

Exponential & Logarithmic Functions

5 – Common Logarithms

Common Logarithms:

Logarithms with base 10.

$$\log_{10} x = \log x$$

Antilogarithm: Sometimes the logarithm of x is known to have a value of a , but x is not known. Then x is called the antilogarithm of a , written *antilog a*.

If $\log x = a$, then $x = \text{antilog } a$.

$$\text{antilog } a = 10^a$$

Formula for Learning Curve:

$u_n = kn^b$, where u_n is the number of hours of labor for the n th product, k is the number of hours of labor for the first product, n is the number of products made, and $b = \frac{\log r}{\log 2}$ where r is the learning rate.

Ex A: Use a calculator to find the common logarithm of each number to the nearest ten thousandth.

#1) 98.2

#2) 424

#3) 2.43

Ex B: Use a calculator to find the antilogarithm of each number to the nearest hundredth.

#1) 2.5499

#2) 0.4398

#3) -1.8989

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Ex D: Word Problems.

#1) The pH of a solution is a measure of its acidity. A low pH indicates an acidic solution, and a high pH indicates a basic solution. Neutral water has a pH of 7. The pH of a solution is related to the concentration of hydrogen ions it contains by the formula $pH = \log \frac{1}{H^+}$, where H^+ is the number of gram atoms of hydrogen ions per liter. If the pH of tomato juice is 4.1, what is the concentration of hydrogen ions?

#2) The JP Truck Company produces diesel engines for trucks. Find the number of hours required to build the forty-fifth engine, assuming that the learning rate is 75% and it took 48,000 hours to build the first one.

The company pays its workers an average of \$11.50 per hour. How much less will the labor on the forty-fifth engine cost than the labor for the first engine?