

CONNECT: Calculators

GETTING TO KNOW YOUR SCIENTIFIC CALCULATOR

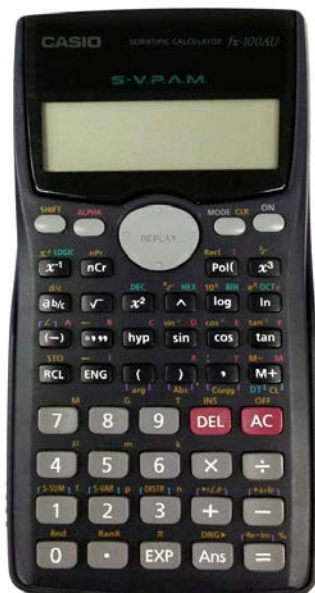


Photo courtesy University of Wollongong library

Your calculator may be different from the one pictured above; however it will have the same functions. Possibly the functions will be positioned differently and possibly they will have a slightly different notation but the calculator pictured is a good place to start!

First steps

1. (a) Make sure your calculator is, at this stage, in *Comp* Mode. This ensures that the normal method of calculation is enabled:
 - Press the **Mode** key until *Comp Cmplx* shows (you may have to press it more than once).
 - Select the number under *Comp* (usually 1).
- (b) Also at this stage, make sure your calculator is in “Deg” Mode.
 - Press the **Mode** key several times until *Deg Rad Gra* shows
 - select *Deg* by pressing the number under it (usually 1). You can do this at any time, even in the middle of a calculation.

(c) Sometimes, maybe by accident, the calculator is put into a different mode; to correct this:

- press the **Mode** key repeatedly until you reach the screen where *Norm* is displayed.
 - Select *Norm* by pressing the number indicated.
 - the choice *Norm 1~2?* is displayed: select 1.
2. Become familiar with the ordinary “operators” in Maths: +, -, x, ÷. () are also very useful. The calculator recognises the conventional Order of Operations and so any straightforward calculation may simply be typed in following the order from left to right, including brackets. If a negative number is needed, then use the **(-)** key. On some calculators, ÷ is represented by /.

Example: $5 + 3 \times -2 - 4 \div 2$

Type from left to right, using **(-)** **2** for -2 and the calculator display should show exactly the calculation above. Pressing the **=** key should give the result -3. (This is because the calculator does the multiplication and division first, so it does $5 + -6 - 2$, that is, it uses the conventional, correct, order). If brackets are inserted at all, the calculation will be changed. There is no need to press **=** until all the expression has been entered.

If you want to know more about the Order of Operations in Mathematics, have a look at *CONNECT: Calculations: ORDER OF OPERATIONS IN MATHEMATICS*.

Clearing an entry; clearing everything

1. You wish to calculate $3 + 5 - 2 \times 6$. Oops! You typed $3 + 5 + 2 \times 6$. You can easily correct the error without having to retype the whole calculation:
 - the **Replay** button (the large one in the middle) gives a cursor. Press the left side of **Replay** until the cursor is under the character you want to correct (this time it's the +).

- Press the **DEL** key and type the **-**. Press **=** and the correct answer is displayed (-4).
 - You can correct an entry as you go or after you have found an answer, as long as the calculation is still displayed.
2. You do not have to clear everything each time you operate the calculator. If you have obtained an answer from a calculation by pressing **=**, then you can begin a new calculation straight away. However, if you do need to clear everything, press **AC**.

Fixed and Scientific Notation

1. *Fix* refers to “fixing” the number of decimal places to which you would like a calculation to be accurate (“rounding”). For example, you may do the calculation 9.61×5.83 but you only want two decimal places in your answer (you might buy 9.61kg of potatoes at \$5.83 per kg).
 - Press **Mode** repeatedly until *Fix Sci Norm* is reached.
 - Select *Fix*. It asks how many decimal places you require: in this case press 2.
 - Enter the calculation: instead of the answer 56.0263, you will see 56.03.
 - To return to the normal amount of decimal places, select *Norm* (see 1 (c) above).
2. *Sci* refers to Scientific notation. This enables very large or very small numbers to be displayed using powers of 10. *Sci* asks you to nominate the number of Significant Figures you wish displayed in your answer. (Significant Figures are different from Decimal Places. If you need further explanation, please refer to *CONNECT: Ways of writing numbers: SCIENTIFIC NOTATION; SIGNIFICANT FIGURES; DECIMAL PLACES.*) For example, calculate 6693.82×41365.3 , giving your answer in Scientific Notation, correct to 3 significant figures. (The answer in “normal” notation is 276 891 872.4 (quite a large number!). Press *Mode* until you reach the *Fix Sci Norm* screen; select *Sci*; press 3 for the number of Significant Figures. Enter the calculation as usual, when you press **=**, the Scientific Notation for the answer is displayed: 2.77×10^8 . There are 3 significant figures in this result (2, 7 and 7) and the power of 10 (8) tells us that the 2 represents two hundred million! To return to the normal display, select *Norm* (see 1 (c) above).

