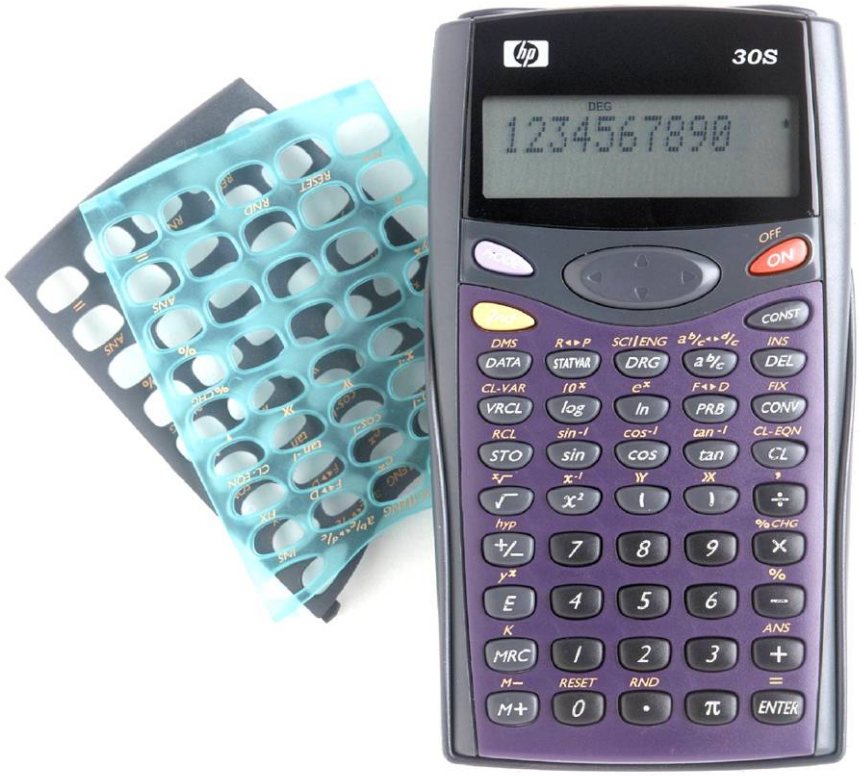
hp calculators



HP 30S Basic Arithmetic

Practice Doing Arithmetic

Practice doing arithmetic

This learning module describes how to carry out simple arithmetic calculations on your HP 30S. Since the HP 30S uses the familiar *algebraic* entry system, you need not learn a new method: expressions are entered in the same left-to-right order that you would write them.

We will work in HOME mode, which is the default operating mode and where common math calculations are done. Computations in STAT, L SOLV and Q SOLV modes are also possible, even though these modes are designed for specific purposes, which are discussed in their respective learning modules.

If HOME is not already the current mode, press MODE and then press ◄ or ► until HOME is selected (underlined), then press ENTER , or simply press MODE 0 in a row. A blinking cursor (the underscore character) appears at the beginning of the entry line. Bear in mind that the maximum number of characters (i.e. digits, parentheses, commands, variables) on the entry line is 80 (including any character added by the constant expression K);, longer calculations must be split.

In the following examples the default display format (Floating Point) is assumed. If you have changed this format, this is the procedure to restore the default mode: press 2nd FIX . and 2nd SCI/ENG then select FLO and press ENTER . Display formats are discussed in the HP 30S learning module *Operating Modes and Display Format.*

Example 1: Add 721.07 and 223.89

Solution: Press:

7 2 1 . 0 7 + 2 2 3 . 8 9 ENTER

The result appears below the entry line as soon as ENTER is pressed.

Answer: 944.96

Once the HP 30S has completed a calculation, the result is stored in a special register and can be retrieved using the Last Answer function (2nd ANS):

Example 2: Multiply the previous result by 5

Solution: × 5 ENTER

Note that “Ans” appears automatically on the entry line. Pressing a number key when the result line is displayed starts a new calculation, but if you press an operator key instead, the HP 30S continues the calculation. This is called a *chain* calculation.

Answer: 47248

Example 3: Calculate $750.34 \times 36 - 25 \times 750.34 \times 36$

Solution: Since 750.34×36 appears twice in the expression, we can calculate it first and use the Answer function to invoke that result:

7 5 0 . 3 4 × 3 6 ENTER − 2 5 2nd ANS ENTER

Note the *implicit* multiplication in "25 Ans": you need not press the [×] key.

Answer: –648293.76

Example 4: Calculate –75 × 45 and 4.52 × (–7.1)

Solution: In order to key in negative numbers the [+/–] key must be pressed *before* keying in the number. Thus the first operation can be done as follows:

[+/–] [7] [5] [×] [4] [5] [ENTER]

As to the second calculation, you can press:

[4] [.] [5] [2] [×] [+/–] [7] [.] [1] [ENTER]

The parenthesis is not necessary. It is important to bear in mind that [+/–] and [–] are *not* interchangeable. The former is a unary operator that makes numbers negative and the latter is the binary operation subtraction.

Answer: –3375 and –32.092

Results greater than 10^{10} or less than 10^{-9} are displayed in scientific notation. To key in numbers in scientific notation, press [+/–] first if the mantissa is negative, next enter the mantissa (which can be omitted if it is 1), press [E] and [+/–] if the exponent is negative, and finally key in the exponent.

