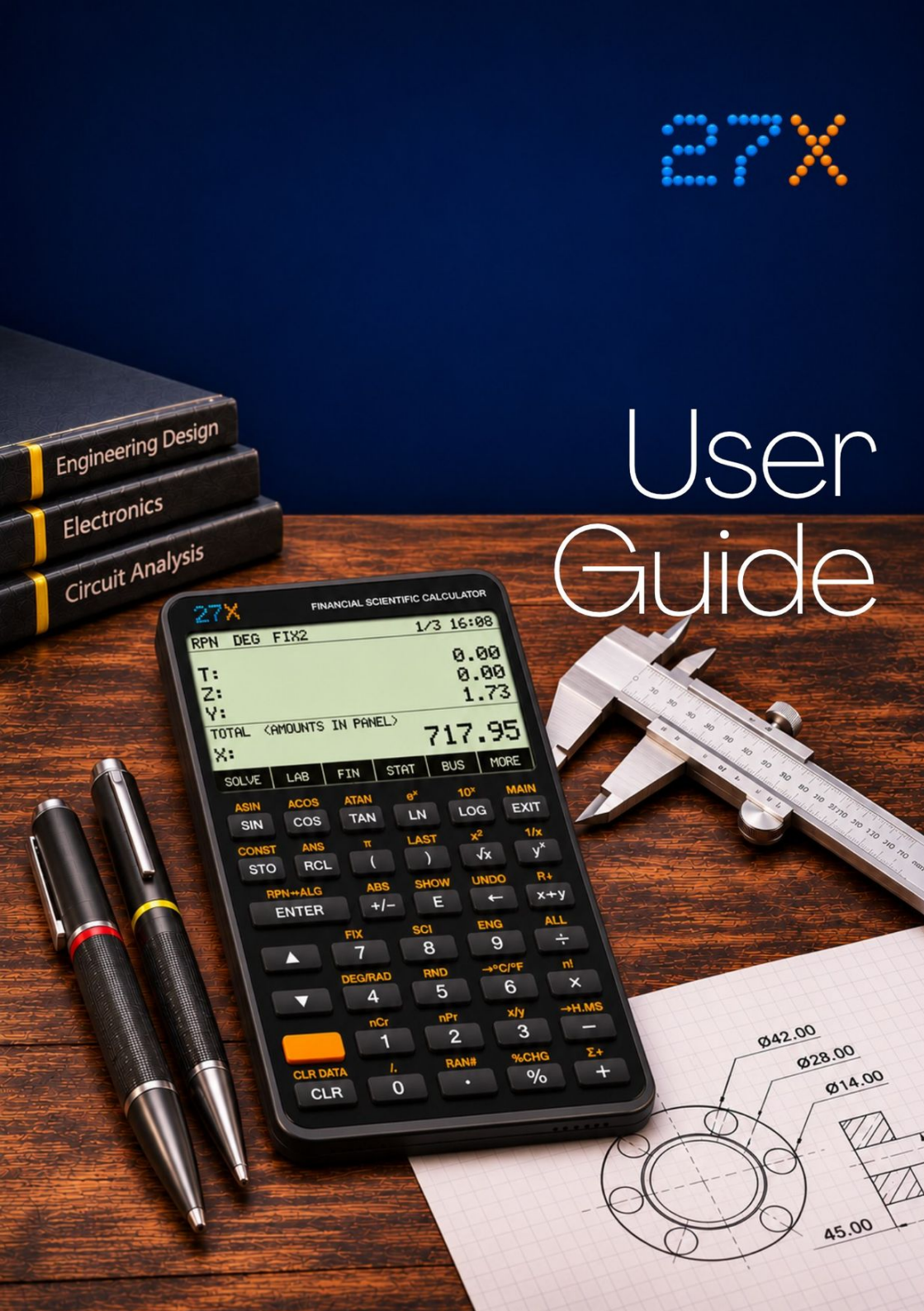
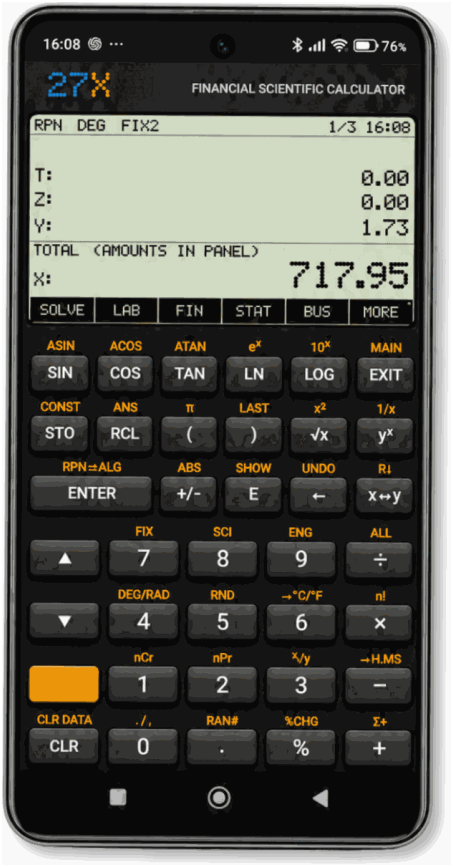

27X
Engineering Design
Electronics
Circuit Analysis
27X
FINANCIAL SCIENTIFIC CALCULATOR
RPN DEG FIX2
1/3 16:08
T:
Z:
Y:
X:
0.00
0.00
1.73
TOTAL (AMOUNTS IN PANEL)
717.95
SOLVE
LAB
FIN
STAT
BUS
MORE
ASIN SIN
ACOS COS
ATAN TAN
eˣ LN
10ˣ LOG
MAIN EXIT
CONST STO
ANS RCL
π (
LAST)
x² √x
1/x yˣ
RPN↔ALG ENTER
ABS +/−
SHOW E
UNDO ←
R↓ x↔y
FIX 7
SCI 8
ENG 9
ALL ÷
DEG/RAD 4
RND 5
→°C/°F 6
n! ×
nCr 1
nPr 2
x/y 3
→H.MS −
CLR DATA CLR
I/. 0
RAN# .
%CHG %
Σ+ +
Ø42.00
Ø28.00
Ø14.00
45.00
User
Guide

CalcCraft

Financial Scientific Calculator

User Guide · version 0.7.4



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1. Welcome to CalcCraft 27X

CalcCraft 27X is a pocket financial, scientific and engineering calculator for Android phones and Windows PCs. It brings together the everyday maths of a scientific calculator, the money tools of a business calculator, an equation solver that lets you work with your own formulas, and dedicated menus for laboratory formulation and engineering.

You can work in **algebraic** mode (type a sum the way you would write it and press ENTER for the answer) or in **RPN** mode (Reverse Polish Notation, where you key in the numbers first and then the operation). You can switch between them at any time.

What this guide covers

- A tour of the keyboard, the orange shortcuts, the display and the menus (chapter 2).
- Everyday arithmetic in both entry modes, memory, and display settings (chapters 3 to 5).
- Every menu in turn — maths, business percentages, finance, statistics, time and dates, the solver, the lab tools and the engineering library — with worked examples (chapters 6 to 13).
- Reference material: error messages, equation rules and a complete list of every function (appendices).

How to read the examples

Every example in this guide was keyed into the calculator exactly as printed, and the screen picture beside it shows the calculator at the end. The keys are written like this:

Written as	Means
[ENTER]	Press the ENTER key on the keyboard.
[π]	Keys printed in orange: press the orange key, then the key with that label above it (here π, above the (key).
‹TVM›	Tap the soft key labelled TVM on the bottom row of the screen. If you can't see it, tap ‹MORE› to show the

Written as	Means
	next page of soft keys.
360	Type the number on the number keys.

Results are shown with the standard display setting, **FIX 2** (two decimal places), unless the example changes it. Start each example from the main menu: press **[MAIN]** (orange, then EXIT). If you go wrong, **[UNDO]** takes back the last step.

Getting the app

CalcCraft 27X is available **only from simucraft.io/calccraft**. Do not install a CalcCraft 27X file that reached you any other way (by e-mail, a messaging app or another website), because it may not be genuine.

Because the app is not installed through an app store, your phone or PC will show one or more warnings while you download and install it. These warnings appear for **every** app installed this way; they do not mean a problem was found in CalcCraft 27X. The steps below show each warning and what to tap. The exact wording depends on your phone or browser.

Android

1. On your phone, open **simucraft.io/calccraft** and tap **Download for Android**. The file is called **CalcCraft27X-X.Y.Z.apk**, where X.Y.Z is the version number.
2. **Browser warning.** Chrome may say *"File might be harmful"* or *"This type of file can harm your device"*. Tap **Download anyway**. Chrome shows this for every app file downloaded from a website.
3. When the download finishes, tap **Open** (or open the file from the **Downloads** or **Files** app).
4. **Unknown apps.** The first time, Android says *"For your security, your phone is not allowed to install unknown apps from this source"*. Tap **Settings**, switch on **Allow from this source**, then go back. This gives your browser permission to install apps; you can switch it off again after installing.
5. Tap **Install**.

6. **Play Protect.** Google Play Protect may show *"App scan recommended"* or *"Play Protect doesn't recognise this app's developer"*. Tap **Scan app** and then **Install**, or tap **More details** and then **Install anyway**. Play Protect shows this for apps it has not seen in the Play Store.
7. Tap **Open**, or find **CalcCraft 27X** in your app drawer.

> Earlier versions were called Kestrel 27X. CalcCraft 27X installs over Kestrel 27X and keeps your settings, equations, statistics and stored values.
>
> Updating: download the newer APK from simucraft.io and install it the same way. It installs over the old version and keeps your settings, equations, statistics and stored values. If Android says *"App not installed"*, the file is incomplete or not genuine: download it again from simucraft.io.

Which version am I running?

The version number shows on the start screen (for example **CalcCraft 27X 0.7.4 beta**) and on the message line when you tap ‹ABOUT› in MODES (page 3 of the main menu). On Android you can also see it in Settings › Apps › CalcCraft 27X. Please quote it if you report a problem. The app also tells you when a newer version is out (see Updates below).

Version numbers have three parts and go up in sequence with each release (0.7.0, 0.7.1, 0.7.2 …). This guide matches **version 0.7.4**. A new edition comes out with every release that adds or changes functions; a release that only fixes bugs may keep the previous edition.

Updates

Once a day, when it is opened and online, CalcCraft 27X checks whether a newer version has been published. It sends nothing about you or your calculations: it only reads the public list of versions. If there is a newer one, the message line shows **Update 0.7.4 beta available · MODES › UPDATE** (for example). Tap ‹UPDATE› in MODES to open simucraft.io/calccraft and download it; install it over the old one and your data is kept. With no connection the check simply waits for another day. To turn it off, tap ‹UPDCHK› in MODES; tapping it again turns it back on and checks straight away.

Windows

1. On your PC, open **simucraft.io/calccraft** and click **Download for Windows**. The file is called **CalcCraft27X-Setup-X.Y.Z.exe**.
2. **Browser warning.** Edge may say *"CalcCraft27X-Setup-X.Y.Z.exe isn't commonly downloaded"*: click **...** (More actions) › **Keep** › **Show more** › **Keep anyway**. Chrome may ask whether to keep the file: click **Keep**. Browsers show this for new programs that few people have downloaded yet.
3. Open the downloaded file.
4. **SmartScreen.** Windows may show a blue box, *"Windows protected your PC"*. Click **More info**, check that the app is **CalcCraft27X-Setup-X.Y.Z.exe**, then click **Run anyway**. Windows shows this for programs that are not yet widely known to Microsoft.
5. If Windows asks *"Do you want to allow this app to make changes to your device?"*, click **Yes**. Follow the installer: it adds Start menu and desktop shortcuts.

> Updating: run the newer installer from simucraft.io; it replaces the old version and keeps your data. To remove CalcCraft 27X: Settings › Apps › Installed apps › CalcCraft 27X › Uninstall. Your antivirus may scan the installer the first time it runs; this is normal.
>
> To keep the calculator in view while you work in other programs, switch on **ONTOP** in MODES (page 3 of the main menu). The window stays on top of other windows until you switch it off. Drag a corner to make the window bigger or smaller; it keeps the calculator's shape.
>
> On a PC you can also use the keyboard: digits, + − * / ^ ( ) %, Enter (=), Backspace, Esc (EXIT), Delete (CLR), the arrow keys, and F1–F6 for the six soft keys.

iPhone and iPad

On an iPhone or iPad, CalcCraft 27X runs as a web app: the same calculator, added to your Home Screen from Safari. It opens full screen with its own icon, and works offline once it has been opened.

1. In **Safari**, open **simucraft.io/calccraft/27x.html** (or tap **iPhone and iPad** on simucraft.io/calccraft).
2. Tap the **Share** button (the square with an arrow; on newer iPhones it may be under the ··· button).

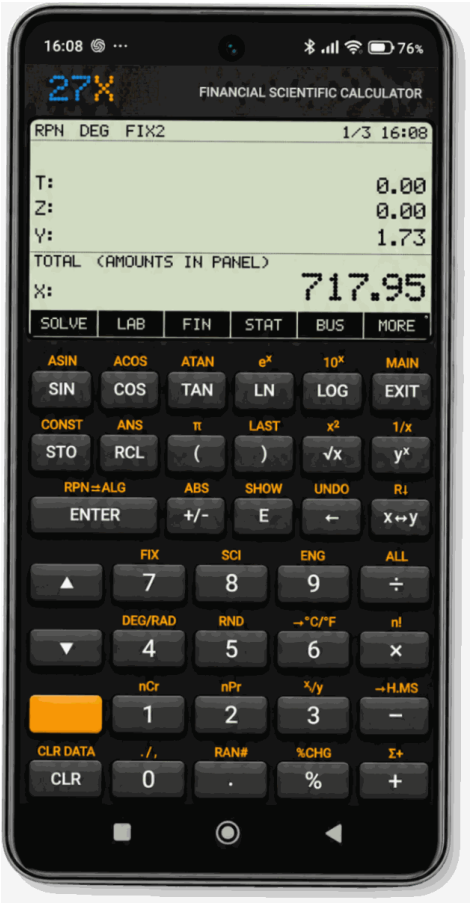
3. Tap **Add to Home Screen**. Leave **Open as Web App** switched on, then tap **Add**.
4. Open **CalcCraft 27X** from your Home Screen.

> The web app updates itself: whenever it is opened online it loads the latest version, so there is nothing to download. Your settings, equations and values are kept on the device; deleting the Home Screen icon also deletes them. A native iPhone app for the App Store is coming soon.

The same web app also runs in any browser on a computer or tablet: open **simucraft.io/calccraft/27x.html**. In **Chrome** or **Edge** on a computer, ‹POPOUT› in MODES opens the calculator in its own small window that floats on top of your other programs.

> On iPad, the calculator keeps its pocket size rather than filling the screen. With iPadOS 26 or later you can also open it in a window and place it beside or over another app: drag the corner handle to resize it.

2. A tour of the calculator



The keyboard

Each key does what its main label says. Many keys also have a second function printed in **orange** above them: press the orange key first (the screen shows SHIFT), then the key. The orange key only affects the next key you press; press it again to cancel.

Key	Main function	Orange function
SIN, COS, TAN	Sine, cosine, tangent	ASIN, ACOS, ATAN (inverse trig)
LN	Natural logarithm	e^x
LOG	Common (base-10) logarithm	10^x
EXIT	Step back one menu level	MAIN — jump straight to the main menu
STO	Store a number in registers 0–9	CONST — list of physical constants
RCL	Recall a number from registers 0–9	ANS — put the last answer into the line
(and)	Brackets (algebraic mode)	π and LAST (last answer / last x)
√x	Square root	x^2
y^x	Power	1/x (reciprocal)
ENTER	Equals (algebraic) / enter a number onto the stack (RPN)	RPN↔ALG — switch entry mode
+/−	Change sign	ABS — absolute value
E	Enter an exponent (1 E 6 = one million)	SHOW — show the value to full precision
←	Delete the last thing typed	UNDO — reverse the last action (one step)
x↔y	Swap X and Y (RPN)	R↓ — roll the stack down (RPN)
▲ ▼	Scroll history, the side panel or the equation list	—
7 8 9 ÷	Numbers and divide	FIX, SCI, ENG (then a digit 0–9 for places), ALL
4 5 6 ×	Numbers and multiply	DEG/RAD (switches),

Key	Main function	Orange function
		RND (round to display), →°C/°F (once °F→°C, twice °C→°F), n!
1 2 3 −	Numbers and subtract	nCr, nPr, $^{x}\sqrt{y}$ (any root), →H.MS (once hours→H.MS, twice H.MS→hours)
0 . % +	Zero, decimal point, percent, add	Decimal point . or , ; RAN# (random number); %CHG; Σ+ (add to statistics)
CLR	Clear the screen (typing, answer, history, stack)	CLR DATA — clear the values stored in the current menu

Orange shortcuts

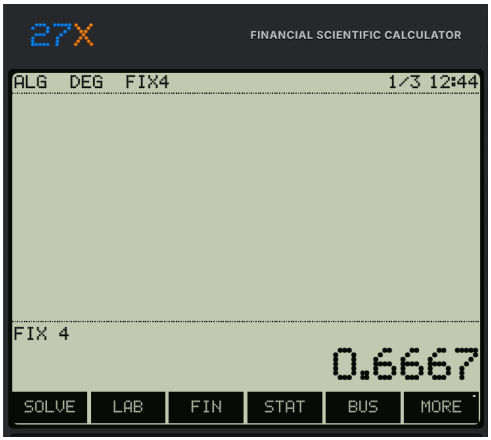
Every key has an orange function, so the settings and functions you use most are one keypress away. They are also still in the soft-key menus (DISP, MODES, PROB, PARTS, ENG › CONST, STAT).

Example — Set four decimal places

2 ÷ 3, then FIX followed by the number of places.

Keys	Display	What it does
2 **[÷]**	2÷	
3 **[ENTER]**	0.67	Completes the calculation
[FIX] 4	FIX 4	Shows 4 decimal places

Result: 0.6667

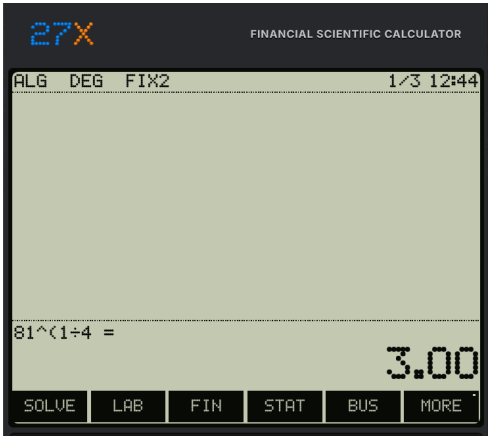


Example — Any root

The 4th root of 81. Type the number, then $\sqrt[x]{y}$, then the root.

Keys: 81 **[$\sqrt[x]{y}$]** 4 **[ENTER]**

Result: 3.00

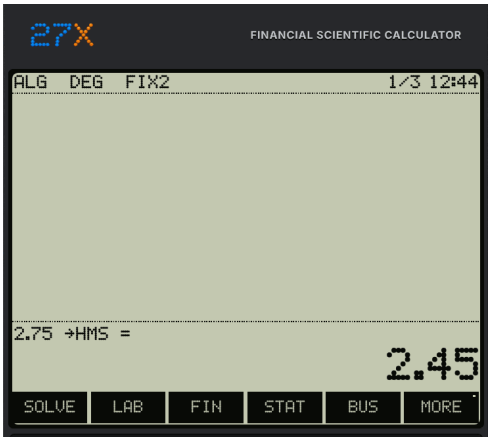


Example — Decimal hours to hours-minutes-seconds

Press →H.MS once: 2.75 hours is 2 h 45 min.

Keys: 2.75 **[→H.MS]**

Result: 2.4500 (2:45:00)

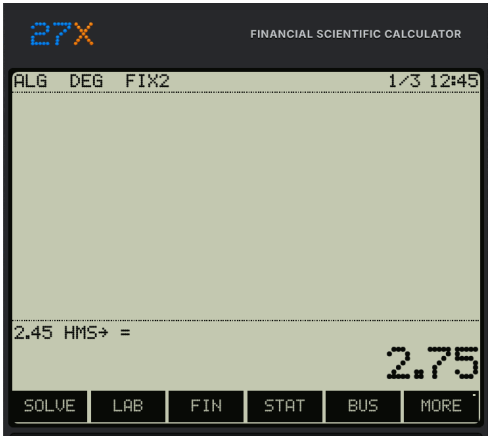


Example — Hours-minutes-seconds to decimal hours

Press →H.MS twice in a row: 2.45 (2 h 45 min) is 2.75 hours.

Keys: 2.45 **[→H.MS] [→H.MS]**

Result: **2.75** hours

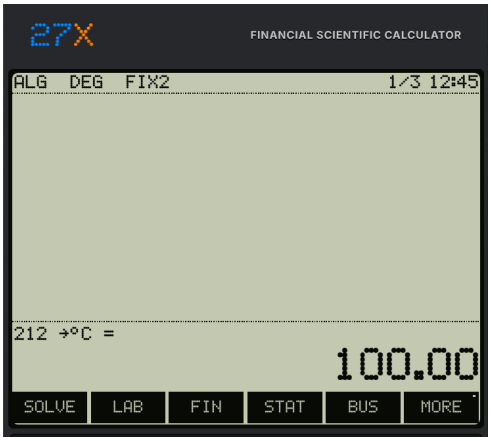


Example — Fahrenheit to Celsius

Press →°C/°F once: 212 °F in Celsius.

