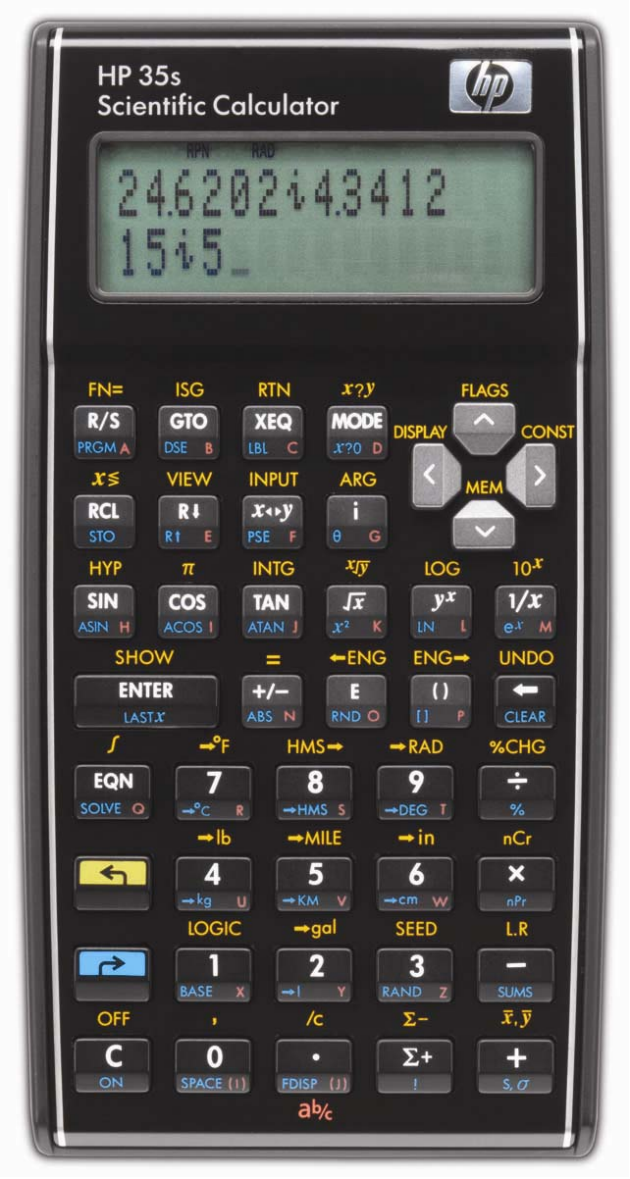
hp calculators

HP 35s Logarithmic functions

Log and antilog functions

Practice working problems involving logarithms



Log and antilog functions

Before calculators like the HP 35s became easily available, logarithms were often used to simply multiplication. They are still used in many subjects, to represent large numbers, as the result of integration, and even in number theory.

The HP 35s has four functions for calculations with logarithms. These are the "common" logarithm of "x", [LOG], its inverse, [10^x], the "natural" logarithm of "x", [LN] and its inverse, [e^x].

Common logarithms are also called "log to base 10" and the common logarithm of a number "x" is written

$$LOG_{10}\ x \quad \text{or just} \quad LOG\ x$$

Natural logarithms are also called "log to base *e*" and the natural logarithm of a number "x" is written

$$LOG_e\ x \quad \text{or} \quad LN\ x$$

[10^x], and [e^x] are also called "antilogarithms" or "antilogs". [e^x] is also called the "exponential" function or "exp". Apart from being the inverses of the log functions, they have their own uses. [10^x] is useful for entering powers of 10. [e^x] is used in calculations where exponential growth is involved.

Practice working problems involving logarithms

Example 1: Find the common logarithm of 2.

Solution: In RPN mode: [2] [↩] [LOG]

Figure 1

In algebraic mode: [↩] [LOG] [2] [ENTER]

Figure 2

Answer: The common logarithm of 2 is very nearly 0.3010.

Example 2: What is the numeric value of the base of natural logarithms, *e*?

Solution: This is a quick way to type the value of *e*.

In RPN mode: [1] [↪] [e^x]

In algebraic mode: [↪] [e^x] [1] [ENTER]

Figure 3

Answer: *e* is equal to 2.71828182846. The pattern 18 – 28 – 18 – 28 is easy to remember.

Example 3: What is the value of X, in the equation: $2^X = 8$?

Solution: To solve this example, we'll apply one of the properties of logarithms which states that the logarithm of an base taken to a power is equal to the power multiplied by the log of the base. This involves taking the logarithm of both sides of the equation. The original equation would then look like this:

X LOG(2) = LOG(8) Figure 4

X is therefore equal to:

$$X = \frac{LOG(8)}{LOG(2)}$$ Figure 5

In RPN mode: [8] [↰] [LOG] [2] [↰] [LOG] [÷]

In algebraic mode: [↰] [LOG] [8] [›] [÷] [↰] [LOG] [2] [ENTER]

Figure 6

Answer: The value of X is 3. Figure 6 shows the result in algebraic mode. Note that the same answer will be found using natural logarithms or common logarithms.