Algebra 2 7.6

Solve exponential equations and inequalities using common logs

Evaluate logarithmic expressions by changing bases

Use log expressions to evaluate pH and H+ concentration

base

exponent

logarithm

default

common log

pH

Whiteboards

$\log_3 90 =$

$\log_{10} 90 =$

Example 4 Solve Exponential Inequalities Using Logarithms

Solve $3^{5y} < 7^{y-2}$. Round to the nearest ten-thousandth.

$5y(\log 3) < (y-2)(\log 7)$

$2.3856y < 0.8451y - 1.6902$

$-0.8451y \quad -0.8451y$

$1.5405y < -1.6902 \qquad y < -1.0972$

Solve each inequality.

4A. $3^{2x} \geq 6^{x+1}$

$2x(\quad) \geq (x+1)(\quad)$

11. $6^{p-1} \leq 4^p$

Real-World Example 2 Quotient Property

SCIENCE The pH of a substance is defined as the concentration of hydrogen ions $[H^+]$ in moles. It is given by the formula $pH = -\log [H^+]$. Find the amount of hydrogen in a liter of acid rain that has a pH of 4.2.

$10^{(-4.2)} = H$

$0.000006309\overset{+5}{6}\overset{-5}{3}$

6.3096×10^{-5}

$-pH = \log_{10} H$

Whiteboards

Use the formula pH = –log [H+] to find the pH of each substance given its concentration of hydrogen ions. Round to the nearest tenth.

4. milk: $[H+] = 2.51 \times 10^{-7}$ mole per liter

5. acid rain: $[H+] = 2.51 \times 10^{-6}$ mole per liter

6. black coffee: $[H+] = 1.0 \times 10^{-5}$ mole per liter

pH = 5

$pH = -\log H$

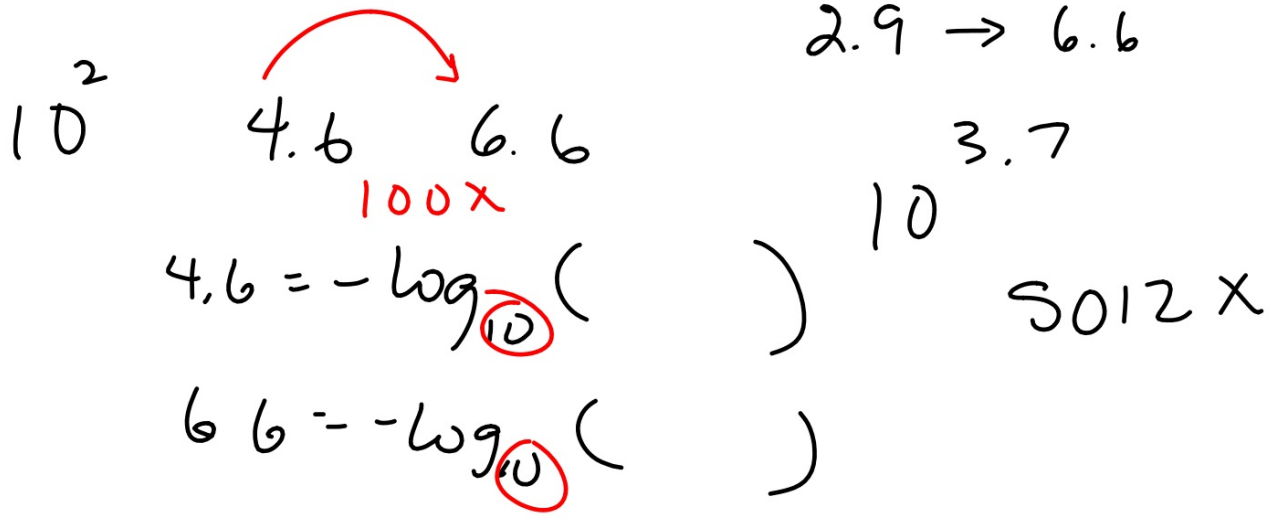
$pH = -\log(2.51 \times 10^{-7})$

$-(-6.6003\ldots)$

6.6

$pH = -(-5.6)$

$= 5.6$


2
10
4.6
6.6
100x
4.6 = -log10( )
6.6 = -log10( )
2.9 → 6.6
3.7
10
5012 x