Keys: 212 **[→°C/°F]**

Result: **100.00** °C

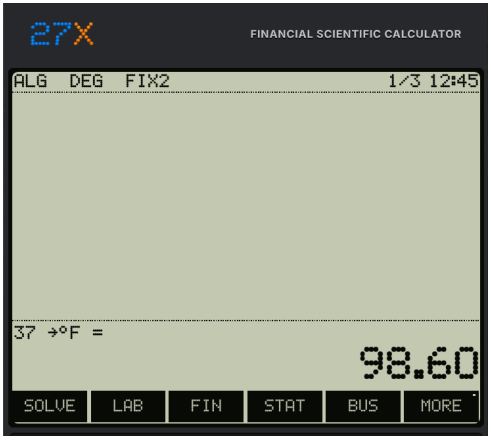


Example — Celsius to Fahrenheit

Press →°C/°F twice in a row: 37 °C in Fahrenheit.

Keys: 37 **[→°C/°F]** **[→°C/°F]**

Result: **98.6** °F

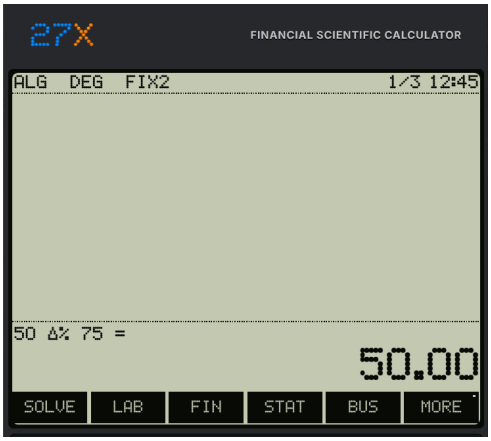


Example — Percent change

From 50 to 75: old value, %CHG, new value.

Keys: 50 **[%CHG]** 75 **[ENTER]**

Result: **50.00** %



Example — Undo a mistake

2 + 3 = 5, then CLR by accident. UNDO brings the 5 back. UNDO reverses one step.

Keys	Display	What it does
2 **[+]**	2+	
3 **[ENTER]**	5.00	Completes the calculation
[CLR]	0.00	Clears the display
[UNDO]	Undone	Undoes the last change

Result: 5.00



Example — Use a constant

2 × R (the gas constant). CONST opens the list; tap the constant you want.

Keys	Display	What it does
2 **[×]**	2×	
[CONST]	2×	Opens the constants (CONST)
‹R›	GAS CONSTANT J/mol·K = 8.314462618	Inserts the gas constant R
[ENTER]	16.63	Completes the calculation

Result: 16.63



The display

The display is a high-density dot-matrix screen. From top to bottom it has:

- **Status line** — entry mode (ALG or RPN), angle mode (DEG or RAD), display format (for example FIX2), any active SHIFT, the menu you are in (tap it to go back), the soft-key page (for example 1/3) and the time.

- **Working area** — your recent calculations (algebraic) or the T, Z and Y stack registers (RPN). When a menu has values to show, a **side panel** on the right lists them; drag or tap it to scroll if it is long.
- **Message line** — the expression that produced the answer, the name of a value you just stored or solved, or an error.
- **Result line** — the current answer (algebraic) or the X register (RPN), in large digits across the full width.
- **Soft keys** — six labels along the bottom edge. Tap a label to use it.

Example — A calculation on the main screen

The expression appears on the message line and the answer below it.

Keys	Display	What it does
12 **[×]**	12×	
3 **[+]**	12×3+	
4 **[ENTER]**	40.00	Completes the calculation

Result: 40.00



Menus and soft keys

Most functions live in menus. The main menu has three pages of soft keys; tap ‹MORE› to move between pages (the status line shows which page you are on).

Page	Soft keys
1	SOLVE · LAB · FIN · STAT · BUS
2	ENG · TIME · CONV · PROB · PARTS
3	HYP · MODES · DISP

To go back: press **EXIT**, tap **‹BACK›** (shown in menus with a free slot), or tap the menu name on the top line. Press **[MAIN]** to jump to the main menu from anywhere. On Android, the phone's back button also steps back through the menus.

Example — Using MORE

Tapping ‹MORE› on the main menu shows its second page.

Keys: **‹MORE›**

Result: Page 2/3 of the main menu



The key idea: menu variables

Many menus — TVM, markup, the solver, the lab and engineering tools — show their values as soft keys. They all work the same way:

- **Type a number, then tap a soft key** to store that value. The side panel shows it.

- **Tap a soft key without typing anything** to calculate that value from the others.

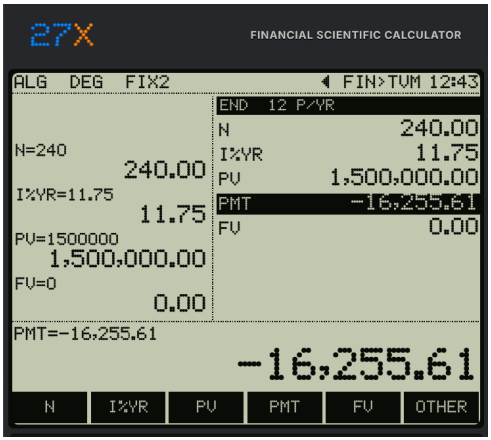
So to find a loan repayment you type the term and tap N, type the rate and tap I%YR, and so on, then simply tap PMT. Change any value and tap again to recalculate.

Example — Menu variables (TVM)

Each value is stored as you tap its key; tapping PMT on its own calculates it.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
240 **‹N›**	N=240.00	Stores 240 in N
11.75 **‹I%YR›**	I%YR=11.75	Stores 11.75 in I %YR
1500000 **‹PV›**	PV=1,500,000.00	Stores 1 500 000 in PV
0 **‹FV›**	FV=0.00	Stores 0 in FV
‹PMT›	PMT=-16,255.61	Calculates PMT

Result: −16,255.61 per month



3. Everyday arithmetic

Algebraic mode

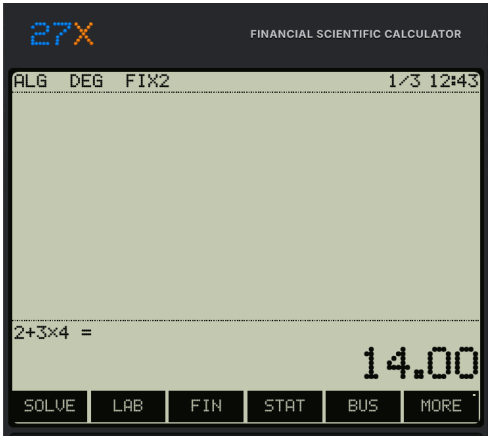
Algebraic (ALG) is the standard mode. Type the sum as you would write it and press ENTER. The calculator follows the usual order: powers first, then × and ÷, then + and −. Use brackets to change the order.

Example — Order of operations

× is done before +.

Keys	Display	What it does
2 **[+]**	2+	
3 **[×]**	2+3×	
4 **[ENTER]**	14.00	Completes the calculation

Result: 14.00

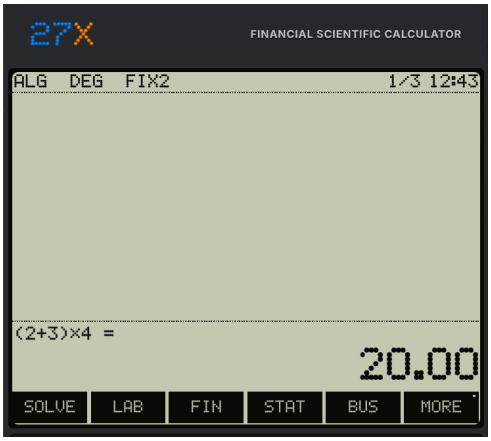


Example — Brackets

The bracket is worked out first.

Keys	Display	What it does
[(]	(	
2 **[+]**	(2+	
3 **[)]**	(2+3)	
[×]	(2+3)×	
4 **[ENTER]**	20.00	Completes the calculation

Result: 20.00

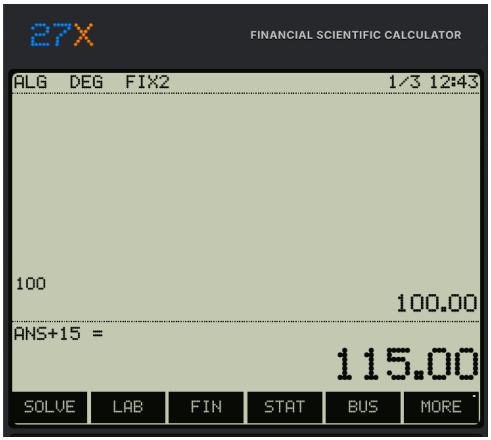


Example — Carrying on from the answer

Starting a new line with an operator uses the last answer (shown as ANS).

Keys	Display	What it does
100 **[ENTER]**	100.00	Completes the calculation
[+]	ANS+	
15 **[ENTER]**	115.00	Completes the calculation

Result: 115.00



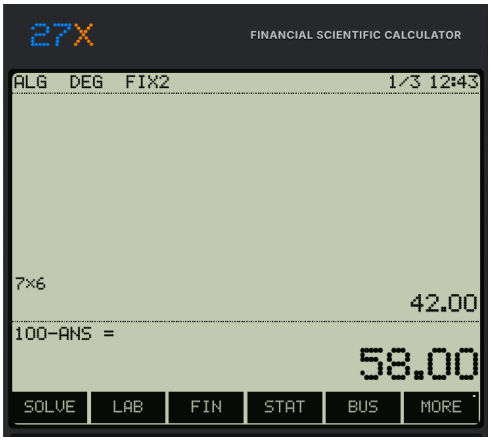
Your calculations stay on screen in the working area. Press ▲ and ▼ to pick an earlier result, then ENTER to copy it into the line you are typing. **[LAST]** inserts the last answer.

Example — Using LAST

7 × 6 gives 42; LAST then puts that answer into the next sum.

Keys	Display	What it does
7 **[×]**	7×	
6 **[ENTER]**	42.00	Completes the calculation
100 **[−]**	100−	
[LAST]	100−ANS	Inserts the last answer (ANS)
[ENTER]	58.00	Completes the calculation

Result: 58.00



RPN mode

Press **[RPN↔ALG]** to switch to RPN; the status line shows RPN. In RPN you enter the numbers first and then the operation, and there is no need for brackets or an equals key. Numbers are held on a four-level **stack**: X (the large bottom line), Y, Z and T.

- Type a number and press ENTER to push it up to Y, ready for the next number.

- An operation such as + or × combines Y and X and leaves the answer in X.
- A function such as √x or SIN works on X alone.
- **x↔y** swaps X and Y; **[R↓]** rolls the stack down; **[LAST]** recalls the X value used in the last operation.

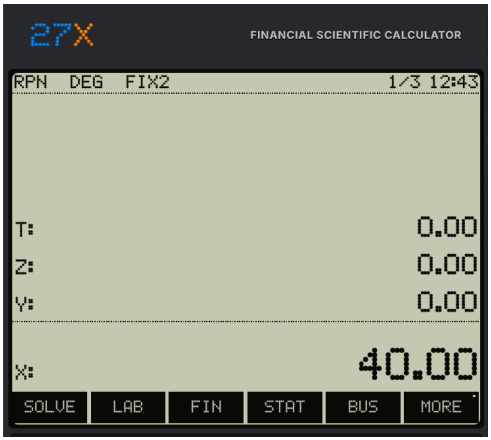
Example — A simple RPN sum

12 × 3, then + 4.

In RPN mode:

Keys	Display	What it does
12 **[ENTER]**	12.00	Enters 12
3 **[×]**	36.00	Keys in 3; multiplies
4 **[+]**	40.00	Keys in 4; adds

Result: 40.00



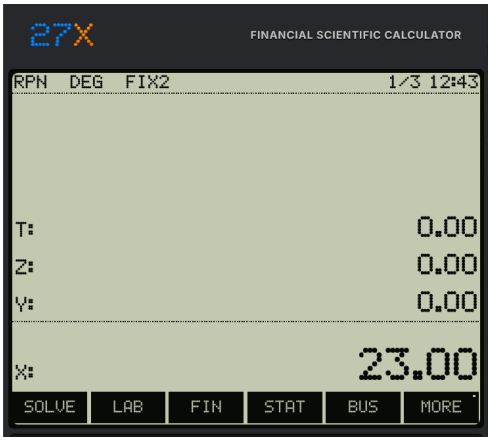
Example — Using the stack

Work out 3 + (4 × 5) without brackets.

In RPN mode:

Keys	Display	What it does
3 **[ENTER]**	3.00	Enters 3
4 **[ENTER]**	4.00	Enters 4
5 **[×]**	20.00	Keys in 5; multiplies
[+]	23.00	Adds

Result: 23.00



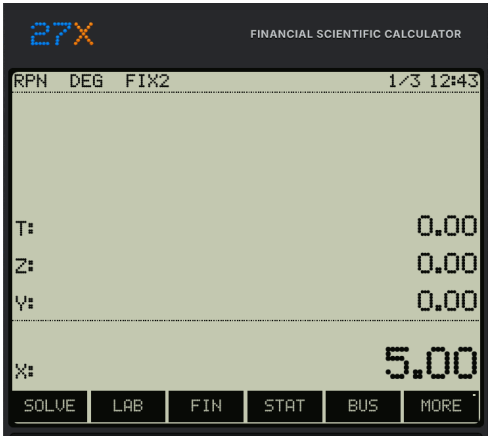
Example — Swapping X and Y

Keyed in the wrong order? Swap before dividing: 10 ÷ 2.

In RPN mode:

Keys	Display	What it does
2 **[ENTER]**	2.00	Enters 2
10 **[x↔y]**	2.00	Swaps X and Y
[÷]	5.00	Divides

Result: 5.00



Big and small numbers

Use **E** to enter a power of ten. For example 6.02 E 23 means 6.02×10^{23}. Press **+/−** after E to make the exponent negative (1.5 E +/− 3 = 0.0015). Very large or very small answers are shown in scientific notation automatically.

Example — Exponents

Double Avogadro's number.

Keys	Display	What it does
6.02 **[E]**	6.02E	
23 **[×]**	6.02E23×	
2 **[ENTER]**	1.20E24	Completes the calculation

Result: 1.20E24 (1.204×10^{24})

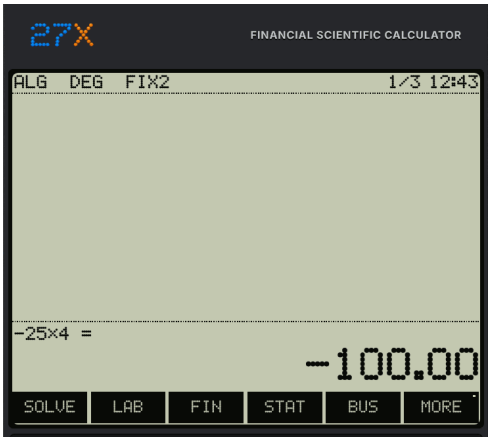


Example — Negative numbers

Press +/− after typing a number to change its sign.

Keys	Display	What it does
25 **[+/−]**	−25	Keys in 25 and makes it negative
[×]	−25×	
4 **[ENTER]**	-100.00	Completes the calculation

Result: −100.00



Percent

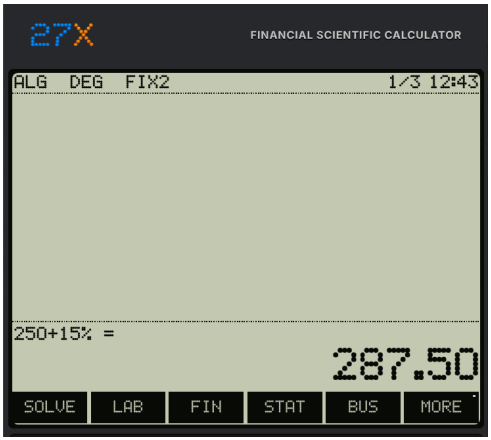
The **%** key divides by 100, with the business-calculator shortcuts you would expect: A + B% adds B percent of A, and A − B% takes it off. In RPN, Y ENTER X % gives X percent of Y.

Example — Adding a percentage

Add 15% to 250.

Keys	Display	What it does
250 **[+]**	250+	
15 **[%]**	250+15%	
[ENTER]	287.50	Completes the calculation

Result: 287.50

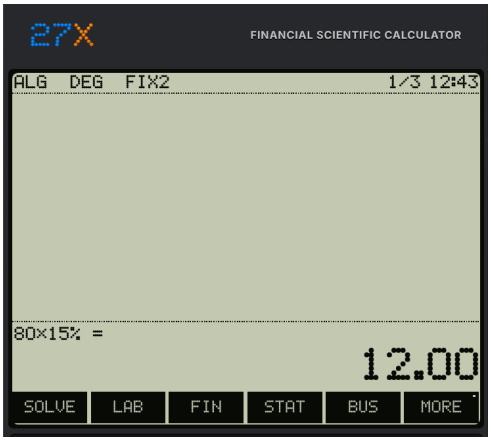


Example — A percentage of a number

15% of 80.

Keys	Display	What it does
80 **[×]**	80×	
15 **[%]**	80×15%	
[ENTER]	12.00	Completes the calculation

Result: 12.00

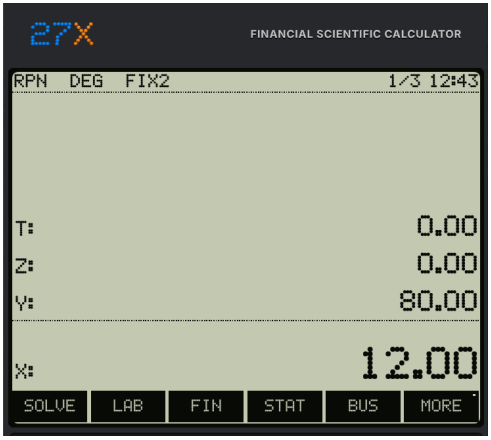


Example — Percent in RPN

15% of 80 in RPN.

Keys: (RPN mode) 80 **[ENTER]** 15 **[%]**

Result: 12.00



For percentage change, percent of total, markup and VAT, see chapter 7.

Correcting and clearing

Key	What it clears
←	The last digit or symbol typed. With nothing typed, it sets the current value to 0.
orange UNDO	Takes back the last action — a calculation, a CLR, a stored value. One step only.
CLR	The screen: what you are typing, the answer, the history and the RPN stack. Menu values are kept.
orange CLR DATA	The values stored in the menu you are in (for example all TVM values, the cash-flow list, the statistics data, the actives).
MODES › RESET	Everything, including saved equations and registers. Asks you to confirm with ENTER.

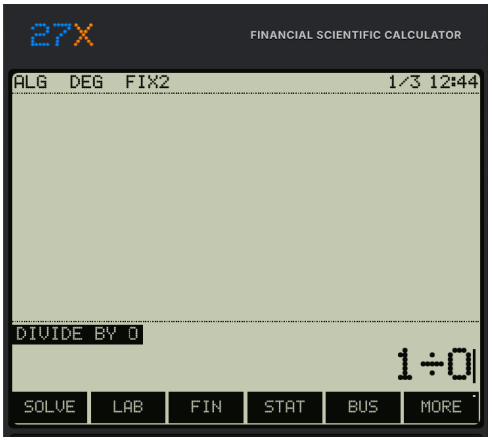
If something can't be calculated, the message line shows an error in reverse video and the calculator beeps. Press any key to carry on.

Example — An error message

Dividing by zero.

Keys: 1 **[÷]** 0 **[ENTER]**

Result: The message **Divide by 0**



4. Storing numbers

There are ten storage registers, numbered 0 to 9. They keep their values until you change them, even when you close the app.

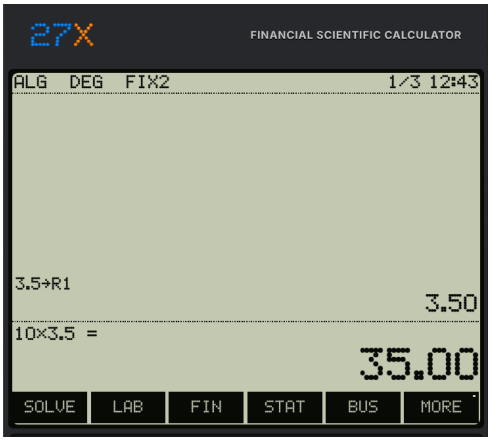
- **STO** then a digit stores the current value (or the answer to what you are typing) in that register.
- **RCL** then a digit brings it back, inserting it into the line you are typing.
- Press **STO** or **RCL** and then a menu soft key to store into, or recall from, a menu variable.
- **[ANS]** (orange RCL) puts the last answer into the line you are typing; **[CONST]** (orange STO) opens the list of physical constants.

Example — Store and recall

Store 3.5 in register 1, then use it.

Keys	Display	What it does
3.5 **[STO]** 1	R1=3.50	Stores 3.5 in register 1
10 **[×]**	10×	
[RCL] 1	R1=3.50	Recalls register 1
[ENTER]	35.00	Completes the calculation

Result: 35.00



> Values entered in menus (TVM, markup, the solver, lab and engineering tools) are also remembered between sessions, so you can come back to a calculation later.

