$\log_2 x$	-2	-1	0	1	2	3

Values of log base 2.

Evaluate $\log_2 \frac{1}{8}$ and compare with the table.

Exercise 5 - Common and natural logs

Evaluate $\log 1000$ and $\ln e^5$.

Exercise 6 - A fractional answer

Evaluate $\log_9 3$.

Exercise 7 - Domain

Find the domain of $f(x) = \log(x-3)$ and its vertical asymptote.

Exercise 8 - Expand

Expand $\log_2 \frac{8x^3}{y}$.

Exercise 9 - Condense

Write $2\log x + \log y - 3\log z$ as a single logarithm.

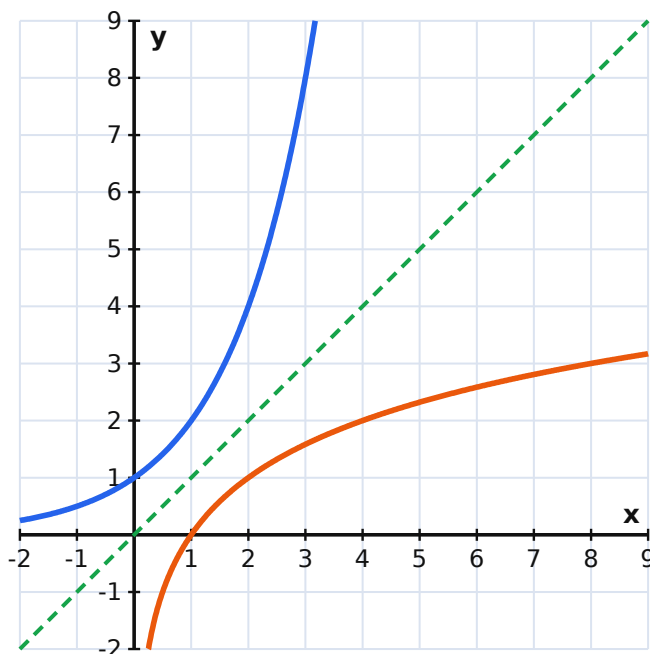
Exercise 10 - Use given values

If $\log_b 2 \approx 0.30$ and $\log_b 3 \approx 0.48$, approximate $\log_b 6$, $\log_b 1.5$ and $\log_b 8$.

Exercise 11 - Change of base

Use the change of base formula to evaluate $\log_3 20$ to three decimal places.

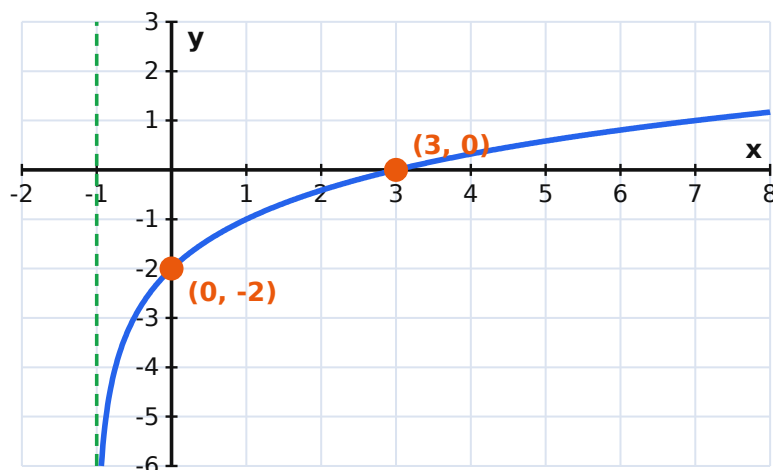
Exercise 12 - Inverse functions



Graphs of $y = 2^x$ and $y = \log_2 x$.

The point $(3, 8)$ is on $f(x) = 2^x$. Name the matching point on $f^{-1}(x) = \log_2 x$ and verify it.

Exercise 13 - Transformed log graph



Graph of a shifted logarithm.

For $y = \log_2(x+1) - 2$, find the vertical asymptote, the x -intercept and the y -intercept.

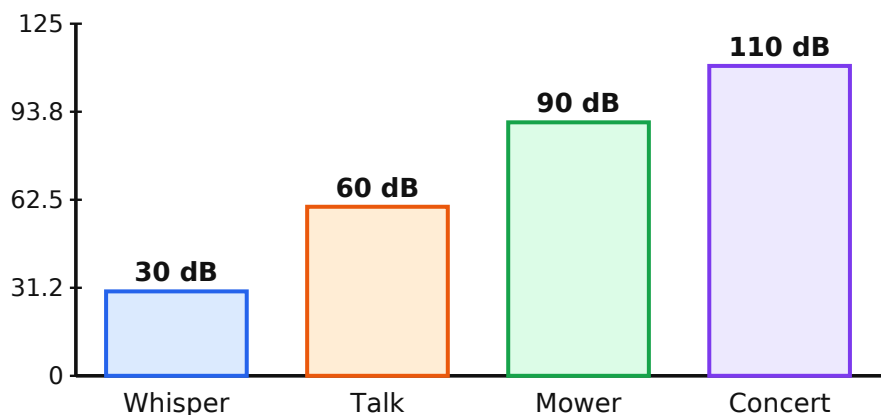
Exercise 14 - Inverse properties

Simplify $e^{\ln 7}$, $10^{\log 4}$, $\ln 1$ and $\log_5 5^{3x}$.

Exercise 15 - Powers inside logs

Evaluate $\log_2 16^3$, $\log 0.01$ and $\log_{1/2} 8$.

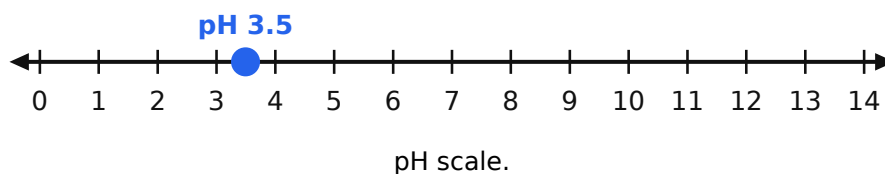
Exercise 16 - Decibels



Common sound levels.

Sound level is $L = 10 \log \frac{I}{I_0}$. For a rock concert, $L = 110$, and for a conversation $L = 60$. How many times more intense is the concert than the conversation?

Exercise 17 - pH



Acidity is $\text{pH} = -\log[\text{H}^+]$. Find the pH of lemon juice with $[\text{H}^+] = 3.2 \times 10^{-4}$ to the nearest tenth, and find $[\text{H}^+]$ when the pH is 8.

Exercise 18 - Magnitude difference

On a log scale, magnitude differences of 1 mean amplitudes differ by a factor of 10. How many times larger is the wave amplitude of a magnitude 7 quake than a magnitude 5 quake?

Exercise 19 - Verify a property

Show that $\log_2 12 = 2 + \log_2 3$ and approximate it using $\log_2 3 \approx 1.585$.

Exercise 20 - Solve for the base or argument

Solve: (a) $\log_x 81 = 4$; (b) $\log_2 x = -4$; (c) $\log_5 125 = x$.