Fractions

(This information is about the calculator entries required for calculating with fractions. If you need practice with fraction calculations by hand, please refer to *CONNECT: Fractions: MANIPULATING FRACTIONS*.)

The Fraction key may look different on your calculator. On the Casio, it is

$$\boxed{\frac{b}{a \frac{b}{c}}}$$

To enter $\frac{3}{4}$ into the calculator, press $\boxed{3}$ $\boxed{\frac{b}{a \frac{b}{c}}}$ $\boxed{4}$.

($\frac{3}{4}$ is represented by $3 \div 4$.)

To enter a mixed number, such as $2\frac{3}{4}$, enter it as $\boxed{2}$ $\boxed{\frac{b}{a \frac{b}{c}}}$ $\boxed{3}$ $\boxed{\frac{b}{a \frac{b}{c}}}$ $\boxed{4}$.

Example to try: $3\frac{1}{2} + \frac{3}{4} \times 4\frac{1}{5}$

(Answer: $6\frac{13}{20}$)

Raising a number to a power (for example, squaring)

Pressing a number followed by the $\boxed{x^2}$ button squares the number. For example 3^2 is found by entering 3 followed by $\boxed{x^2}$. (Answer 9.)

To square a minus (negative) number, you MUST use brackets.

Example: calculate the square of -3. You would use $(-3)^2$. The actual buttons to press would be: $\boxed{(}$ $\boxed{-}$ $\boxed{3}$ $\boxed{)}$ $\boxed{x^2}$ $\boxed{=}$. You will never get a negative answer when you square a single positive or negative number. For further information, please refer to *CONNECT: Calculations: ORDER OF OPERATIONS IN MATHEMATICS*. and *CONNECT: Calculations: DIRECTED NUMBERS*.

To raise numbers to powers other than 2, the button to use is written differently on various calculators: it could be $\boxed{x^y}$; $\boxed{y^x}$; or $\boxed{\wedge}$, for example. For this resource, I shall use $\boxed{\wedge}$ (because it is easiest to type!).

An example might be: $2^4 + 3^2 - 5^3$. This would be entered:

$2 \wedge 4 + 3 x^2 - 5 \wedge 3 =$ and the answer is -100 .

You can also use \wedge (or its equivalent on your calculator) to do squaring.

Calculating a square root

Most whole numbers do not have an exact whole number square root. So do not be surprised to see a large number of decimal places for something that looks as simple as $\sqrt{5}$, for example. The square root is found using the $\sqrt{\square}$ key. Find the square root of 5: press $\sqrt{\square}$ followed by 5 and get 2.2360... . Some calculators require brackets for the number and automatically insert the first bracket. You need to close the brackets by using the \square key.

Often you are asked to find the square root of a quite complex calculation. For example: $\sqrt{15^2 + 13.2^2}$. Here you press the $\sqrt{\square}$ first, then immediately the open bracket $(\square$ key. Press 15, then x^2 followed by $+$ then 13.2 then x^2 . Close the brackets with \square . Press $=$. Answer: 19.980...

More complicated: $\sqrt{\frac{12.8^3}{3} - \frac{5.3^2}{2}}$

Answer: 26.1726...

Statistics mode

There is a choice of Statistics modes available: *SD* gives calculations such as mean, standard deviation, total scores, sums of squares. *Reg* allows two variables to be entered at once and the coefficient of correlation, and the regression equation's coefficients calculated. It may be easiest to refer to your calculator booklet to find out the way to enter data and to calculate these values.

Logarithms

For further information about the meaning and uses of logarithms, please refer to *CONNECT: Logarithms*.

There are generally two logarithm keys on your Scientific calculator. The first is obvious: $\boxed{\log}$, but the second is not quite so obvious: $\boxed{\ln}$. This is actually the letters ℓ and n (not "l" and n). $\boxed{\log}$ number gives the logarithm to base 10, ($\log_{10} \text{number}$) and $\boxed{\ln}$ number gives the logarithm to base e ($\log_e \text{number}$). The context (or formula) will tell you which one to use.

You will notice that there are still many buttons and functions that I have not explained in this resource. If you would like further information or if this information did not cover anything you feel you require, then please make an appointment with the Maths Support lecturer, Learning Development, through Reception on 02 4221 3977, or Level 3 (top floor), Building 11, or through your campus.