5. Display and settings

Number format — DISP

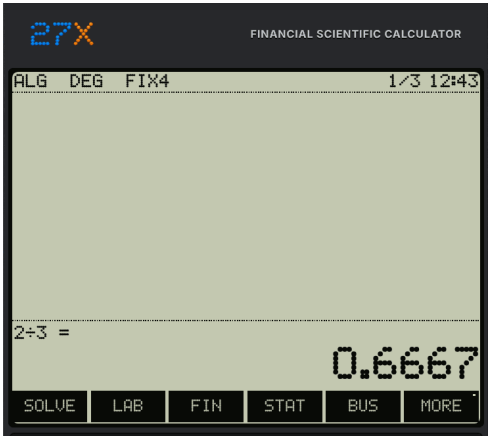
The four number formats are on the orange 7, 8, 9 and ÷ keys. Press **[FIX]**, **[SCI]** or **[ENG]** and then a digit 0–9 for the number of places, or **[ALL]** for as many digits as needed. The same settings are in ‹DISP› on page 3 of the main menu.

Format	Shows	Example (2 ÷ 3, or 123 456)
FIX n	n decimal places	FIX 4 → 0.6667
SCI n	Scientific notation, n decimals	SCI 3 → 1.235E5
ENG n	Engineering notation (exponent a multiple of 3)	ENG 3 → 123.5E3
ALL	As many digits as needed	ALL → 0.666666666667

Example — FIX 4

Keys	Display	What it does
[FIX] 4	FIX 4	Shows 4 decimal places
2 **[÷]**	2÷	
3 **[ENTER]**	0.6667	Completes the calculation

Result: 0.6667



Example — SCI 3

Keys: [SCI] 3 123456 **[ENTER]**

Result: 1.235E5



Example — ENG 3

Keys: [ENG] 3 123456 **[ENTER]**

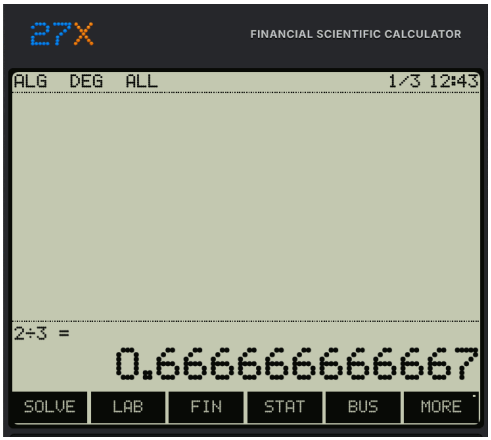
Result: 123.5E3



Example — ALL

Keys	Display	What it does
[ALL]	ALL	Shows all digits
2 **[÷]**	2÷	
3 **[ENTER]**	0.666666666667	Completes the calculation

Result: 0.666666666667



Press **[FIX]** 2 to return to the standard setting.

Whatever the format, the calculator works internally to 12 significant digits. **[SHOW]** briefly shows the current value in full. **[. / ,]** (orange 0) switches the decimal point between a point and a comma. In the engineering menus results always show five significant figures or engineering notation so small values are not lost.

MODES

Settings you set once and leave: ‹MODES› on page 3 of the main menu.

Soft key	What it does
DEG / RAD	Angles in degrees or radians (the active one shows a dot). **[DEG/RAD]** on the 4 key switches between

Soft key	What it does
	them.
ALG / RPN	Algebraic or RPN entry (same as orange RPN↔ALG).
DISP	Number format (see above).
THEME	Display colours: classic LCD, paper, amber and ice.
COMPACT	On: the calculator is a little smaller and centred (easier one-handed). Off: it fills the screen.
FONT	Dot-matrix font or a fine smooth font.
RDX	Decimal point or comma.
CLICK / BEEP / BUZZ	Key click sound, error beep and vibration on or off.
UPDCHK	Daily update check on (•) or off. When on, the app looks once a day, when online, for a newer version. Not shown in the web app, which always loads the latest version.
UPDATE	Appears only when a newer version is available; opens simucraft.io/calccraft in your browser.
ONTOP	Windows app only. Keeps the calculator on top of other windows (•), so it stays in view while you work in a spreadsheet or a PDF. Tap again for a normal window. Remembered next time.
POPOUT	Web app in Chrome or Edge on a computer only. Opens the calculator in its own small window that floats on top of other apps. The page shows Bring it back; closing the small window also brings the calculator back to the page.
ABOUT	Shows which version of CalcCraft 27X you are running (for example CalcCraft 27X 0.7.4 beta), and any newer version found.
RESET	Erase everything and start fresh (asks for confirmation).

Arranging the soft keys

You can put the soft keys you use most where you want them, in any menu:

1. Press and hold a soft key for about half a second (or press the orange key, then tap it). It shows outlined and the message line says MOVE.
2. Tap the key it should swap with. Use ‹MORE› to reach other pages.
3. Repeat for other keys, then press EXIT to finish. Press CLR instead of EXIT to put that menu back to its original order.

6. Mathematics

Keyboard functions

In algebraic mode, a function key applies to the number or bracket you have just typed (or to the last answer if the line is empty). In RPN it applies to X.

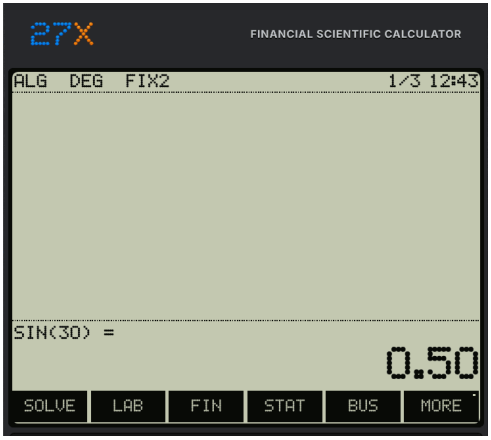
Function	Keys	Example
Sine, cosine, tangent	SIN COS TAN	sin 30° = 0.5
Inverse trig	orange ASIN, ACOS, ATAN	asin 0.5 = 30°
Natural log and e^x	LN, orange e^x	ln 10 = 2.302…; e^1 = 2.718…
Common log and 10^x	LOG, orange 10^x	log 1000 = 3; 10^2 = 100
Square root and square	√x, orange x^2	√144 = 12; 12^2 = 144
Power and reciprocal	y^x, orange 1/x	2^{10} = 1024; 1/4 = 0.25
π	orange π	π × 5^2 = 78.54
Any root	orange $^x\sqrt{}$y (3 key)	$^4\sqrt{}$81 = 3
Factorial	orange n! (× key)	5! = 120
Combinations, permutations	orange nCr, nPr (1 and 2 keys)	10 nCr 3 = 120
Absolute value	orange ABS (+/– key)	|−7.5| = 7.5
Round to the display	orange RND (5 key)	3.14159 → 3.14 at FIX 2
Random number	orange RAN# (. key)	between 0 and 1

Example — Sine

Angles are in degrees unless you choose RAD in MODES.

Keys: 30 **[SIN] [ENTER]**

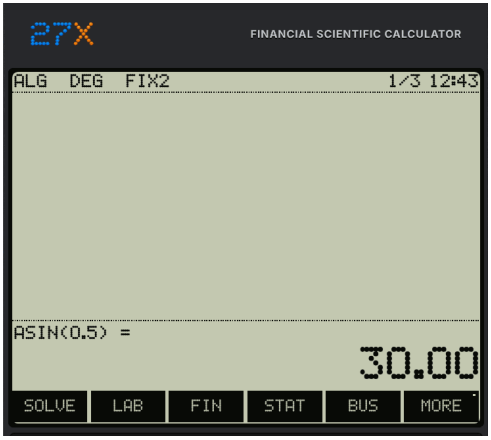
Result: 0.50



Example — Inverse sine

Keys: 0.5 **[ASIN] [ENTER]**

Result: 30.00 degrees



Example — Natural log

Keys: 10 **[LN] [ENTER]**

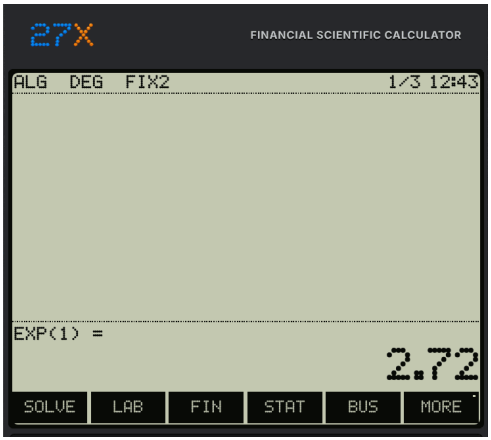
Result: **2.30** (2.302585...)



Example — e^x

Keys: 1 **[e^x] [ENTER]**

Result: **2.72** (2.718282...)



Example — Common log

Keys: 1000 **[LOG] [ENTER]**

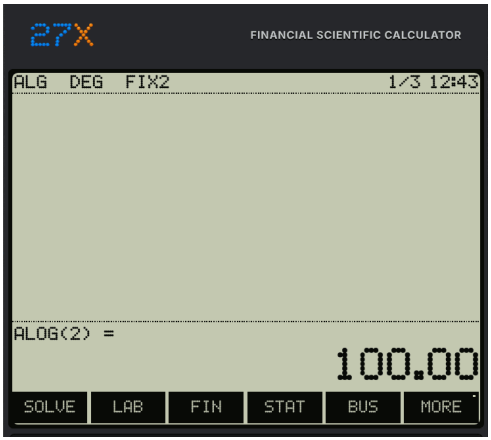
Result: 3.00



Example — 10^x

Keys: 2 **[10^x] [ENTER]**

Result: 100.00



Example — Square root

Keys: 144 **[√x]** **[ENTER]**

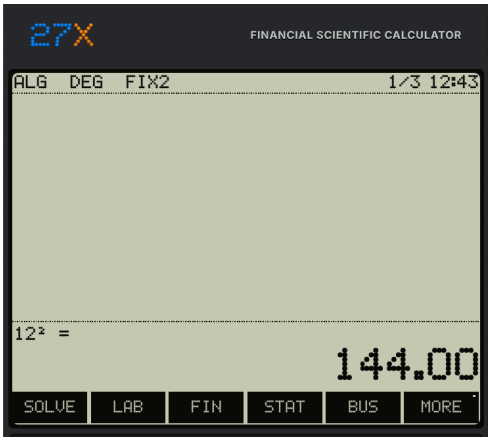
Result: 12.00



Example — Square

Keys: 12 **[x²]** **[ENTER]**

Result: 144.00

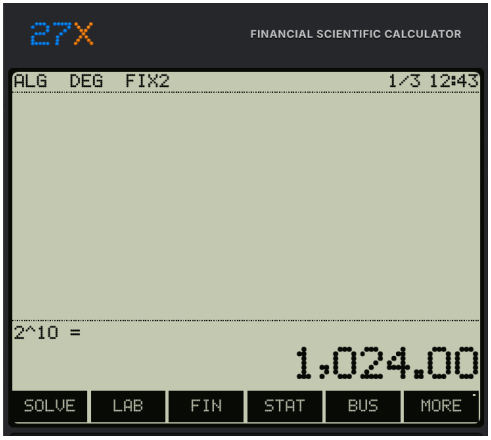


Example — Power

2 to the power 10.

Keys: 2 **[y^x]** 10 **[ENTER]**

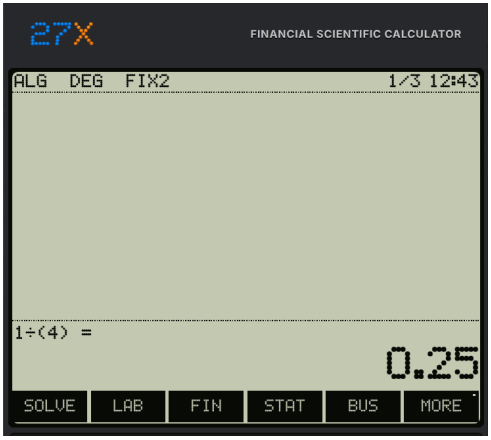
Result: 1,024.00



Example — Reciprocal

Keys: 4 **[1/x]** **[ENTER]**

Result: 0.25

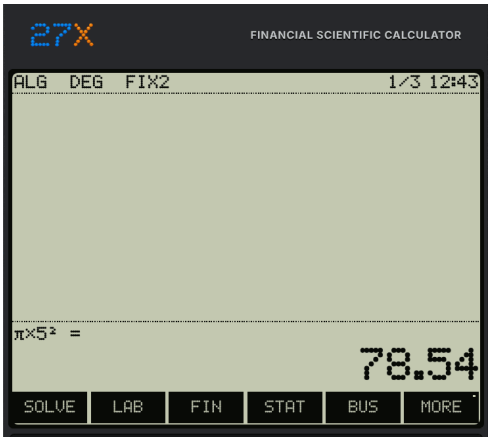


Example — Area of a circle

π r² with r = 5.

Keys	Display	What it does
[π]	π	Inserts π
[×]	π×	
5 [x²]	π×5²	Squares the number
[ENTER]	78.54	Completes the calculation

Result: 78.54

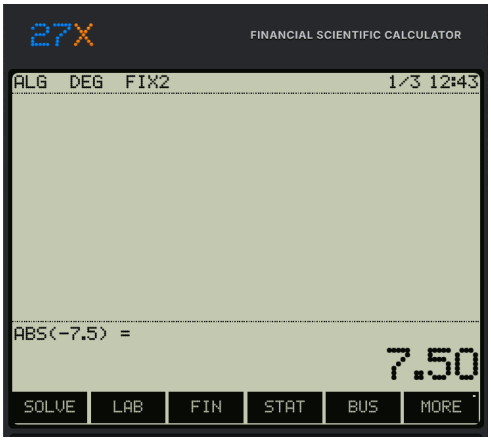


Example — Absolute value

Type the number, make it negative with +/−, then ABS.

Keys	Display	What it does
7.5 **[+/−]**	−7.5	Keys in 7.5 and makes it negative
[ABS]	ABS(−7.5)	Absolute value
[ENTER]	7.50	Completes the calculation

Result: 7.50



Probability

nCr, nPr, n! and RAN# are orange functions on the keyboard. They are also in the ‹PROB› menu on page 2 of the main menu.

Key	What it does
orange nCr (COMB)	Combinations: n nCr r = ways of choosing r items from n when order doesn't matter.
orange nPr (PERM)	Permutations: as nCr, but order matters.
orange n!	Factorial.

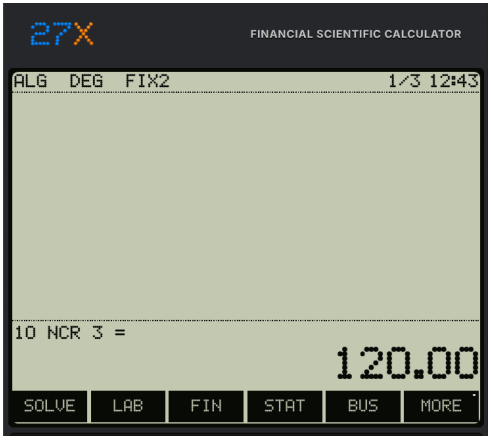
Key	What it does
orange RAN#	A random number between 0 and 1.

Example — Combinations

How many ways to pick 3 from 10?

Keys: 10 **[nCr]** 3 **[ENTER]**

Result: 120

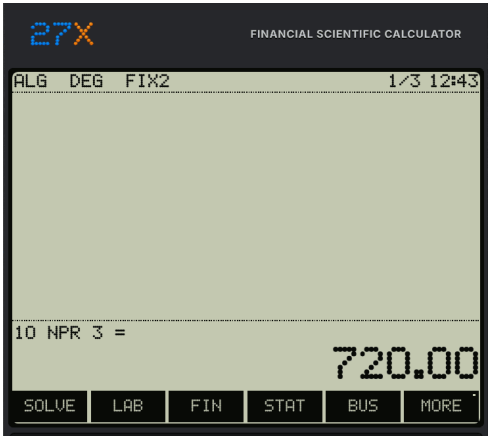


Example — Permutations

How many ways to fill 1st, 2nd and 3rd place from 10?

Keys: 10 **[nPr]** 3 **[ENTER]**

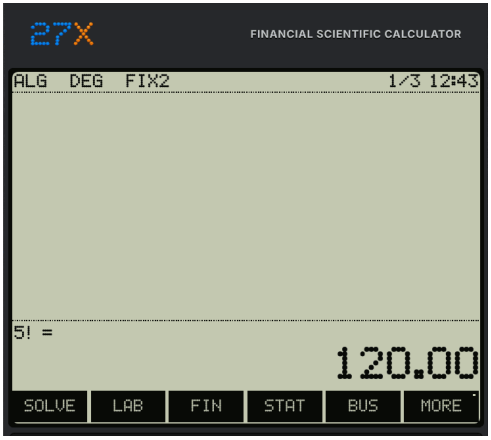
Result: 720



Example — Factorial

Keys: 5 **[n!]** **[ENTER]**

Result: 120



PARTS — parts of a number

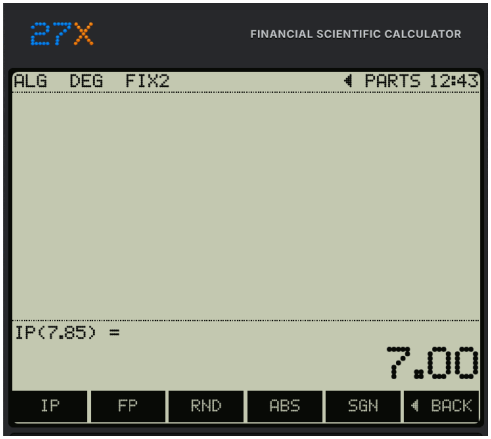
Tap ‹PARTS› on page 2 of the main menu. RND and ABS are also orange functions (5 and +/− keys).

Soft key	What it does
IP	Integer part (7.85 → 7).
FP	Fractional part (7.85 → 0.85).
RND	Round to the current display setting.
ABS	Absolute value.
SGN	Sign: −1, 0 or 1.

Example — Integer part

Keys	Display	What it does
7.85 **‹PARTS›**	7.85	Keys in 7.85; opens PARTS
‹IP›	IP(7.85)	Applies IP
[ENTER]	7.00	Completes the calculation

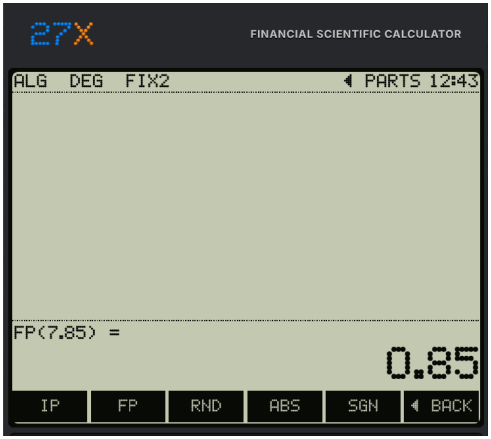
Result: 7.00



Example — Fractional part

Keys	Display	What it does
7.85 **‹PARTS›**	7.85	Keys in 7.85; opens PARTS
‹FP›	FP(7.85)	Applies FP
[ENTER]	0.85	Completes the calculation

Result: 0.85

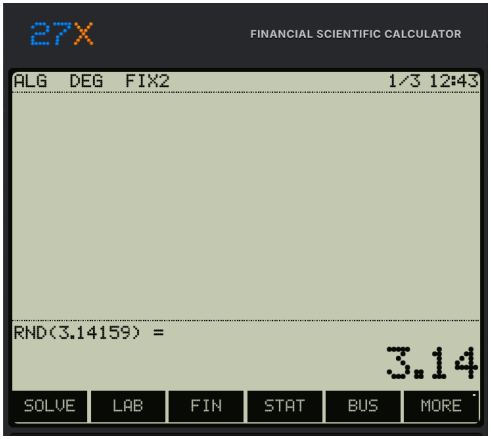


Example — Rounding to the display

With FIX 2, orange RND makes the stored value exactly 3.14.

Keys: 3.14159 **[RND]**

Result: 3.14



HYP — hyperbolic functions

Tap ‹HYP› on page 3 of the main menu: SINH, COSH and TANH, and their inverses ASINH, ACOSH and ATANH.

Example — Hyperbolic sine

Keys	Display	What it does
1 **‹HYP›**	1	Keys in 1; opens HYP
‹SINH›	SINH(1)	Applies SINH
[ENTER]	1.18	Completes the calculation

Result: 1.18 (1.175201…)



CONV — conversions

Tap ‹CONV› on page 2 of the main menu. Two conversions are also on the keyboard. **[→°C/°F]** (6 key): press once to convert °F to °C, or twice in a row to convert °C to °F. **[→H.MS]** (– key): press once to convert decimal hours to hours-minutes-seconds, or twice in a row for the reverse.