Example 5: Calculate 1 000 000 ÷ 2.75

Solution: [E] [6] [÷] [2] [.] [7] [5] [ENTER]

Powers of ten are entered by pressing the [E] key . Since the mantissa is 1, it can be omitted. It is simpler to work with than 1000000 and easier than using [1] [×] [1] [0] [2nd] [y^x] [6] .

Answer: 363636.3636

Parentheses are important in specifying the order of operation. Without parentheses, the HP 30S calculates according to the order of algebraic precedence. You also need to use parentheses to enclose arguments for functions, such as SIN(45), but they are automatically included along with the function name when the function key (or menu item) is pressed. Trailing parentheses that would be entered just before pressing [ENTER] may be omitted. Right or opening parentheses are entered by pressing the [(] key. To close a parenthesis that has been inserted by a function, simply press the [▶] key. If the parenthesis was created by the the [(] key , press the [)] key to close it.

Example 6: Calculate (73 – 89) × (523 + 34)

Solution: [(] [7] [3] [–] [8] [9] [)] [×] [(] [5] [2] [3] [+] [3] [4] [ENTER]

But, try this:

[(] [7] [3] [–] [8] [9] [)] [(] [5] [2] [3] [+] [3] [4] [ENTER]

Notice the implicit multiplication again! There's no need to enter the multiplication symbol between parentheses or between a number and a parenthesis.

Answer: –8912

Functions within an expression are evaluated in the order of precedence stated in the manual included with your calculator, and reproduced below for your own convenience. As far as basic arithmetic is concerned, multiplication and division have priority over addition and subtraction.

1. Expressions within parentheses. Nested parentheses are evaluated from inner to outer. Up to 18 levels of nested parentheses are allowed in a calculation.
2. Coordinate transformations.
3. Prefix functions such as [sin] , [cos] , [tan] etc
4. Postfix functions such as [x^2] , [2nd] [x^{-1}] etc.
5. Power function ([2nd] [y^x]) and [2nd] [$\sqrt[3]{}$]
6. Fractions
7. π, RAND, RANDI, constants.
8. The change sign function ([+/–])
9. Implicit multiplication in front of prefix functions, e.g. 2√3
10. nPr and nCr
11. Multiplication (and other implied multiplication—see the note at the end of this document) and division.
12. Addition and subtraction
13. All other conversions ([2nd] [$a^b/_c \leftrightarrow d/_c$] , [2nd] [F↔D] and ▸DMS ([2nd] [DMS] ◀ [ENTER]).

Functions with the same precedence are evaluated in order from left to right, therefore parentheses are not required in the following example:

Example 7: Calculate $\dfrac{8/3}{5}$

Solution: [8] [÷] [3] [÷] [5] [ENTER]

Answer: 0.533333333

Example 8: Calculate $\frac{8}{3/5}$

Solution: 8 ÷ (3 ÷ 5 ENTER

Answer: 13.33333333

One handy features on the HP 30S is that the very last calculation can be repeated very easily –just pressing ENTER . This feature is most useful when combined with the Ans function.

Example 9: We can always add 1 by pressing two keys, but is there a way of counting by pressing a single button?

Solution: Here's a simple yet useful counting technique. Press 0 and ENTER . This stores 0 in Ans. Now press + 1 ENTER . Now, each time ENTER is pressed, the result is incremented by one. Of course, several refinements are possible: we can initialize the counter to any desired number and count by a number other than one.

Example 10: Find the first five multiples of e

Solution: Repeated calculations make finding multiples of a number as easy as pressing a button. The number e is the base of the natural logarithms; press:

2nd e^x 1 ENTER

This is the first multiple, and is stored in Ans. Press:

+ 2nd e^x 1 ENTER

The second multiple is displayed. From now on, each press of ENTER gives a multiple of e.

Answer: 2.718281828, 5.436563657, 8.154845485, 10.87312731, 13.59140914.

Not only the last calculation can be easily repeated. In fact, the HP 30S keeps a record of up to 320 characters of previous input. To access the history stack use the ▲ and ▼ keys. Please note that this list is cleared when you change the operating mode, and that it is not available in STAT mode. Refer to the learning module *Clearing, Editing and Correcting* for more information.

Example 11: Which are the largest and smallest numbers on your HP 30S?

Answer: The largest number the HP 30S can represent is 9.999999999E99. The smallest non-zero positive number this calculator can display is 1E-99. But your HP 30S keeps a trick up its sleeve. Try this:

E +/– 9 9 ÷ 1 0 ENTER

returns 0, but if we multiply the result by 10,

× 1 0 ENTER

we get the correct 1×10^{-99}! So internally, the smallest number is 10^{-100}.

Note. Implied multiplication on the HP 30S differs from the HP 9g. The following table illustrates the differences between both models:

Entry	HP 30S	HP 9g
1 / 2 A B	1/ (2 × A × B)	(1/ (2×A)) × B
1 / 2 A 3 B	(1 / (2 × A)) × 3 × B	(1 / (2 ×A)) × 3 × B
1 / A A	1 / (A × A)	(1 / A) × A
1 / A π	1 / (A × π)	(1 / A) × π
1 / 2 A -B (- is the Change Sign key)	(1 / (2×A)) × (-B)	(1 / (2×A)) × (-B)