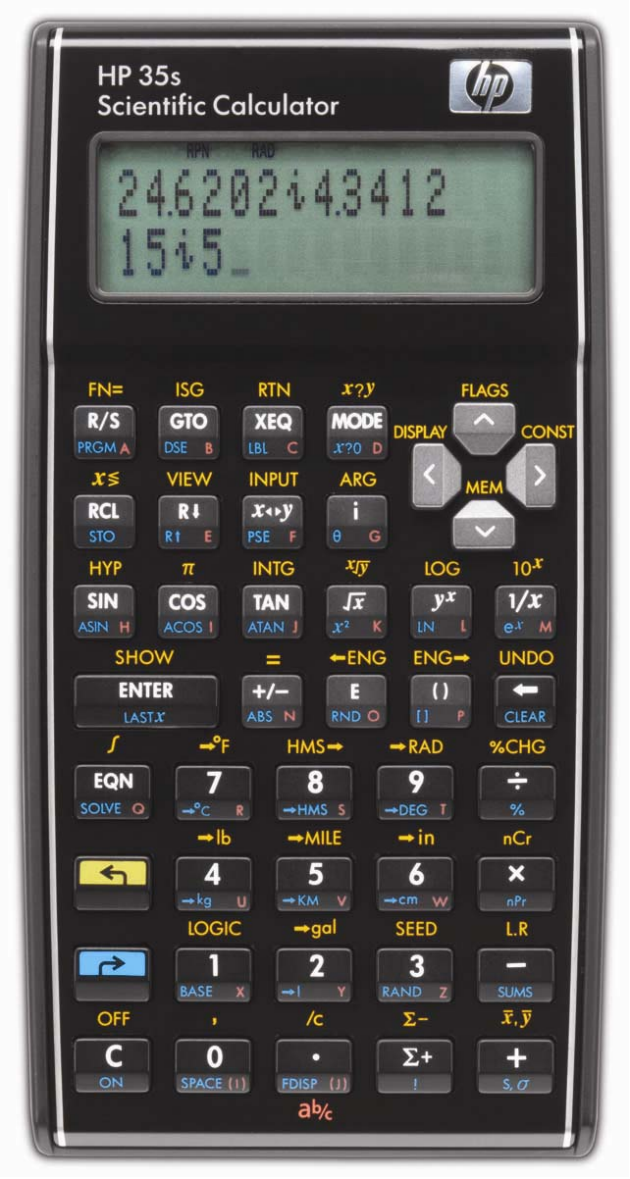
hp calculators

HP 35s Using the built-in constants

The built-in constants

Practice using the built-in constants



The built-in constants

The HP 35s includes 41 physics constants built into the [↶] [CONST] menu. These constants remove the need to keep a table of frequently used constants handy or to look them up in a reference manual. These constants can be used when doing calculations in run mode, within a program, or within an equation. The 41 constants included are:

Speed of light in vacuum
Standard acceleration of gravity
Newtonian constant of gravitation
Molar volume of ideal gas
Avogadro constant
Rydberg constant
Elementary charge
Electron mass
Proton mass
Neutron mass
Muon mass
Boltzmann constant
Planck constant
Planck constant over 2 pi
Magnetic flux quantum
Bohr radius
Electric constant
Molar gas constant
Faraday constant
Atomic mass constant
Magnetic constant
Bohr magneton
Nuclear magneton
Proton magnetic moment
Electron magnetic moment
Neutron magnetic moment
Muon magnetic moment
Classical electron radius
Characteristic impendence of vacuum
Compton wavelength
Neutron Compton wavelength
Proton Compton wavelength
Fine structure constant
Stefan–Boltzmann constant
Celsius temperature
Standard atmosphere
Proton gyromagnetic ratio
First radiation constant
Second radiation constant
Conductance quantum
The base number e of natural logarithm

In algebraic mode, the constants are shown as the corresponding symbol. In RPN mode, when doing calculations manually, the constants are shown as their numeric values. In either mode, the constants are shown as their corresponding symbol when in equation mode or within a program.

The HP 35s displays between 4 to 6 constants on the screen, depending on which "page" of the constant menu is being viewed. The first two pages are shown in example 1 below. To move from one page to the next, you can press [⌄] to move down a page or [⌃] to move up a page. To move across a page, press [›] to move right and [‹] to move left. Once you are on the page, you can select a constant by pressing the numeric key indicating its position on the page, with 1 selecting the first constant shown, 2 the second, etc.

Practice using the built-in constants

Example 1: What is the ratio of a proton's mass to an electron's mass?

Solution: These constants are on the second displayed page of constants. The first page looks like this:

Figure 1

The second page looks like this. To move from one page to the next, you can press ▼ to move down a page or ▲ to move up a page.

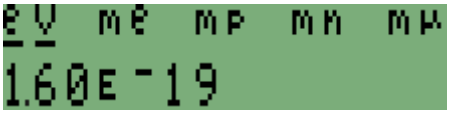


Figure 2

In RPN mode, press: [↰] [CONST] [▼] [>] [>] [ENTER] [↰] [CONST] [▼] [>] [ENTER]

Figure 3

The display is now showing the two mass values. Press [÷] to compute the ratio.

Figure 4

In algebraic mode, press: [↰] [CONST] [▼] [>] [>] [ENTER] [÷] [↰] [CONST] [▼] [>] [ENTER] [ENTER]

Figure 5

Answer: The proton is approximately 1836 times more massive than an electron.

Example 2: A space probe is traveling at 50,000 miles per hour. How many times faster would it have to travel to reach 10% of the speed of light?

Solution: In RPN mode, press:

[↰] [CONST] [ENTER] [1] [0] [÷]

Now convert the space probe's speed to miles per second.

[5] [0] [0] [0] [0] [ENTER] [6] [0] [÷] [6] [0] [÷]

Now compute the number of times faster the probe would have to travel to reach 10% of the speed of light by dividing the two values.

[÷]

In algebraic mode, press:

[( )] [↰] [CONST] [ENTER] [÷] [1] [0] [>] [÷]

Now convert the space probe's speed to miles per second.

( ) 5 0 0 0 0 ÷ 6 0 ÷ 6 0

Now compute the number of times faster the probe would have to travel to reach 10% of the speed of light by pressing:

ENTER

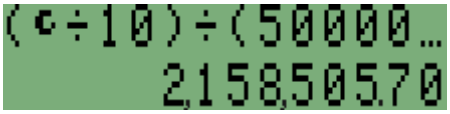


Figure 6

Answer: The space probe would have to travel over two million times faster than its present speed to reach 10% of the speed of light. Figure 6 shows the result in algebraic mode.