Soft keys	Converts
→°F, →°C	Celsius to Fahrenheit and back
→MI, →KM	Kilometres to miles and back
→LB, →KG	Kilograms to pounds and back
→IN, →CM	Centimetres to inches and back

Soft keys	Converts
→GAL, →L	Litres to US gallons and back
→HMS, HMS→	Decimal hours to H.MMSS and back (2.5 h → 2.3000 = 2 h 30 min)
→RAD, →DEG	Degrees to radians and back

Example — Celsius to Fahrenheit

Keys: 100 **‹CONV› ‹→°F›**

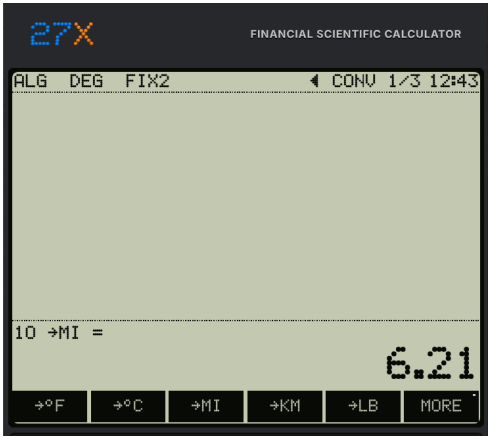
Result: **212.00** °F



Example — Kilometres to miles

Keys: 10 **‹CONV›** **‹→MI›**

Result: **6.21** miles



Example — Decimal hours to hours-minutes

2.5 hours is 2 hours 30 minutes (H.MMSS).

Keys: 2.5 **‹CONV›** **‹→HMS›**

Result: **2.30** (2 h 30 min 00 s)



7. Business percentages — BUS

Tap ‹BUS› on the main menu. Each item is a small set of linked values: enter the ones you know and tap the one you want.

%CHG — percentage change

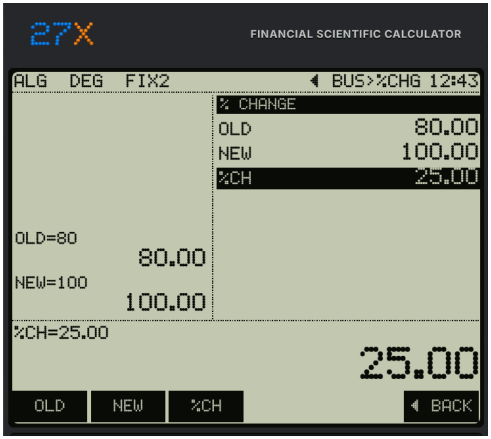
Values: **OLD**, **NEW** and **%CH**. Find the change from an old value to a new one, or work back from a percentage. For a quick answer without the menu, use **[%CHG]** on the % key: old value, orange %CHG, new value, ENTER (see chapter 2).

Example — Price rise

A price went from 80 to 100.

Keys	Display	What it does
‹BUS›	0.00	Opens BUS
‹%CHG›	0.00	Opens %CHG
80 **‹OLD›**	OLD=80.00	Stores 80 in OLD
100 **‹NEW›**	NEW=100.00	Stores 100 in NEW
‹%CH›	%CH=25.00	Calculates %CH

Result: 25.00% increase



%TOTL — percent of total

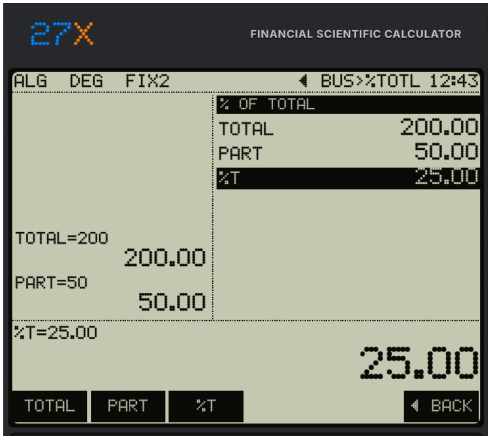
Values: **TOTAL**, **PART** and **%T**.

Example — Share of total

50 is what percent of 200?

Keys	Display	What it does
‹BUS›	0.00	Opens BUS
‹%TOTL›	0.00	Opens %TOTL
200 **‹TOTAL›**	TOTAL=200.00	Stores 200 in TOTAL
50 **‹PART›**	PART=50.00	Stores 50 in PART
‹%T›	%T=25.00	Calculates %T

Result: 25.00%



MARKUP — cost, price and gross profit

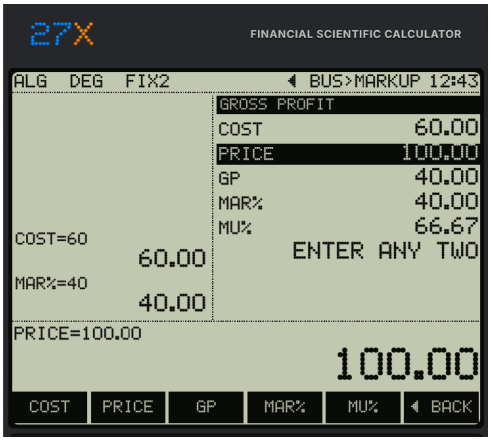
Values: **COST**, **PRICE**, **GP** (gross profit in money), **MAR%** (margin, as a percent of price) and **MU%** (markup, as a percent of cost). Enter any two and tap any of the others; the side panel fills in all five.

Example — Selling price from a margin

A product costs 60 and you want a 40% margin.

Keys	Display	What it does
‹BUS›	0.00	Opens BUS
‹MARKUP›	0.00	Opens MARKUP
60 **‹COST›**	COST=60.00	Stores 60 in COST
40 **‹MAR%›**	MAR%=40.00	Stores 40 in MAR %
‹PRICE›	PRICE=100.00	Calculates PRICE

Result: Price **100.00**

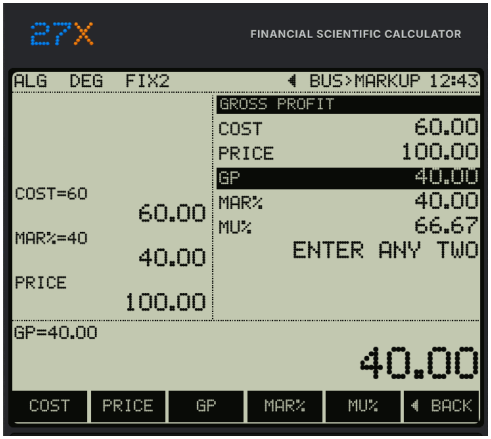


Example — Gross profit

Same values, tap GP.

Keys	Display	What it does
‹BUS›	0.00	Opens BUS
‹MARKUP›	0.00	Opens MARKUP
60 **‹COST›**	COST=60.00	Stores 60 in COST
40 **‹MAR%›**	MAR%=40.00	Stores 40 in MAR %
‹PRICE›	PRICE=100.00	Calculates PRICE
‹GP›	GP=40.00	Calculates GP

Result: Gross profit **40.00**

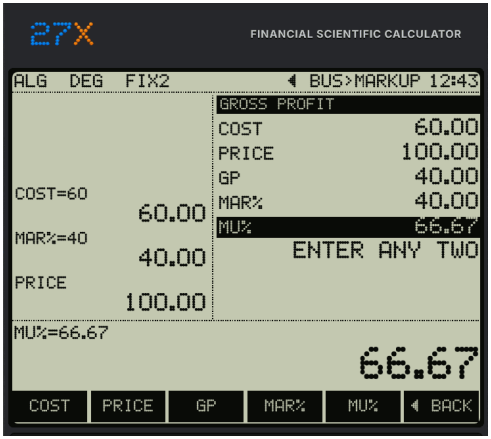


Example — Markup on cost

Same values, tap MU%. A 40% margin is a 66.67% markup.

Keys	Display	What it does
‹BUS›	0.00	Opens BUS
‹MARKUP›	0.00	Opens MARKUP
60 **‹COST›**	COST=60.00	Stores 60 in COST
40 **‹MAR%›**	MAR%=40.00	Stores 40 in MAR %
‹PRICE›	PRICE=100.00	Calculates PRICE
‹MU%›	MU%=66.67	Calculates MU%

Result: 66.67%



VAT

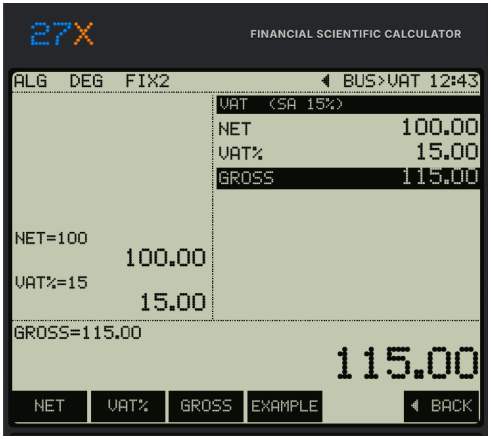
Values: **NET**, **VAT%** and **GROSS**. Enter any two to find the third.

Example — Adding VAT

R100 plus 15% VAT.

Keys	Display	What it does
‹BUS›	0.00	Opens BUS
‹VAT›	0.00	Opens VAT
100 **‹NET›**	NET=100.00	Stores 100 in NET
15 **‹VAT%›**	VAT%=15.00	Stores 15 in VAT%
‹GROSS›	GROSS=115.00	Calculates GROSS

Result: Gross **115.00**

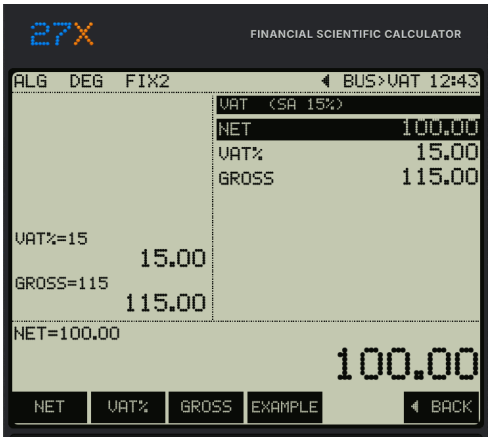


Example — Removing VAT

What is the price before 15% VAT on R115?

Keys	Display	What it does
‹BUS›	0.00	Opens BUS
‹VAT›	0.00	Opens VAT
15 **‹VAT%›**	VAT%=15.00	Stores 15 in VAT%
115 **‹GROSS›**	GROSS=115.00	Stores 115 in GROSS
‹NET›	NET=100.00	Calculates NET

Result: Net **100.00**



8. Finance — FIN

Tap ‹FIN› on the main menu: TVM, AMORT, CFLO, BOND, DEPRC, S.INT and ICNV.

Money in and money out

The finance tools follow the standard cash-flow sign rule: **money you receive is positive, money you pay out is negative**. For a loan, the amount borrowed (PV) is positive and the repayments (PMT) are negative. For savings, deposits are negative and the amount you end up with (FV) is positive. If you get “No solution”, check the signs first.

TVM — time value of money

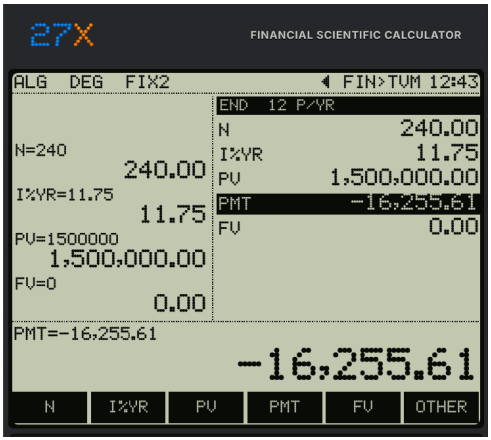
Soft key	Meaning
N	Number of payments (e.g. 240 for 20 years monthly)
I%YR	Annual interest rate, as a percent
PV	Present value — the amount now (loan amount, initial deposit)
PMT	The regular payment
FV	Future value — the amount at the end (balloon, savings goal; 0 if paid off)
OTHER	P/YR (payments per year, default 12), BEG / END (payments at the start or end of each period), EXAMPLE

Example — Home loan repayment

R1 500 000 over 20 years at 11.75%, monthly.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
240 **‹N›**	N=240.00	Stores 240 in N
11.75 **‹I%YR›**	I%YR=11.75	Stores 11.75 in I %YR
1500000 **‹PV›**	PV=1,500,000.00	Stores 1 500 000 in PV
0 **‹FV›**	FV=0.00	Stores 0 in FV
‹PMT›	PMT=-16,255.61	Calculates PMT

Result: −16,255.61 a month

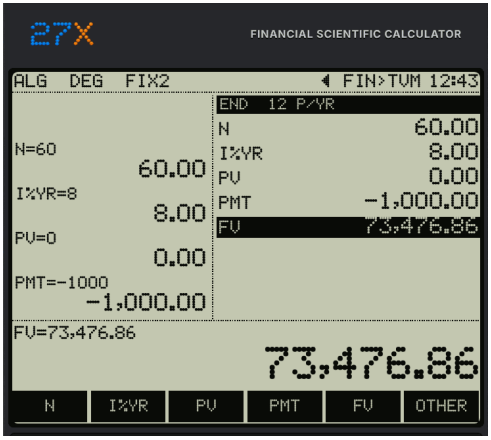


Example — Saving monthly

Save R1 000 a month for 5 years at 8%. How much will you have?

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
60 **‹N›**	N=60.00	Stores 60 in N
8 **‹I%YR›**	I%YR=8.00	Stores 8 in I%YR
0 **‹PV›**	PV=0.00	Stores 0 in PV
1000 **[+/−]**	−1000	Keys in 1000 and makes it negative
‹PMT›	PMT=-1,000.00	Stores −1000 in PMT
‹FV›	FV=73,476.86	Calculates FV

Result: 73,476.86

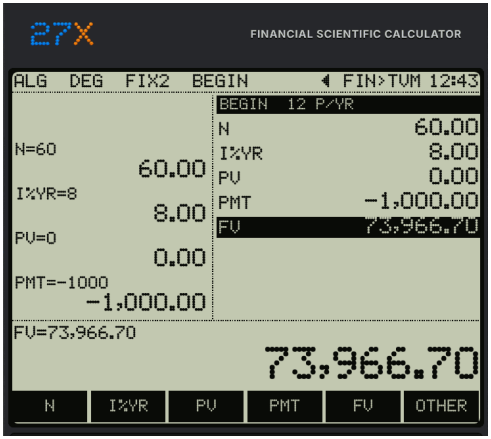


Example — Payments at the start of each month

The same savings plan with BEGIN payments earns one extra month of interest on each deposit.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
‹OTHER›	0.00	Opens OTHER
‹BEG›	BEGIN mode	BEGIN mode
‹BACK›	BEGIN mode	Back to the previous menu
60 **‹N›**	N=60.00	Stores 60 in N
8 **‹I%YR›**	I%YR=8.00	Stores 8 in I%YR
0 **‹PV›**	PV=0.00	Stores 0 in PV
1000 **[+/−]**	−1000	Keys in 1000 and makes it negative
‹PMT›	PMT=-1,000.00	Stores −1000 in PMT
‹FV›	FV=73,966.70	Calculates FV

Result: 73,966.70

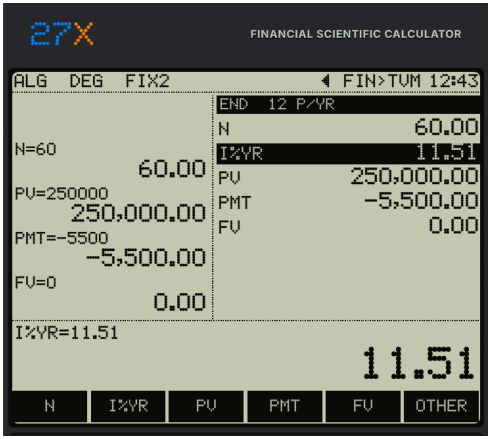


Example — Finding the interest rate

A R250 000 car paid off at R5 500 a month over 60 months. What rate is that?

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
60 **‹N›**	N=60.00	Stores 60 in N
250000 **‹PV›**	PV=250,000.00	Stores 250 000 in PV
5500 **[+/−]**	−5500	Keys in 5500 and makes it negative
‹PMT›	PMT=-5,500.00	Stores −5500 in PMT
0 **‹FV›**	FV=0.00	Stores 0 in FV
‹I%YR›	I%YR=11.51	Calculates I%YR

Result: 11.51% a year



AMORT — amortisation

AMORT uses the values already in TVM. Enter how many payments to group with **#P**, then tap **INT** (interest paid), **PRIN** (capital repaid) or **BAL**

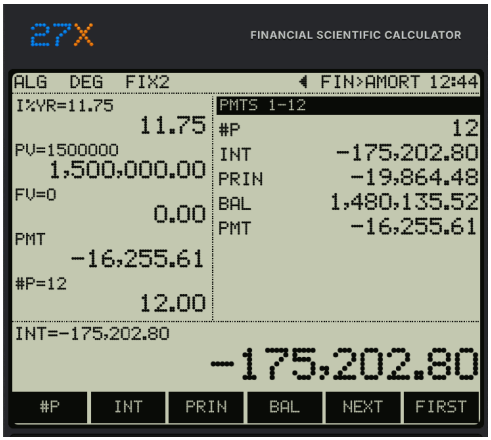
(balance left). **NEXT** moves on to the next group of payments; **FIRST** goes back to the start.

Example — Interest in year one

For the home loan above, how much of the first 12 payments is interest?

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
240 **‹N›**	N=240.00	Stores 240 in N
11.75 **‹I%YR›**	I%YR=11.75	Stores 11.75 in I %YR
1500000 **‹PV›**	PV=1,500,000.00	Stores 1 500 000 in PV
0 **‹FV›**	FV=0.00	Stores 0 in FV
‹PMT›	PMT=-16,255.61	Calculates PMT
[EXIT]	-16,255.61	Leaves this menu
‹AMORT›	-16,255.61	Opens AMORT
12 **‹#P›**	#P=12.00	Stores 12 in #P
‹INT›	INT=-175,202.80	Calculates INT

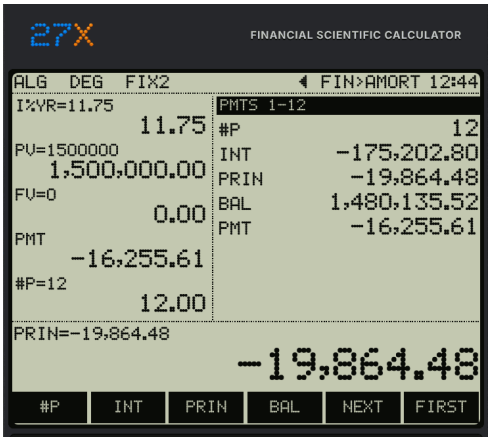
Result: −175,202.80



Example — Capital repaid in year one

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
240 **‹N›**	N=240.00	Stores 240 in N
11.75 **‹I%YR›**	I%YR=11.75	Stores 11.75 in I %YR
1500000 **‹PV›**	PV=1,500,000.00	Stores 1 500 000 in PV
0 **‹FV›**	FV=0.00	Stores 0 in FV
‹PMT›	PMT=-16,255.61	Calculates PMT
[EXIT]	-16,255.61	Leaves this menu
‹AMORT›	-16,255.61	Opens AMORT
12 **‹#P›**	#P=12.00	Stores 12 in #P
‹PRIN›	PRIN=-19,864.48	Calculates PRIN

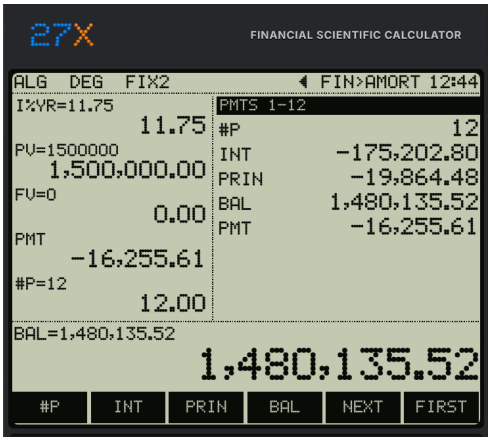
Result: −19,864.48



Example — Balance after year one

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹TVM›	0.00	Opens TVM
240 **‹N›**	N=240.00	Stores 240 in N
11.75 **‹I%YR›**	I%YR=11.75	Stores 11.75 in I %YR
1500000 **‹PV›**	PV=1,500,000.00	Stores 1 500 000 in PV
0 **‹FV›**	FV=0.00	Stores 0 in FV
‹PMT›	PMT=-16,255.61	Calculates PMT
[EXIT]	-16,255.61	Leaves this menu
‹AMORT›	-16,255.61	Opens AMORT
12 **‹#P›**	#P=12.00	Stores 12 in #P
‹BAL›	BAL=1,480,135.52	Calculates BAL

Result: 1,480,135.52



CFLO — cash flows, NPV and IRR

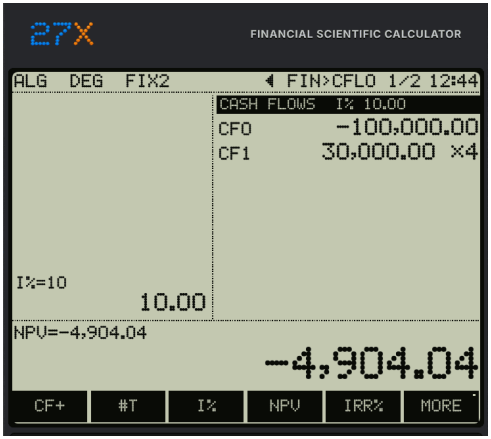
For an uneven series of cash flows. Type each flow in order and tap **CF+** (the first one is the initial flow, CF0). To repeat the last flow several times, type the count and tap **#T**. Then enter the discount rate with **I%** and tap **NPV** (net present value) or **NFV** (net future value), or tap **IRR%** for the internal rate of return. **DEL** removes the last flow.

Example — Net present value

Invest 100 000, receive 30 000 a year for 4 years, discount rate 10%.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹CFLO›	0.00	Opens CFLO
100000 **[+/−]**	−100000	Keys in 100 000 and makes it negative
‹CF+›	CF0=-100,000.00	Stores −100 000 as CF0
30000 **‹CF+›**	CF1=30,000.00	Stores 30 000 as CF1
4 **‹#T›**	#T=4	Stores 4 in #T
10 **‹I%›**	I%=10.00	Stores 10 in I%
‹NPV›	NPV=-4,904.04	Calculates NPV

Result: −4,904.04 (the project falls short at 10%)

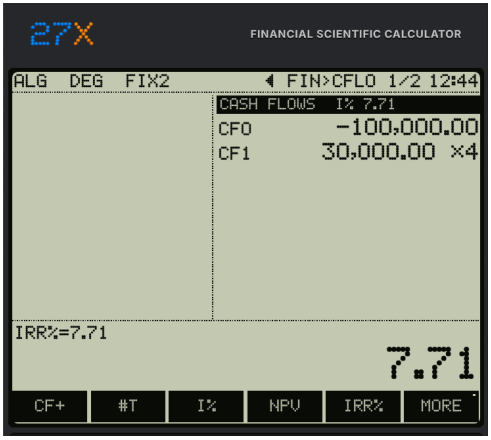


Example — Internal rate of return

The same flows.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹CFLO›	0.00	Opens CFLO
100000 **[+/−]**	−100000	Keys in 100 000 and makes it negative
‹CF+›	CF0=-100,000.00	Stores −100 000 as CF0
30000 **‹CF+›**	CF1=30,000.00	Stores 30 000 as CF1
4 **‹#T›**	#T=4	Stores 4 in #T
‹IRR%›	IRR%=7.71	Calculates IRR%

Result: 7.71%



BOND — bond price and yield

Enter the settlement date (**SETT**) and maturity date (**MAT**) as DD.MMYYYY, the annual coupon rate (**CPN%**) and the redemption value per 100 (**CALL**, usually 100). Then enter **YLD%** and tap **PRICE**, or enter

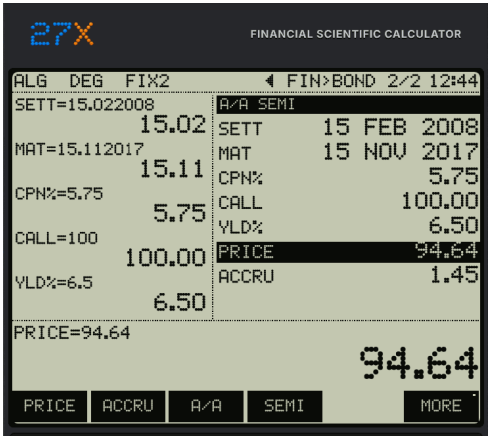
PRICE and tap YLD%. **ACCRU** gives accrued interest. Toggles: **A/A** or **30/360** day count, **SEMI** or **ANNUAL** coupons.

Example — Bond price

Settlement 15 Feb 2008, maturity 15 Nov 2017, 5.75% coupon, 6.5% yield, semi-annual, actual/actual.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹BOND›	0.00	Opens BOND
15.022008 **‹SETT›**	SETT=FRI 15 FEB 2008	Stores 15.022008 in SETT
15.112017 **‹MAT›**	MAT=WED 15 NOV 2017	Stores 15.112017 in MAT
5.75 **‹CPN%›**	CPN%=5.75	Stores 5.75 in CPN %
100 **‹CALL›**	CALL=100.00	Stores 100 in CALL
6.5 **‹YLD%›**	YLD%=6.50	Stores 6.5 in YLD%
‹PRICE›	PRICE=94.64	Calculates PRICE

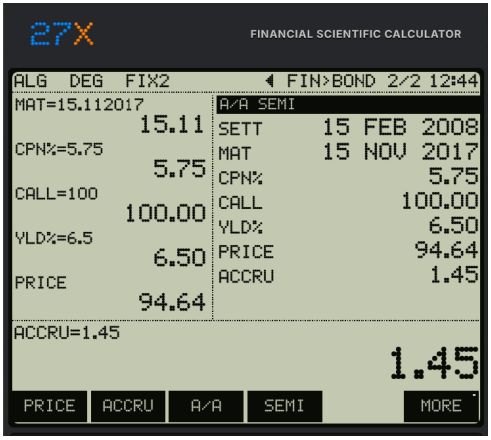
Result: Price **94.6354** per 100



Example — Accrued interest

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹BOND›	0.00	Opens BOND
15.022008 **‹SETT›**	SETT=FRI 15 FEB 2008	Stores 15.022008 in SETT
15.112017 **‹MAT›**	MAT=WED 15 NOV 2017	Stores 15.112017 in MAT
5.75 **‹CPN%›**	CPN%=5.75	Stores 5.75 in CPN %
100 **‹CALL›**	CALL=100.00	Stores 100 in CALL
6.5 **‹YLD%›**	YLD%=6.50	Stores 6.5 in YLD%
‹PRICE›	PRICE=94.64	Calculates PRICE
‹ACCRU›	ACCRU=1.45	Calculates ACCRU

Result: 1.4533 per 100



DEPRC — depreciation

Enter **BASIS** (cost), **SALV** (salvage value), **LIFE** (years) and **YR#** (which year), then tap a method: **SL** (straight line), **SOYD** (sum of the years' digits)

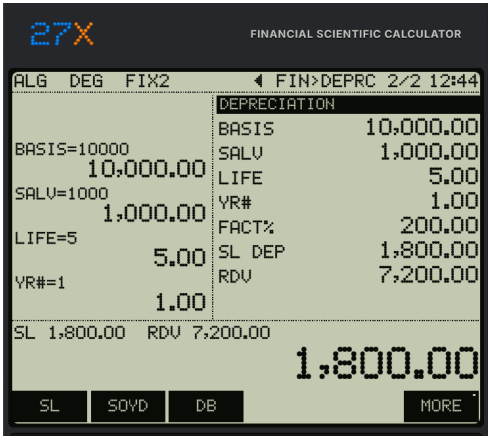
or **DB** (declining balance at **FACT%**, 200% = double declining). The message line also shows the remaining depreciable value (RDV).

Example — Straight line

R10 000 asset, R1 000 salvage, 5 years, year 1.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹DEPRC›	0.00	Opens DEPRC
10000 **‹BASIS›**	BASIS=10,000.00	Stores 10 000 in BASIS
1000 **‹SALV›**	SALV=1,000.00	Stores 1000 in SALV
5 **‹LIFE›**	LIFE=5.00	Stores 5 in LIFE
1 **‹YR#›**	YR#=1.00	Stores 1 in YR#
‹SL›	SL 1,800.00 RDV 7,200.00	Calculates SL

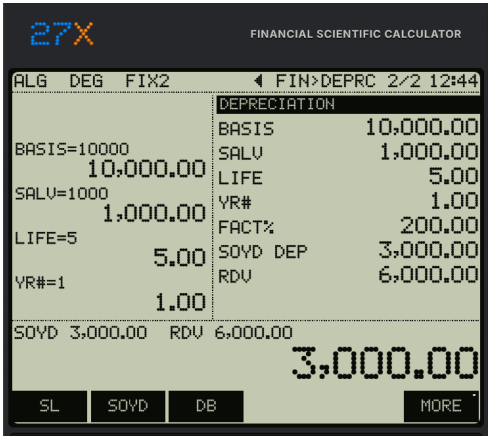
Result: 1,800.00



Example — Sum of the years' digits

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹DEPRC›	0.00	Opens DEPRC
10000 **‹BASIS›**	BASIS=10,000.00	Stores 10 000 in BASIS
1000 **‹SALV›**	SALV=1,000.00	Stores 1000 in SALV
5 **‹LIFE›**	LIFE=5.00	Stores 5 in LIFE
1 **‹YR#›**	YR#=1.00	Stores 1 in YR#
‹SOYD›	SOYD 3,000.00 RDV 6,000.00	Calculates SOYD

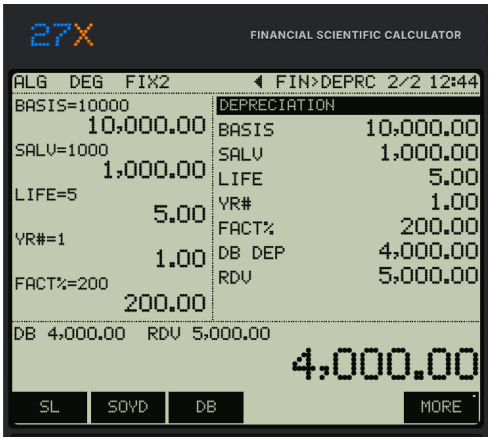
Result: 3,000.00



Example — Double declining balance

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹DEPRC›	0.00	Opens DEPRC
10000 **‹BASIS›**	BASIS=10,000.00	Stores 10 000 in BASIS
1000 **‹SALV›**	SALV=1,000.00	Stores 1000 in SALV
5 **‹LIFE›**	LIFE=5.00	Stores 5 in LIFE
1 **‹YR#›**	YR#=1.00	Stores 1 in YR#
200 **‹FACT%›**	FACT%=200.00	Stores 200 in FACT%
‹DB›	DB 4,000.00 RDV 5,000.00	Calculates DB

Result: 4,000.00



S.INT — simple interest

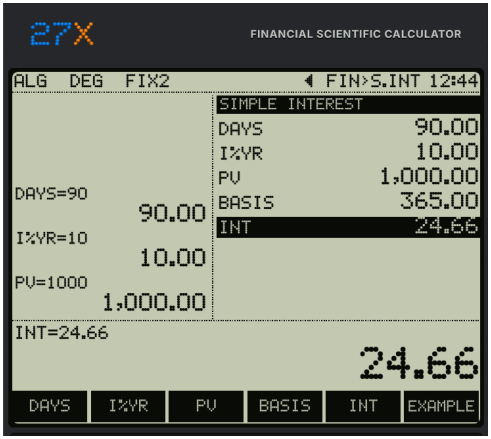
Values: **DAYS**, **I%YR**, **PV** and **BASIS** (days in the year: 365, or 360). Tap **INT** for the interest.

Example — Simple interest

R1 000 at 10% for 90 days, 365-day year.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹S.INT›	0.00	Opens S.INT
90 **‹DAYS›**	DAYS=90.00	Stores 90 in DAYS
10 **‹I%YR›**	I%YR=10.00	Stores 10 in I%YR
1000 **‹PV›**	PV=1,000.00	Stores 1000 in PV
‹INT›	INT=24.66	Calculates INT

Result: 24.66



ICNV — interest rate conversion

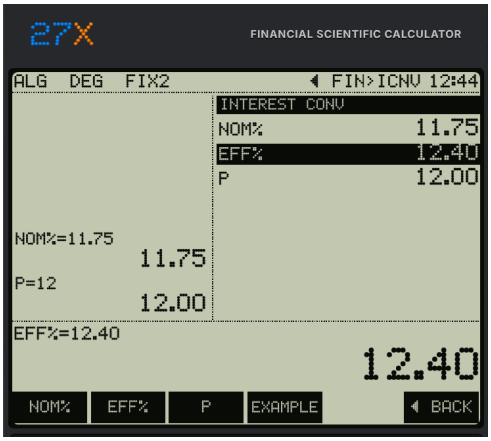
Values: **NOM%** (nominal annual rate), **EFF%** (effective annual rate) and **P** (compounding periods per year).

Example — Effective rate

11.75% compounded monthly.

Keys	Display	What it does
‹FIN›	0.00	Opens FIN
‹ICNV›	0.00	Opens ICNV
11.75 **‹NOM%›**	NOM%=11.75	Stores 11.75 in NOM%
12 **‹P›**	P=12.00	Stores 12 in P
‹EFF%›	EFF%=12.40	Calculates EFF%

Result: 12.40% effective



Notes about finance

- Money you receive is positive; money you pay out is negative. A loan you receive is +PV and its payments are −PMT.
- P/YR (payments per year, under OTHER) starts at 12. BEG and END set whether payments fall at the start or end of each period.
- Enter any four of N, I%YR, PV, PMT and FV, then tap the fifth to calculate it.
- CLR DATA in TVM clears N, I%YR, PV, PMT and FV; P/YR and BEG/END stay as they are.

9. Statistics — STAT

STAT works with a list of numbers (**1VAR**) or a list of x, y pairs (**2VAR**). Tap the 1VAR / 2VAR key to switch. The side panel shows the latest values, the count, mean and standard deviation.

Soft key	What it does
Σ+	Add the current number to the list (2VAR: type x, Σ+, then y, Σ+)
Σ−	Remove a number (or pair) from the list
MEAN, SDEV	Mean and sample standard deviation (2VAR: of x and y)
TOTAL, N	Sum of the values, number of values
MEDN, MIN, MAX, RANGE	Median, smallest, largest, largest − smallest
L.R.	Linear regression: SLOPE, INTCP (intercept), CORR (correlation), Y-EST and X-EST (estimates)

Clear the list with **[CLR DATA]** while in STAT. The data are kept when you close the app.

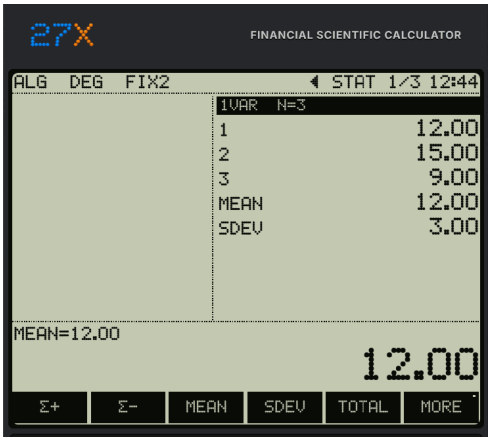
[Σ+] (orange +) adds a number to the list from anywhere, without opening STAT — handy for keying in a column of readings.

Example — Quick data entry

Add 12, 15 and 9 with orange Σ+, then open STAT and tap MEAN.

Keys	Display	What it does
12 **[Σ+]**	Σ+ N=1	Σ+: adds 12 to the data
15 **[Σ+]**	Σ+ N=2	Σ+: adds 15 to the data
9 **[Σ+]**	Σ+ N=3	Σ+: adds 9 to the data
‹STAT›	Σ+ N=3	Opens STAT
‹MEAN›	MEAN=12.00	Calculates MEAN

Result: 12.00

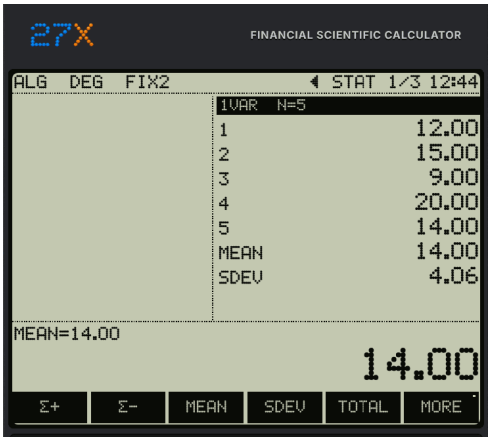


Example — Mean

Five readings: 12, 15, 9, 20, 14.

Keys	Display	What it does
‹STAT›	0.00	Opens STAT
12 **‹Σ+›**	Σ+ N=1	Adds 12 to the data
15 **‹Σ+›**	Σ+ N=2	Adds 15 to the data
9 **‹Σ+›**	Σ+ N=3	Adds 9 to the data
20 **‹Σ+›**	Σ+ N=4	Adds 20 to the data
14 **‹Σ+›**	Σ+ N=5	Adds 14 to the data
‹MEAN›	MEAN=14.00	Calculates MEAN

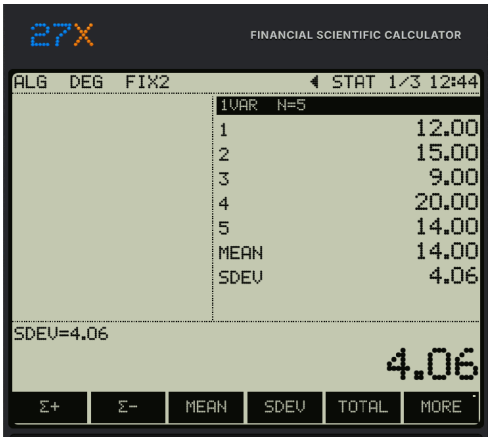
Result: 14.00



Example — Standard deviation

Keys	Display	What it does
‹STAT›	0.00	Opens STAT
12 ‹Σ+›	Σ+ N=1	Adds 12 to the data
15 ‹Σ+›	Σ+ N=2	Adds 15 to the data
9 ‹Σ+›	Σ+ N=3	Adds 9 to the data
20 ‹Σ+›	Σ+ N=4	Adds 20 to the data
14 ‹Σ+›	Σ+ N=5	Adds 14 to the data
‹SDEV›	SDEV=4.06	Calculates SDEV

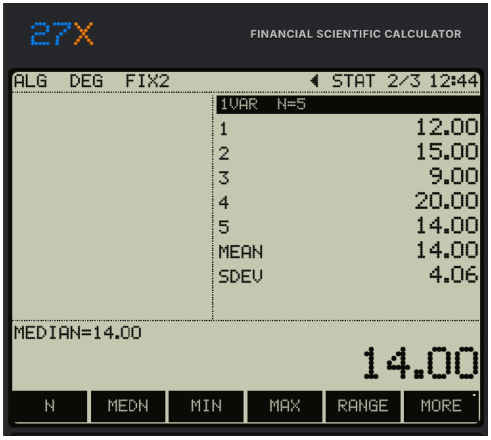
Result: 4.06



Example — Median

Keys	Display	What it does
‹STAT›	0.00	Opens STAT
12 ‹Σ+›	Σ+ N=1	Adds 12 to the data
15 ‹Σ+›	Σ+ N=2	Adds 15 to the data
9 ‹Σ+›	Σ+ N=3	Adds 9 to the data
20 ‹Σ+›	Σ+ N=4	Adds 20 to the data
14 ‹Σ+›	Σ+ N=5	Adds 14 to the data
‹MEDN›	MEDIAN=14.00	Calculates MEDIAN

Result: 14.00



Linear regression

Switch to 2VAR, then enter each pair: type x, tap Σ+, type y, tap Σ+. (In RPN: type y, ENTER, type x, Σ+.) Then tap L.R.

Example — Slope

Points (1, 2), (2, 4.1), (3, 5.9), (4, 8.2).

Keys	Display	What it does
‹STAT›	0.00	Opens STAT
‹1VAR›	2-variable (x,y) data	Switches to 2-variable (x, y) data
1 **‹Σ+›**	X=1.00 now Y, Σ+	x = 1; now the y value
2 **‹Σ+›**	Σ+ N=1	y = 2; adds the point
2 **‹Σ+›**	X=2.00 now Y, Σ+	x = 2; now the y value
4.1 **‹Σ+›**	Σ+ N=2	y = 4.1; adds the point
3 **‹Σ+›**	X=3.00 now Y, Σ+	x = 3; now the y value
5.9 **‹Σ+›**	Σ+ N=3	y = 5.9; adds the point
4 **‹Σ+›**	X=4.00 now Y, Σ+	x = 4; now the y value
8.2 **‹Σ+›**	Σ+ N=4	y = 8.2; adds the point
‹L.R.›	Σ+ N=4	Opens L.R.
‹SLOPE›	SLOPE=2.04	Calculates SLOPE

Result: 2.04


27X
FINANCIAL SCIENTIFIC CALCULATOR
ALG DEG FIX2
STAT>L.R. 12:44
2VAR N=4
1 1.00,2.00
2 2.00,4.10
3 3.00,5.90
4 4.00,8.20
MEAN 2.50
SDEV 1.29
SLOPE=2.04
2.04
SLOPE
INTCP
CORR
Y-EST
X-EST
BACK

Example — Intercept

Keys	Display	What it does
‹STAT›	0.00	Opens STAT
‹1VAR›	2-variable (x,y) data	Switches to 2-variable (x, y) data
1 **‹Σ+›**	X=1.00 now Y, Σ+	x = 1; now the y value
2 **‹Σ+›**	Σ+ N=1	y = 2; adds the point
2 **‹Σ+›**	X=2.00 now Y, Σ+	x = 2; now the y value
4.1 **‹Σ+›**	Σ+ N=2	y = 4.1; adds the point
3 **‹Σ+›**	X=3.00 now Y, Σ+	x = 3; now the y value
5.9 **‹Σ+›**	Σ+ N=3	y = 5.9; adds the point
4 **‹Σ+›**	X=4.00 now Y, Σ+	x = 4; now the y value
8.2 **‹Σ+›**	Σ+ N=4	y = 8.2; adds the point
‹L.R.›	Σ+ N=4	Opens L.R.
‹INTCP›	INTCP=-0.05	Calculates INTCP

Result: −0.05


27X
FINANCIAL SCIENTIFIC CALCULATOR
ALG DEG FIX2
STAT>L.R. 12:44
2VAR N=4
1 1.00,2.00
2 2.00,4.10
3 3.00,5.90
4 4.00,8.20
MEAN 2.50
SDEV 1.29
INTCP=-0.05
-0.05
SLOPE
INTCP
CORR
Y-EST
X-EST
BACK

Example — Correlation

Keys	Display	What it does
‹STAT›	0.00	Opens STAT
‹1VAR›	2-variable (x,y) data	Switches to 2-variable (x, y) data
1 **‹Σ+›**	X=1.00 now Y, Σ+	x = 1; now the y value
2 **‹Σ+›**	Σ+ N=1	y = 2; adds the point
2 **‹Σ+›**	X=2.00 now Y, Σ+	x = 2; now the y value
4.1 **‹Σ+›**	Σ+ N=2	y = 4.1; adds the point
3 **‹Σ+›**	X=3.00 now Y, Σ+	x = 3; now the y value
5.9 **‹Σ+›**	Σ+ N=3	y = 5.9; adds the point
4 **‹Σ+›**	X=4.00 now Y, Σ+	x = 4; now the y value
8.2 **‹Σ+›**	Σ+ N=4	y = 8.2; adds the point
‹L.R.›	Σ+ N=4	Opens L.R.
‹CORR›	CORR=1.00	Calculates CORR

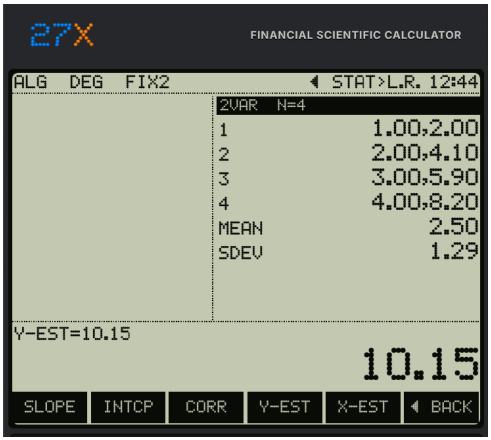
Result: 0.9990 (shown as 1.00 at FIX 2)



Example — Estimate y for x = 5

Keys	Display	What it does
‹STAT›	0.00	Opens STAT
‹1VAR›	2-variable (x,y) data	Switches to 2-variable (x, y) data
1 **‹Σ+›**	X=1.00 now Y, Σ+	x = 1; now the y value
2 **‹Σ+›**	Σ+ N=1	y = 2; adds the point
2 **‹Σ+›**	X=2.00 now Y, Σ+	x = 2; now the y value
4.1 **‹Σ+›**	Σ+ N=2	y = 4.1; adds the point
3 **‹Σ+›**	X=3.00 now Y, Σ+	x = 3; now the y value
5.9 **‹Σ+›**	Σ+ N=3	y = 5.9; adds the point
4 **‹Σ+›**	X=4.00 now Y, Σ+	x = 4; now the y value
8.2 **‹Σ+›**	Σ+ N=4	y = 8.2; adds the point
‹L.R.›	Σ+ N=4	Opens L.R.
5 **‹Y-EST›**	Y-EST=10.15	Calculates Y-EST for 5

Result: 10.15



Notes about statistics

- Σ+ adds a value to the data; Σ− removes one you entered by mistake.
- 1VAR switches to two-variable (x, y) data: enter x and tap Σ+, then y and tap Σ+.
- SDEV and the regression results need at least two points.
- CLR DATA in STAT clears all the data.

10. Time and dates — TIME

Dates are entered as **DD.MMYYYY** — day, a decimal point, then month and year: 25 December 2026 is 25.122026. Switch to month-first (MM.DDYYYY) with the ‹D.MY› key. The panel shows each date in words with its weekday.

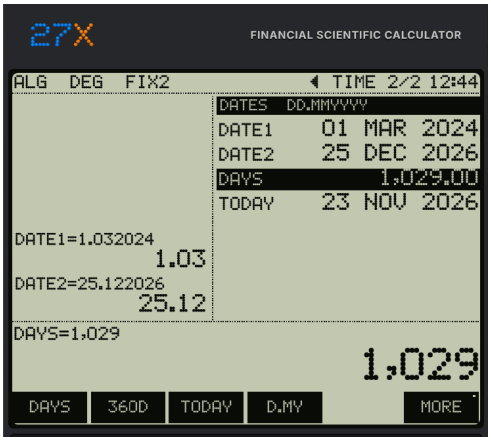
Soft key	What it does
NOW	The current Unix timestamp (seconds since 1 Jan 1970)
→UNIX	Convert a date (at local midnight) to a Unix timestamp
UNIX→	Convert a Unix timestamp to a date; the full date and time show on the message line
DATE1, DATE2, DAYS	Linked values: days between two dates, or a date plus or minus a number of days
360D	Days between DATE1 and DATE2 on a 30/360 basis
TODAY	Today’s date
D.MY / M.DY	Day-first or month-first date entry

Example — Days between dates

1 March 2024 to 25 December 2026.

Keys	Display	What it does
‹TIME›	0.00	Opens TIME
1.032024 **‹DATE1›**	DATE1=FRI 01 MAR 2024	Stores 1.032024 in DATE1
25.122026 **‹DATE2›**	DATE2=FRI 25 DEC 2026	Stores 25.122026 in DATE2
‹DAYS›	DAYS=1,029	Calculates DAYS

Result: 1,029 days

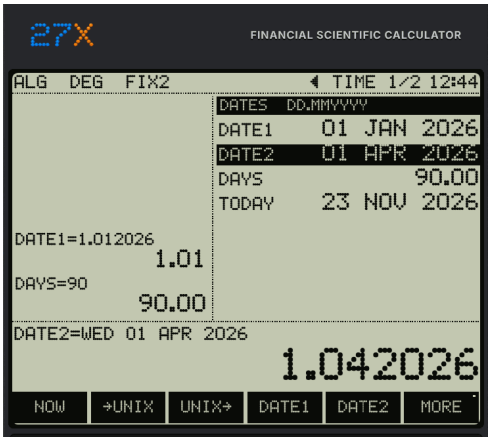


Example — A date 90 days later

90 days after 1 January 2026.

Keys	Display	What it does
‹TIME›	0.00	Opens TIME
1.012026 **‹DATE1›**	DATE1=THU 01 JAN 2026	Stores 1.012026 in DATE1
90 **‹DAYS›**	DAYS=90	Stores 90 in DAYS
‹DATE2›	DATE2=WED 01 APR 2026	Calculates DATE2

Result: 1.042026 — Wednesday 1 April 2026

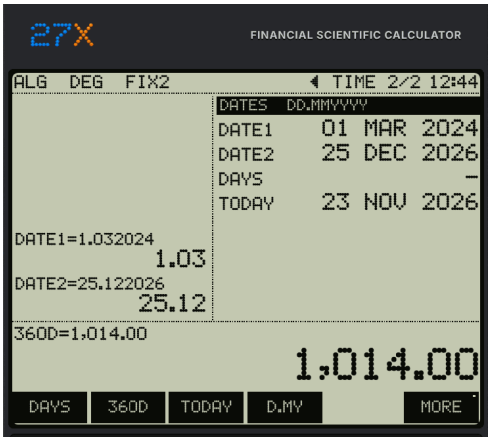


Example — 30/360 days

The same two dates on a 30/360 basis.

Keys	Display	What it does
‹TIME›	0.00	Opens TIME
1.032024 **‹DATE1›**	DATE1=FRI 01 MAR 2024	Stores 1.032024 in DATE1
25.122026 **‹DATE2›**	DATE2=FRI 25 DEC 2026	Stores 25.122026 in DATE2
‹360D›	360D=1,014.00	Calculates 360D

Result: 1,014 days

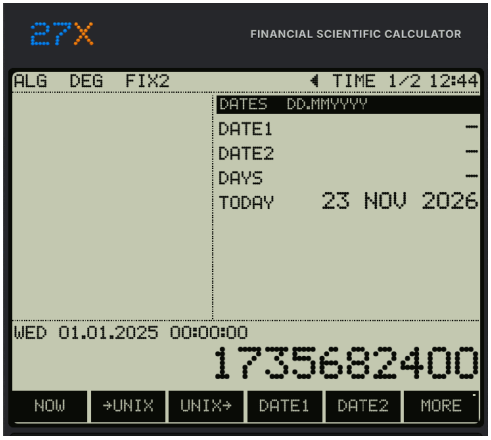


Example — Date to Unix time

Midnight on 1 January 2025 (South African time).

Keys: ‹TIME› 1.012025 ‹→UNIX›

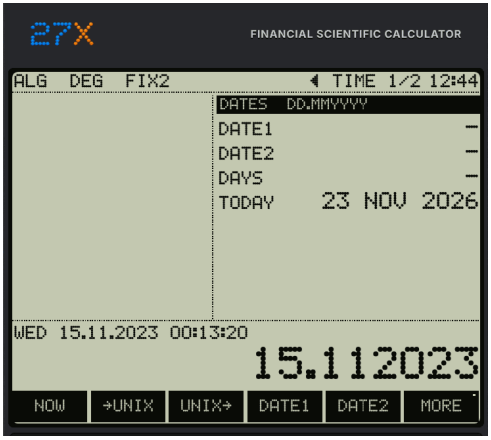
Result: 1735682400



Example — Unix time to date

Keys: ‹TIME› 1700000000 ‹UNIX→›

Result: 15.112023 — Wednesday 15 November 2023, 00:13:20



Unix conversions use the time zone of your phone or PC. Unix timestamps are shown as a plain string of digits, without separators.

11. The equation solver — SOLVE

The solver lets you save your own formulas and solve them for any variable. Once an equation is saved, each of its variables becomes a soft key, and it works exactly like the built-in menus: type a value and tap a variable to store it, or tap a variable alone to solve for it.

The equation list

Tap ‹SOLVE›. The list shows your saved equations by name (or by the formula, if you didn't give a name); press ▲ ▼ to choose one. When the selected equation has a name, its formula shows on the message line. Five named sample equations are included to start with.

Soft key	What it does
CALC	Open the selected equation: its variables become soft keys
NEW	Write a new equation
EDIT	Change the selected equation
DEL	Delete the selected equation

Example — Solving a built-in equation

MARGIN=(PRICE−COST)÷PRICE×100: price 100, cost 60.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
100 **‹PRICE›**	PRICE=100.00	Stores 100 in PRICE
60 **‹COST›**	COST=60.00	Stores 60 in COST
‹MARGIN›	MARGIN=40.00	Calculates MARGIN

Result: Margin **40.00%**



Example — Solving for a different variable

Now set MARGIN to 45 and solve for PRICE.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
100 **‹PRICE›**	PRICE=100.00	Stores 100 in PRICE
60 **‹COST›**	COST=60.00	Stores 60 in COST
‹MARGIN›	MARGIN=40.00	Calculates MARGIN
45 **‹MARGIN›**	MARGIN=45.00	Stores 45 in MARGIN
‹PRICE›	PRICE=109.09	Calculates PRICE

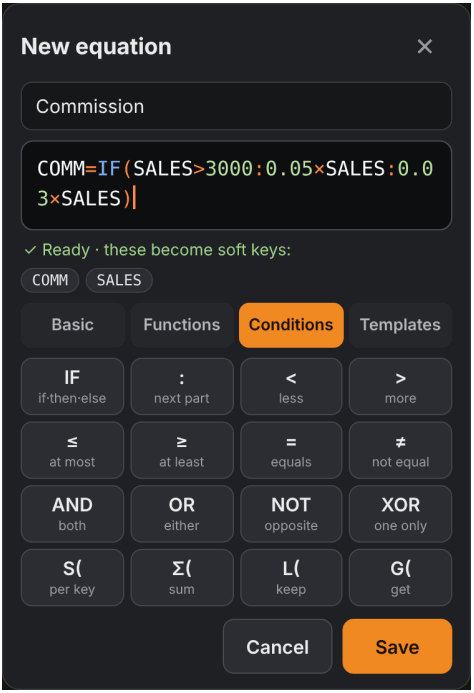
Result: Price **109.09**



Writing your own equations

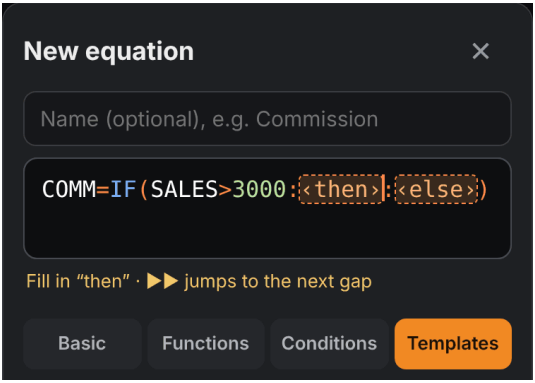
Tap ‹NEW› (or ‹EDIT› to change the selected equation). The equation screen has:

- **Name** (optional): a short name such as Commission, shown in the equation list.
- **The equation box**, coloured as you type: functions in blue, numbers in green, operators in orange. You can type * and /; they turn into × and ÷.
- **A live check** under the box. It tells you straight away what is wrong ("Missing) · 1 bracket still open", "IF needs three parts"), and when all is well it shows ✓ **Ready** with the names that will become soft keys.
- **Four tabs of buttons. Basic**: = + − × ÷ ^ ( ) π √, plus cursor keys, delete and ▶▶ (next gap). **Functions**: SIN, LN, ABS, MIN and the rest. **Conditions**: IF, the : separator, comparisons, AND OR NOT XOR, S(Σ(L(G(. **Templates**: ready-made patterns. Every button has a short caption; **press and hold** a button to see what it does.



Templates are the quickest way to start. Tap one and it appears with orange gaps such as "test" and "then". The first gap is selected, so just type; then tap ▶▶ (or the Enter/Next key on the phone keyboard, or Tab

on a PC) to move to the next gap. Gaps with the same label are filled together: in “Tiered rate”, typing AMT into the first “amount” gap fills every “amount” gap. You can’t save until every gap is filled. The *Ready to use* templates are complete equations from this guide.



Tap **Save** when the check shows ✓ Ready.

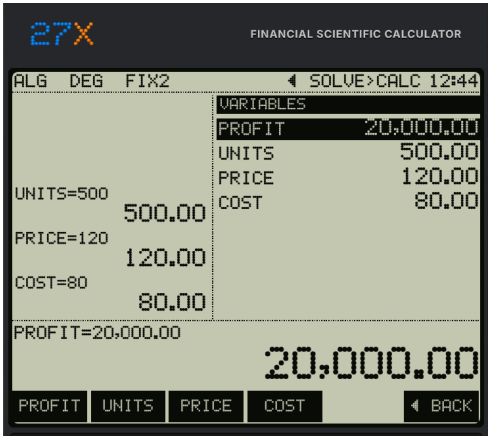
- Write it with one equals sign: PROFIT=UNITS×(PRICE−COST). If you leave out the equals sign, the expression is set equal to zero.
- Variable names use letters and digits (start with a letter), for example RATE, V2, COST1.
- You can use * for × and / for ÷. Multiplication can be implied: 2PI or 3(A+B).
- Functions: SIN COS TAN ASIN ACOS ATAN, SINH COSH TANH, LN LOG EXP ALOG, SQRT CBRT SQ, ABS IP FP INT SGN, MIN(a:b) MAX(a:b), ROOT(y:x), RND(x:places), MOD(a:b). Conditions (IF, S, Σ, L, G) are described in the next section.

Example — Your own equation

Saved as PROFIT=UNITS×(PRICE−COST): 500 units at 120, cost 80.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
500 **‹UNITS›**	UNITS=500.00	Stores 500 in UNITS
120 **‹PRICE›**	PRICE=120.00	Stores 120 in PRICE
80 **‹COST›**	COST=80.00	Stores 80 in COST
‹PROFIT›	PROFIT=20,000.00	Calculates PROFIT

Result: Profit **20,000.00**

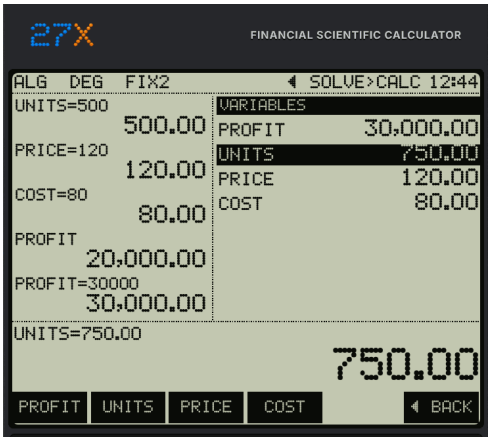


Example — Working backwards

How many units for a profit of 30 000?

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
500 **‹UNITS›**	UNITS=500.00	Stores 500 in UNITS
120 **‹PRICE›**	PRICE=120.00	Stores 120 in PRICE
80 **‹COST›**	COST=80.00	Stores 80 in COST
‹PROFIT›	PROFIT=20,000.00	Calculates PROFIT
30000 **‹PROFIT›**	PROFIT=30,000.00	Stores 30 000 in PROFIT
‹UNITS›	UNITS=750.00	Calculates UNITS

Result: **750.00** units

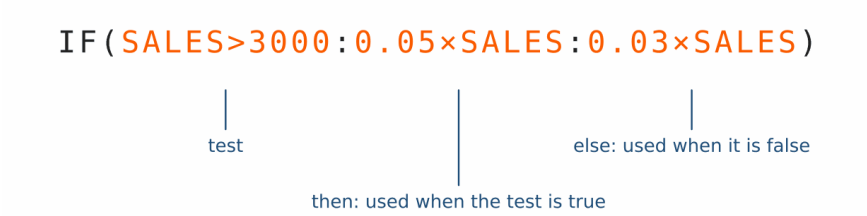


Conditions and decisions

Equations can make decisions, in the tradition of the classic solver calculators. Parts are separated with a colon; a comma or semicolon also works.

Write	Meaning
IF(test:then:else)	Uses the *then* expression when the test is true, otherwise the *else* expression. IFs can be nested
= ≠ (or <>) < > ≤ (or <=) ≥ (or >=)	Comparisons inside a test
AND OR XOR NOT	Combine tests, for example A>7 AND A≤15. NOT comes first, then AND, then OR and XOR
S(name)	True while you are solving for *name*. One saved equation can then hold several formulas: the one used depends on the soft key you tap
Σ(K:start:end:step:expr)	Adds up *expr* for K = start, start+step … end. K is a counter, not a soft key
L(name:expr)	Works out *expr*, uses it here and keeps it under *name*
G(name)	Gets a value kept by L(), so a long sub-expression is written only once

Here is how the parts of an IF line up:



Reading conditions

Each pair below shows an equation and what it means in words.

Equation	Means
Y=IF(X>0:X:0)	Y is X when X is positive, otherwise 0
FEE=IF(AMT<500:25:0.05×AMT)	A fee of 25 below 500, otherwise 5% of the amount
T=IF(A≠0 AND B≠0:A×B:0)	T is A × B, but only when neither is zero
V=IF(NOT(P>100):P:100)	V is P, capped at 100 (the same as MIN(P:100))
R=IF(X<0 OR X>10:0:1)	R is 1 inside 0 to 10, and 0 outside

How AND, OR, XOR and NOT combine two tests, A and B:

Test	A true, B true	A true, B false	A false, B true	A false, B false
A AND B	true	false	false	false
A OR B	true	true	true	false
A XOR B	false	true	true	false
NOT A	false	false	true	true

> Use MAX, MIN or ABS instead of IF where you can: MAX(C:D) does the same job as IF(C>D:C:D) and is easier to read.

Inside IF, a branch written as A=B means “A equals B”, so each branch can be a complete equation (see the S() examples). Only the values the chosen branch needs have to be entered; the solver asks for any that are missing.

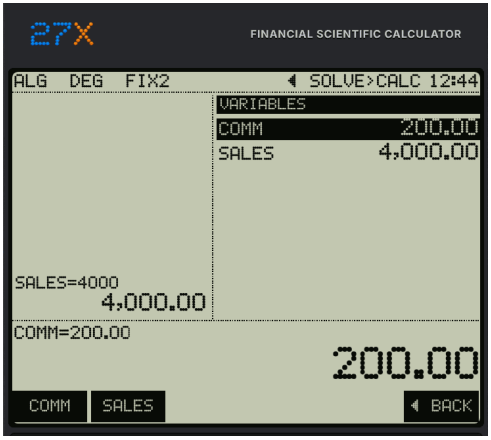
Business examples

Example — Sales commission

COMM=IF(SALES>3000:0.05×SALES:0.03×SALES) — 5% above 3 000, otherwise 3%. Sales of 4 000.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
4000 **‹SALES›**	SALES=4,000.00	Stores 4000 in SALES
‹COMM›	COMM=200.00	Calculates COMM

Result: Commission **200.00**

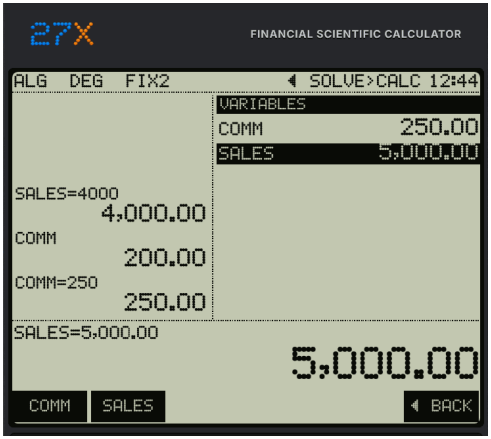


Example — Sales needed for a commission

Now set COMM to 250 and solve for SALES.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
4000 **‹SALES›**	SALES=4,000.00	Stores 4000 in SALES
‹COMM›	COMM=200.00	Calculates COMM
250 **‹COMM›**	COMM=250.00	Stores 250 in COMM
‹SALES›	SALES=5,000.00	Calculates SALES

Result: Sales **5,000.00**

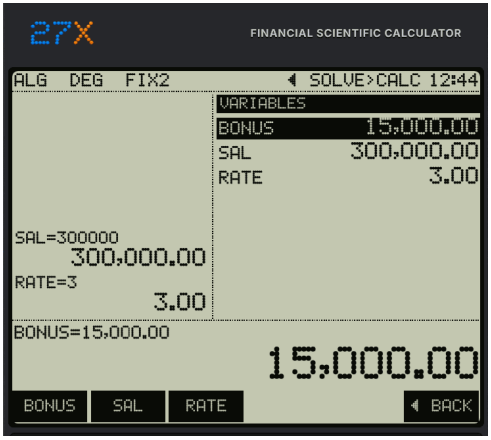


Example — Bonus by rating (nested IF)

BONUS=SAL×IF(RATE≥4:0.1:IF(RATE≥3:0.05:0)) — 10% for a rating of 4 or more, 5% for 3 or more, nothing below. Salary 300 000, rating 3.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
300000 **‹SAL›**	SAL=300,000.00	Stores 300 000 in SAL
3 **‹RATE›**	RATE=3.00	Stores 3 in RATE
‹BONUS›	BONUS=15,000.00	Calculates BONUS

Result: Bonus **15,000.00**

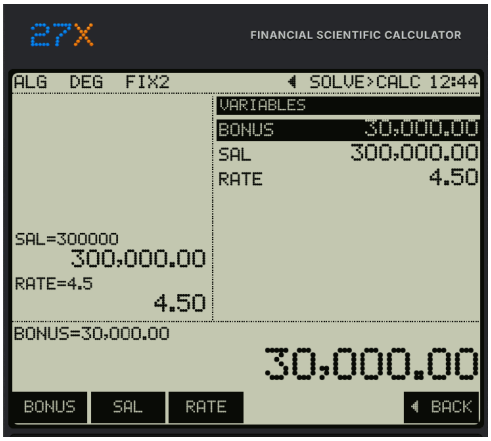


Example — A higher rating

The same salary with a rating of 4.5.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
300000 **‹SAL›**	SAL=300,000.00	Stores 300 000 in SAL
4.5 **‹RATE›**	RATE=4.50	Stores 4.5 in RATE
‹BONUS›	BONUS=30,000.00	Calculates BONUS

Result: Bonus **30,000.00**

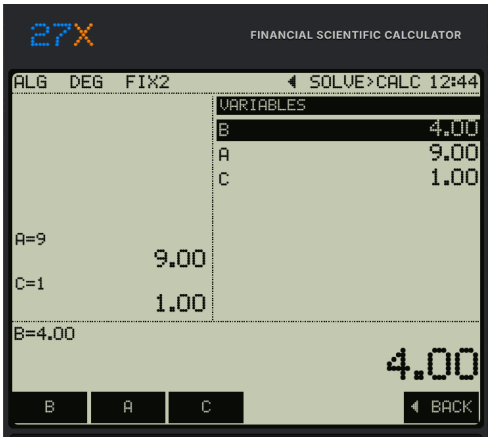


Example — A range test

B=IF(A>7 AND A≤15:2×A÷6+C:3×A+10+C): one formula inside a range, another outside it. A = 9, C = 1.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
9 **‹A›**	A=9.00	Stores 9 in A
1 **‹C›**	C=1.00	Stores 1 in C
‹B›	B=4.00	Calculates B

Result: B = **4.00**

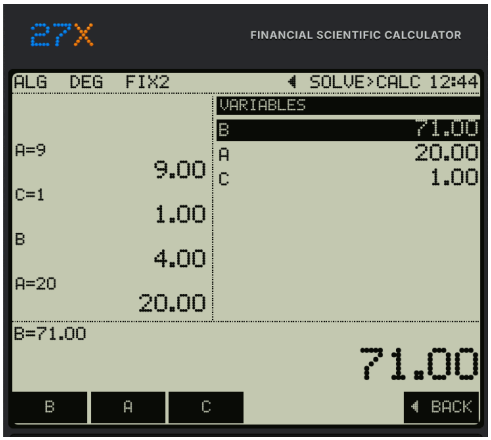


Example — Outside the range

Change A to 20.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
9 **‹A›**	A=9.00	Stores 9 in A
1 **‹C›**	C=1.00	Stores 1 in C
‹B›	B=4.00	Calculates B
20 **‹A›**	A=20.00	Stores 20 in A
‹B›	B=71.00	Calculates B

Result: B = **71.00**



Several formulas in one equation — S()

```
IF(S(DBGAIN):DBGAIN=20×LOG(VOUT÷VIN):VGAIN=VOUT÷VIN)
```

solving for DBGAIN?

yes: use this equation

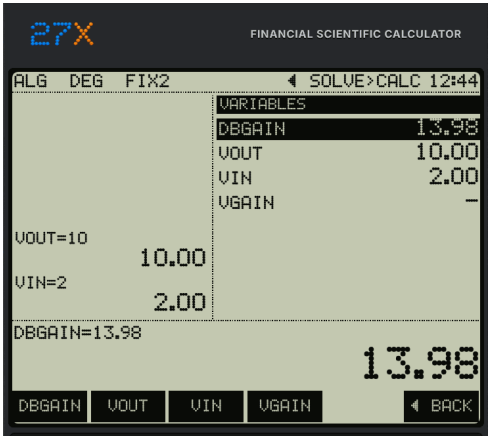
no: use this one

Example — Gain in decibels

IF(S(DBGAIN):DBGAIN=20×LOG(VOUT÷VIN):VGAIN=VOUT÷VIN). VOUT 10, VIN 2, solve DBGAIN.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
10 **‹VOUT›**	VOUT=10.00	Stores 10 in VOUT
2 **‹VIN›**	VIN=2.00	Stores 2 in VIN
‹DBGAIN›	DBGAIN=13.98	Calculates DBGAIN

Result: 13.98 dB

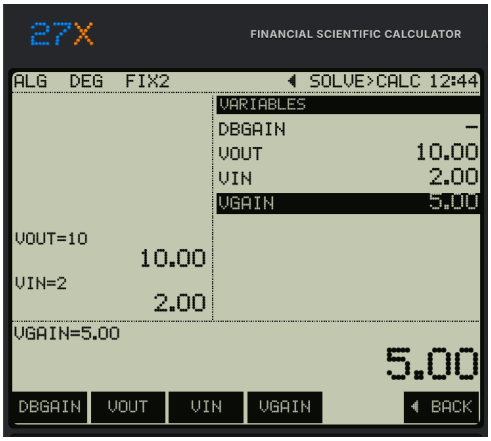


Example — Voltage gain from the same equation

Same values, tap VGAIN instead.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
10 **‹VOUT›**	VOUT=10.00	Stores 10 in VOUT
2 **‹VIN›**	VIN=2.00	Stores 2 in VIN
‹VGAIN›	VGAIN=5.00	Calculates VGAIN

Result: Gain **5.00**

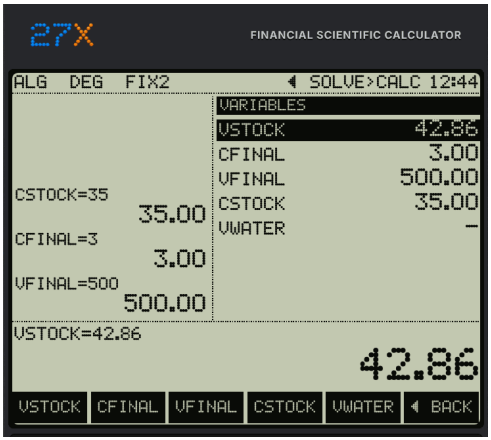


Example — Making up a dilution

IF(S(VSTOCK):VSTOCK=CFINAL×VFINAL÷CSTOCK:VWATER=VFINAL−CFINAL×VFINAL÷CSTOCK). 500 mL of 3% from 35% stock (by volume).

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
35 **‹CSTOCK›**	CSTOCK=35.00	Stores 35 in CSTOCK
3 **‹CFINAL›**	CFINAL=3.00	Stores 3 in CFINAL
500 **‹VFINAL›**	VFINAL=500.00	Stores 500 in VFINAL
‹VSTOCK›	VSTOCK=42.86	Calculates VSTOCK

Result: Stock **42.86** mL



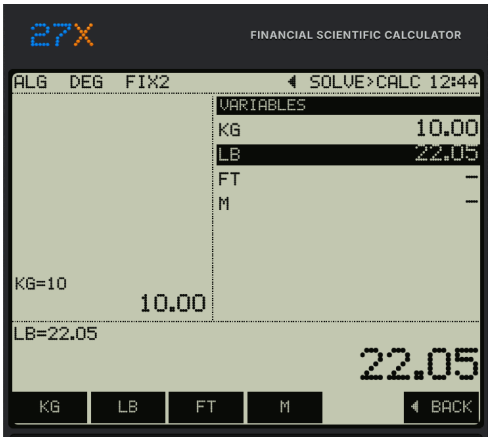
S() tests can be combined. Here one equation converts both mass and length: the first formula is used when you solve for KG or LB, the second for M or FT.

Example — Kilograms to pounds

IF(S(KG) OR S(LB):LB=KG×2.20462262:FT=M×3.2808399). 10 kg in pounds.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
10 **‹KG›**	KG=10.00	Stores 10 in KG
‹LB›	LB=22.05	Calculates LB

Result: 22.05 lb

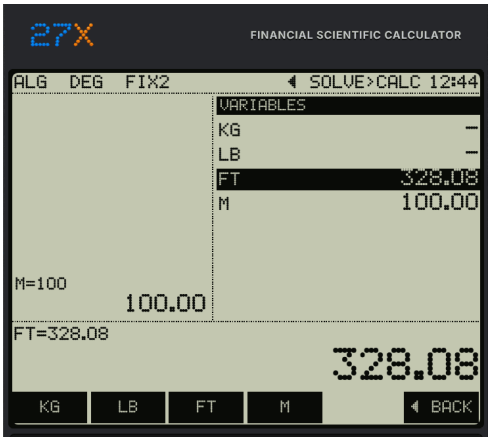


Example — Metres to feet, same equation

100 m in feet.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
100 **‹M›**	M=100.00	Stores 100 in M
‹FT›	FT=328.08	Calculates FT

Result: 328.08 ft

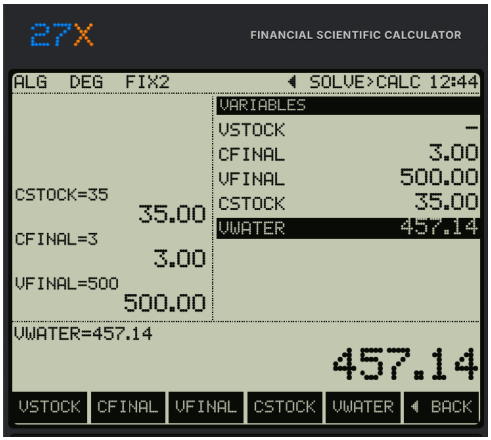


Example — Water to add

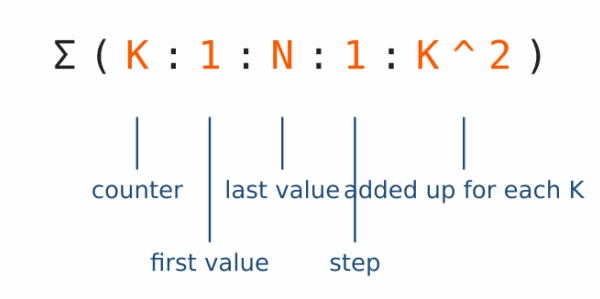
Same values, tap VWATER.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
35 **‹CSTOCK›**	CSTOCK=35.00	Stores 35 in CSTOCK
3 **‹CFINAL›**	CFINAL=3.00	Stores 3 in CFINAL
500 **‹VFINAL›**	VFINAL=500.00	Stores 500 in VFINAL
‹VWATER›	VWATER=457.14	Calculates VWATER

Result: Water **457.14** mL



Sums — Σ()

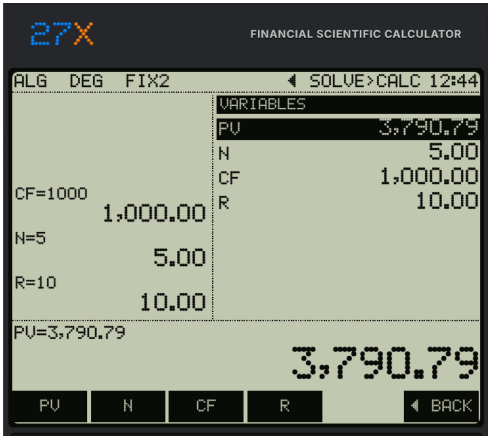

Σ (K : 1 : N : 1 : K ^ 2)
counter
first value
last value
step
added up for each K

Example — Present value of payments

PV=Σ(K:1:N:1:CF÷(1+R÷100)^K) — 1 000 a year for 5 years at 10%.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
1000 **‹CF›**	CF=1,000.00	Stores 1000 in CF
5 **‹N›**	N=5.00	Stores 5 in N
10 **‹R›**	R=10.00	Stores 10 in R
‹PV›	PV=3,790.79	Calculates PV

Result: PV **3,790.79**

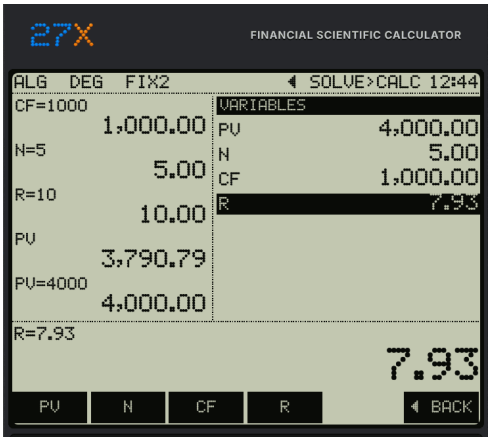


Example — Rate for a given price

What rate gives a PV of 4 000? Set PV to 4 000 and tap R.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
1000 **‹CF›**	CF=1,000.00	Stores 1000 in CF
5 **‹N›**	N=5.00	Stores 5 in N
10 **‹R›**	R=10.00	Stores 10 in R
‹PV›	PV=3,790.79	Calculates PV
4000 **‹PV›**	PV=4,000.00	Stores 4000 in PV
‹R›	R=7.93	Calculates R

Result: 7.93%



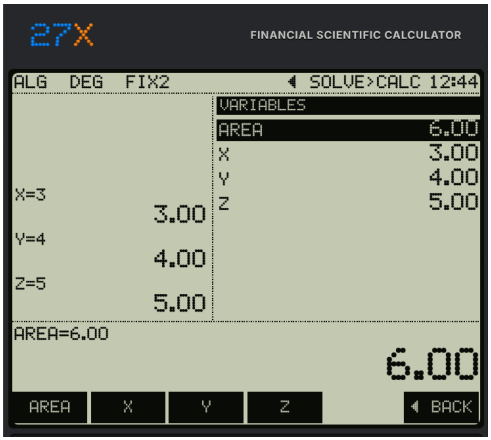
Keeping a value — L() and G()

Example — Triangle area from three sides

AREA=SQRT(L(SP:(X+Y+Z)÷2)×(G(SP)−X)×(G(SP)−Y)×(G(SP)−Z)) — Heron's formula; the half-perimeter SP is written once. Sides 3, 4 and 5.

Keys	Display	What it does
‹SOLVE›	0.00	Opens SOLVE
‹CALC›	0.00	Shows the variables
3 **‹X›**	X=3.00	Stores 3 in X
4 **‹Y›**	Y=4.00	Stores 4 in Y
5 **‹Z›**	Z=5.00	Stores 5 in Z
‹AREA›	AREA=6.00	Calculates AREA

Result: Area **6.00**



Notes about conditions

- IF(test:then:else) uses “then” when the test is true, otherwise “else”. IFs can be nested.
- Separate the parts with colons. A comma or semicolon also works.
- A test must be complete: write IF(A≠0:...), not IF(A:...).
- S(name) is true only while you solve for that name; use it to keep several formulas in one equation.
- Σ counts whole steps from the first value to the last; its counter is not a soft key.
- Only the values the chosen branch needs have to be entered.
- Tests make an equation jump between formulas. Solving backwards across a jump can land on the boundary or report “Sign reversal”; give a starting guess on the side you want.

Before you save: a checklist

The live check catches most mistakes, but these are worth a glance with longer equations:

1. Brackets match. The check counts them for you.
2. The parts of IF, Σ, MIN, MAX and the rest are separated by colons.
3. No thousands separators: type 10000, not 10,000 or 10 000.
4. Percentages are written as ÷100 where the formula needs a fraction.
5. Try a piece of a long equation on the keyboard first, with numbers you know, to check the order of operations.
6. After saving, solve it once with values whose answer you already know.

Organising your equations

- Say what the equation is for in one sentence. If you can’t, split it into smaller equations.
- Equations that use the same name share its value, so a big job can be a chain of small equations.

- Choose names that someone else would understand from the soft keys alone: PRICE, not P1.
- Give the equation a name in the Name box; the list then shows "Commission" instead of the formula.
- Start from a template or a similar equation instead of a blank box.

Notes about the solver

- Every name in a saved equation becomes a soft key: type a value and tap the key to store it, or tap the key alone to solve for it.
- The value already stored in the unknown is the starting guess. Store a guess near the answer you want when there could be more than one.
- CLR DATA in the solver clears all the solver's stored values.
- If no exact answer exists the solver says so, and keeps the closest value it found. Appendix D explains the messages.

How the solver finds an answer

The solver searches for the value that makes both sides equal, starting from the value already stored in the unknown. If an equation has more than one answer (a quadratic, for example), steer it by storing a guess near the answer you want first. **Appendix D** shows, with graphs, what happens in each case and what the messages mean.

12. Laboratory tools — LAB

Tap ‹LAB›: ACTIVE, BATCH, DILUTE and STOCK. Enter amounts in any consistent unit (grams, kilograms, millilitres…).

ACTIVE — adding actives to a base

Use this when you start with a quantity of base product and add actives A, B, C… so that **each active ends at a fixed percentage of the final product**. Because every active you add dilutes the others, the amounts can only be worked out once all of them are entered.

1. Type the base amount and tap **BASE**.
2. For each active, type its final percentage and tap its letter (A to F). Nothing is calculated yet.
3. Tap **CALC** (always the last soft key). The panel lists the amount of each active to add and the final total.

Tap a letter after CALC to see that amount on the result line. To work from a target batch size instead, type the final amount and tap **TOTAL**; the calculator works out the base you need (then tap CALC). Every active is assumed to be added at full strength.

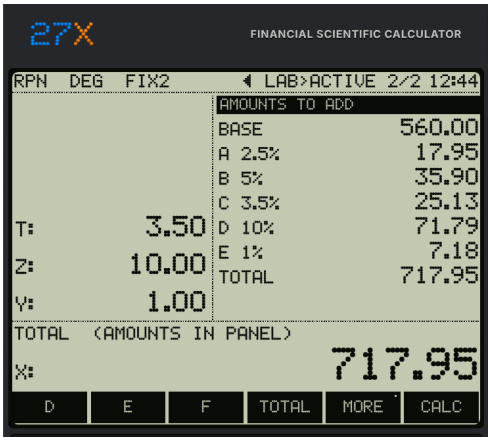
Example — Five actives (the cover picture)

In RPN: 560 g base; A 2.5%, B 5%, C 3.5%, D 10% and E 1% of the final product. The actives make up 22%, so the base is 78% of the total.

In RPN mode:

Keys	Display	What it does
‹LAB›	0.00	Opens LAB
‹ACTIVE›	0.00	Opens ACTIVE
560 **‹BASE›**	BASE=560.00	Stores 560 in BASE
2.5 **‹A›**	A = 2.50% of final product	Stores 2.5 in A
5 **‹B›**	B = 5.00% of final product	Stores 5 in B
3.5 **‹C›**	C = 3.50% of final product	Stores 3.5 in C
10 **‹D›**	D = 10.00% of final product	Stores 10 in D
1 **‹E›**	E = 1.00% of final product	Stores 1 in E
‹CALC›	TOTAL (amounts in panel)	Calculates (results in the panel)

Result: Final total **717.95** g; add A 17.95, B 35.90, C 25.13, D 71.79, E 7.18 g

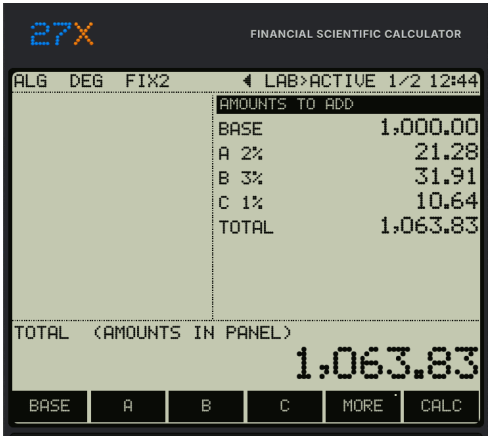


Example — Three actives

1 000 g base; A at 2%, B at 3%, C at 1% of the final product.

Keys	Display	What it does
‹LAB›	0.00	Opens LAB
‹ACTIVE›	0.00	Opens ACTIVE
1000 **‹BASE›**	BASE=1,000.00	Stores 1000 in BASE
2 **‹A›**	A = 2.00% of final product	Stores 2 in A
3 **‹B›**	B = 3.00% of final product	Stores 3 in B
1 **‹C›**	C = 1.00% of final product	Stores 1 in C
‹CALC›	TOTAL (amounts in panel)	Calculates (results in the panel)

Result: Final total **1,063.83** g; add A 21.28 g, B 31.91 g, C 10.64 g

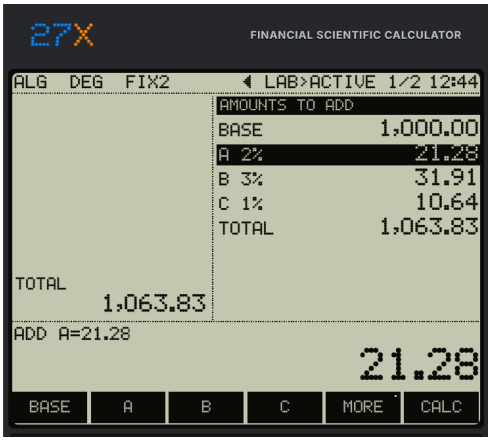


Example — Amount of one active

After CALC, tap A.

Keys	Display	What it does
‹LAB›	0.00	Opens LAB
‹ACTIVE›	0.00	Opens ACTIVE
1000 **‹BASE›**	BASE=1,000.00	Stores 1000 in BASE
2 **‹A›**	A = 2.00% of final product	Stores 2 in A
3 **‹B›**	B = 3.00% of final product	Stores 3 in B
1 **‹C›**	C = 1.00% of final product	Stores 1 in C
‹CALC›	TOTAL (amounts in panel)	Calculates (results in the panel)
‹A›	ADD A=21.28	Shows how much A to add

Result: 21.28 g

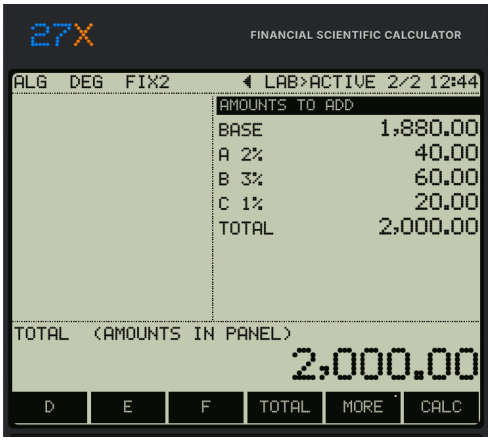


Example — Starting from the batch size

Make 2 000 g of finished product with the same actives.

Keys	Display	What it does
‹LAB›	0.00	Opens LAB
‹ACTIVE›	0.00	Opens ACTIVE
2 **‹A›**	A = 2.00% of final product	Stores 2 in A
3 **‹B›**	B = 3.00% of final product	Stores 3 in B
1 **‹C›**	C = 1.00% of final product	Stores 1 in C
2000 **‹TOTAL›**	TOTAL 2,000.00 → BASE 1,880.00, now CALC	Stores 2 000 in TOTAL; works out the BASE
‹CALC›	TOTAL (amounts in panel)	Calculates (results in the panel)

Result: Total **2,000.00** g (base 1 880 g)



BATCH — percent of a batch (w/w)

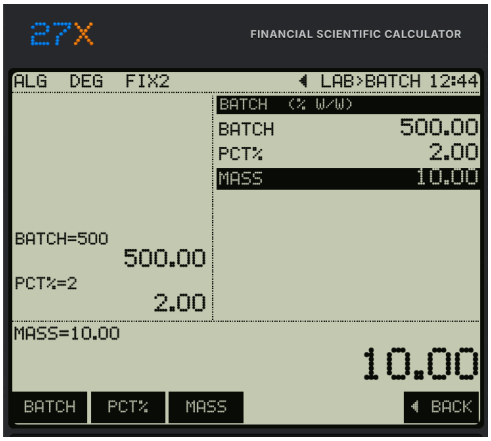
Values: **BATCH**, **PCT%** and **MASS**: how much of an ingredient makes up a given percentage of a batch.

Example — Ingredient mass

2% of a 500 g batch.

Keys	Display	What it does
‹LAB›	0.00	Opens LAB
‹BATCH›	0.00	Opens BATCH
500 **‹BATCH›**	BATCH=500.00	Stores 500 in BATCH
2 **‹PCT%›**	PCT%=2.00	Stores 2 in PCT%
‹MASS›	MASS=10.00	Calculates MASS

Result: 10.00 g



DILUTE — C1·V1 = C2·V2

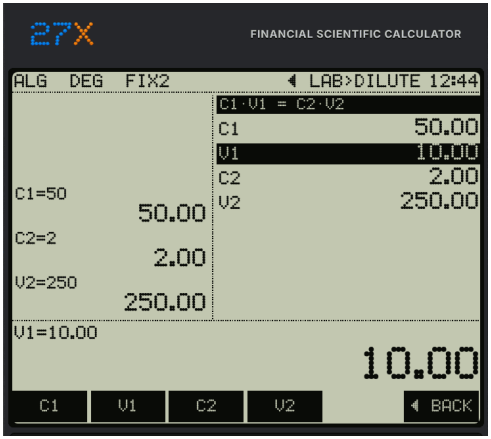
Values: **C1**, **V1**, **C2** and **V2**. Enter any three to find the fourth.

Example — Volume of stock needed

Make 250 mL of 2% from a 50% stock.

Keys	Display	What it does
‹LAB›	0.00	Opens LAB
‹DILUTE›	0.00	Opens DILUTE
50 **‹C1›**	C1=50.00	Stores 50 in C1
2 **‹C2›**	C2=2.00	Stores 2 in C2
250 **‹V2›**	V2=250.00	Stores 250 in V2
‹V1›	V1=10.00	Calculates V1

Result: **10.00** mL of stock, topped up to 250 mL



STOCK — % w/v from a % w/w stock

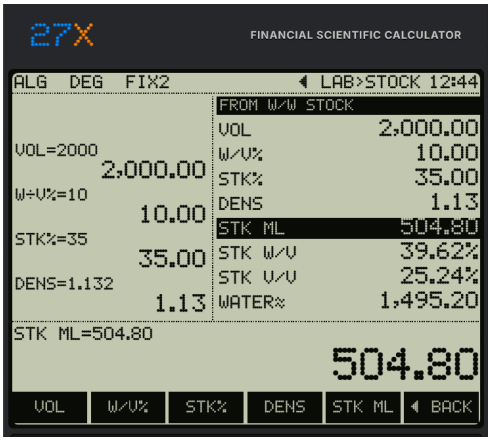
Many stock solutions (hydrogen peroxide, for instance) are sold as % w/w. To make a % w/v solution you need the stock's density. Values: **VOL** (final volume, mL), **W/V%** (target), **STK%** (stock strength, w/w), **DENS** (stock density, g/mL) and **STK mL** (volume of stock to measure). The panel also shows the stock's own w/v strength, the v/v of stock in the final solution and the approximate water to add.

Example — 10% w/v hydrogen peroxide

2 000 mL of 10% w/v from 35% w/w stock (density about 1.132 g/mL — check your supplier's figure).

Keys	Display	What it does
‹LAB›	0.00	Opens LAB
‹STOCK›	0.00	Opens STOCK
2000 **‹VOL›**	VOL=2,000.00	Stores 2000 in VOL
10 **‹W/V%›**	W/V%=10.00	Stores 10 in W/V%
35 **‹STK%›**	STK%=35.00	Stores 35 in STK%
1.132 **‹DENS›**	DENS=1.13	Stores 1.132 in DENS
‹STK mL›	STK mL=504.80	Calculates STK mL

Result: Measure **504.80** mL of stock and make up to 2 000 mL



13. Engineering — ENG

Tap ‹ENG› (page 2 of the main menu): CHEM, ELEC, MECH, CIVIL, CONST, TOOLS and DEFAULT. Each calculation is a set of linked values with units in the key names; enter the ones you know and tap the one you want. Every calculation has an **EXAMPLE** key that loads and solves a typical problem.

Choose **DEFAULT** to make ENG open straight into your own discipline (‹BACK› still reaches the full ENG menu).

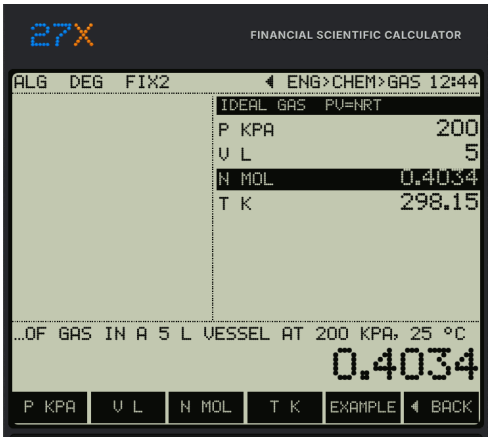
CHEM — chemical

Soft key	Equation	EXAMPLE problem	Answer
GAS	$P \cdot V = n \cdot R \cdot T$ (kPa, L, mol, K)	5 L vessel at 200 kPa, 25 °C	0.4034 mol
MOLAR	mass = M × MW × V	NaCl for 250 mL of 0.5 M	7.305 g
pH	$pH = -\log[H^+]$	$[H^+]$ = 2.5E−4 mol/L	3.602
HEAT	$Q = m \cdot Cp \cdot \Delta T$	Heat 2 kg of water by 25 °C	209.3 kJ
REYN	$Re = \rho \cdot v \cdot D / \mu$	Water at 1.5 m/s in a 50 mm pipe	74 850
DARCY	$\Delta P = f \cdot (L/D) \cdot \rho v^2/2$	50 m of 50 mm pipe, f = 0.02	22 455 Pa
ARRH	$k = A \cdot e^{-Ea/RT}$	Ea 75 kJ/mol at 37 °C	2.306

Example — Ideal gas (EXAMPLE key)

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹CHEM›	0.00	Opens CHEM
‹GAS›	0	Opens GAS
‹EXAMPLE›	Moles of gas in a 5 L vessel at 200 kPa, 25 °C	Loads the example: Moles of gas in a 5 L vessel at 200 kPa, 25 °C

Result: 0.4034 mol



ELEC — electronic

Soft key	Equation	EXAMPLE problem	Answer
OHM	V = I·R	12 V across 470 Ω	25.532 mA
POWER	P = V·I	230 V at 2.5 A	575 W
R‖	R = R1·R2 / (R1 + R2)	1 kΩ ‖ 2.2 kΩ	687.5 Ω
VDIV	Vout = Vin·R2 / (R1 + R2)	12 V, 10 k / 4.7 k	3.837 V

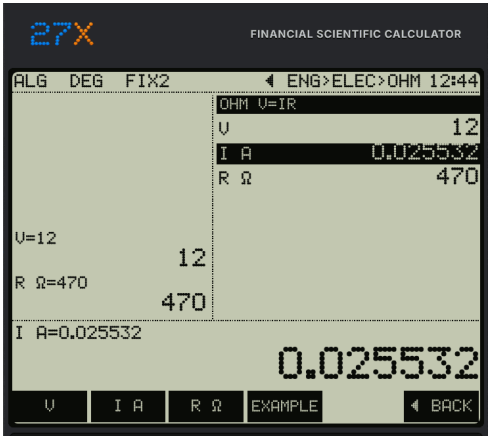
Soft key	Equation	EXAMPLE problem	Answer
RC	fc = 1 / (2πRC)	10 kΩ, 100 nF	159.15 Hz
XC	Xc = 1 / (2πfC)	10 µF at 50 Hz	318.31 Ω
XL	XL = 2πfL	10 mH at 1 kHz	62.832 Ω
LC	f = 1 / (2π√(LC))	10 mH with 100 nF	5 032.9 Hz
LED	R = (Vs − Vf) / I	2 V LED, 20 mA, 5 V supply	150 Ω
dB	dB = 20·log(V2/V1)	Gain of 10×	20 dB

Example — Ohm's law

Current through 470 Ω on 12 V. ENG menus show 5 significant figures.

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹ELEC›	0.00	Opens ELEC
‹OHM›	0	Opens OHM
12 **‹V›**	V=12	Stores 12 in V
470 **‹R Ω›**	R Ω=470	Stores 470 in R Ω
‹I A›	I A=0.025532	Calculates I A

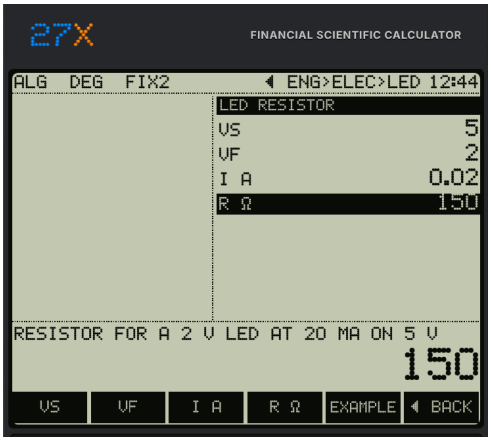
Result: 0.025532 A (25.5 mA)



Example — LED resistor (EXAMPLE key)

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹ELEC›	0.00	Opens ELEC
‹LED›	0	Opens LED
‹EXAMPLE›	Resistor for a 2 V LED at 20 mA on 5 V	Loads the example: Resistor for a 2 V LED at 20 mA on 5 V

Result: 150 Ω



MECH — mechanical

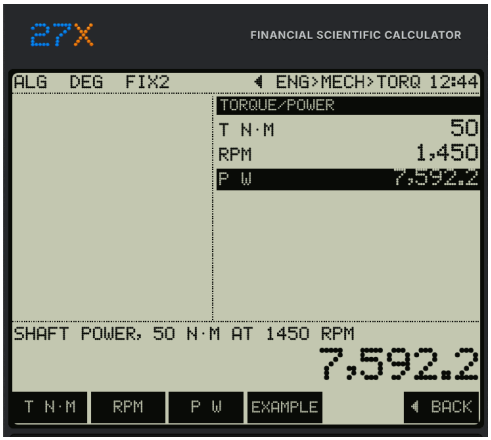
Soft key	Equation	EXAMPLE problem	Answer
TORQUE	P = T·2π·rpm / 60	50 N·m at 1 450 rpm	7 592.2 W
KE	E = ½·m·v²	1 200 kg car at 100 km/h	463 040 J
STRESS	σ = F / A	50 kN on a 50 × 50 mm section	20 MPa

Soft key	Equation	EXAMPLE problem	Answer
HEAD	P = ρ·g·h	10 m of water	98 067 Pa

Example — Shaft power (EXAMPLE key)

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹MECH›	0.00	Opens MECH
‹TORQUE›	0	Opens TORQUE
‹EXAMPLE›	Shaft power, 50 N·m at 1450 rpm	Loads the example: Shaft power, 50 N·m at 1450 rpm

Result: **7 592.2** W



CIVIL — civil and structural

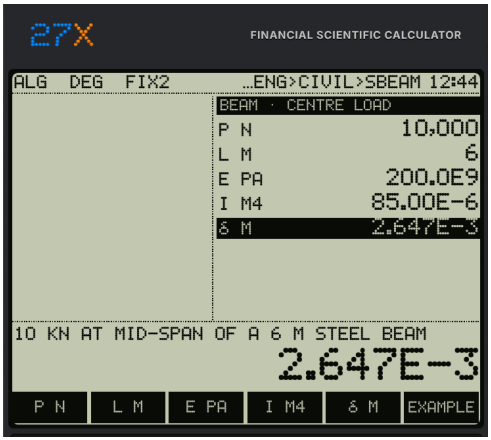
Soft key	Equation	EXAMPLE problem	Answer
BEAM P	δ = P·L³ / (48·E·I)	10 kN at mid-span, 6 m steel beam	2.647 mm

Soft key	Equation	EXAMPLE problem	Answer
BEAM w	$\delta = 5 \cdot w \cdot L^4 / (384 \cdot E \cdot I)$	5 kN/m over a 6 m steel beam	4.963 mm
MOMENT	$M = w \cdot L^2 / 8$	5 kN/m over 6 m	22 500 N·m
CANTLV	$\delta = P \cdot L^3 / (3 \cdot E \cdot I)$	2 kN at the tip of a 3 m cantilever	3.6 mm
EULER	$Pcr = \pi^2 \cdot E \cdot I / (K \cdot L)^2$	Pinned steel column, 4 m	3.084 MN
MANNING	$Q = A \cdot R^{2/3} \cdot \sqrt{S} / n$	Concrete channel, slope 1:1000	1.450 m^3/s
SLAB	$V = L \cdot W \cdot T$	6 × 4 m slab, 150 mm	3.6 m^3

Example — Beam deflection (EXAMPLE key)

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹CIVIL›	0.00	Opens CIVIL
‹BEAM P›	0	Opens BEAM P
‹EXAMPLE›	10 kN at mid-span of a 6 m steel beam	Loads the example: 10 kN at mid-span of a 6 m steel beam

Result: 2.647E−3 m (2.65 mm)



CONST — physical constants

Open the list with **[CONST]** (orange STO) from anywhere, or ENG › CONST. Tap a constant to insert it into your calculation; its full name and value show on the message line.

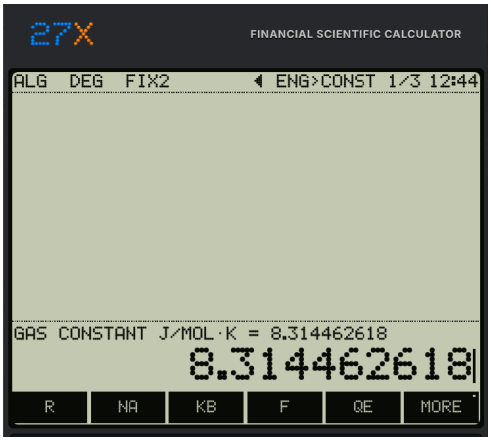
Key	Constant	Value
R	Molar gas constant	8.314462618 J/(mol·K)
NA	Avogadro constant	$6.02214076 \times 10^{23}$ /mol
KB	Boltzmann constant	1.380649×10^{-23} J/K

Key	Constant	Value
F	Faraday constant	96 485.33212 C/mol
QE	Elementary charge	$1.602176634 \times 10^{-19}$ C
C	Speed of light	299 792 458 m/s
H	Planck constant	$6.62607015 \times 10^{-34}$ J·s
G	Standard gravity	9.80665 m/s²
ε0	Vacuum permittivity	$8.8541878128 \times 10^{-12}$ F/m
μ0	Vacuum permeability	$1.25663706212 \times 10^{-6}$ H/m
ATM	Standard atmosphere	101 325 Pa
σSB	Stefan–Boltzmann constant	$5.670374419 \times 10^{-8}$ W/(m²·K⁴)
VM	Molar volume of ideal gas (0 °C, 1 atm)	22.41396954 L/mol
T0	Zero Celsius	273.15 K

Example — Inserting a constant

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹CONST›	0.00	Opens CONST
‹R›	GAS CONSTANT J/mol·K = 8.314462618	Shows the gas constant R

Result: R is inserted into the line; the message shows its value



TOOLS

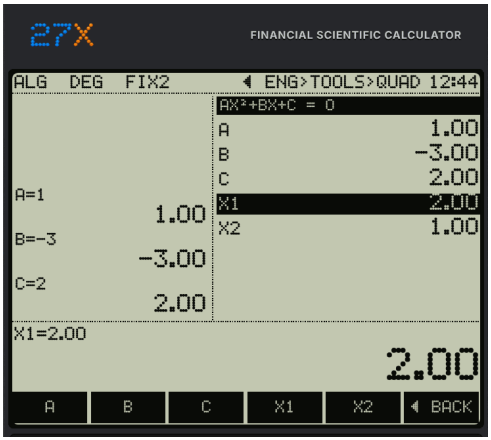
QUAD solves a·x² + b·x + c = 0 (enter a, b and c, then tap x1 or x2; complex roots are reported on the message line). **SIM2** solves two simultaneous equations a1·x + b1·y = c1 and a2·x + b2·y = c2.

Example — Quadratic roots

$x^2 - 3x + 2 = 0$.

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹TOOLS›	0.00	Opens TOOLS
‹QUAD›	0.00	Opens QUAD
1 **‹a›**	a=1.00	Stores 1 in a
3 **[+/−]**	−3	Keys in 3 and makes it negative
‹b›	b=-3.00	Stores −3 in b
2 **‹c›**	c=2.00	Stores 2 in c
‹x1›	x1=2.00	Calculates x1

Result: x1 = **2**, x2 = 1

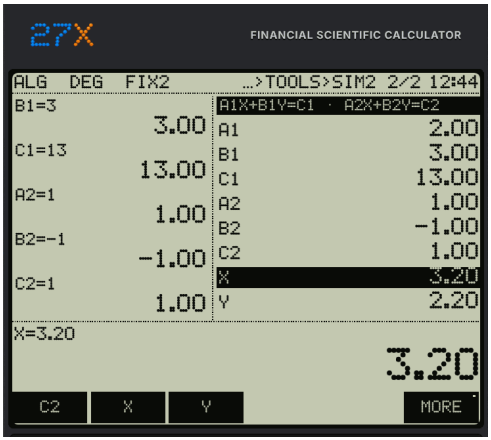


Example — Simultaneous equations

2x + 3y = 13 and x − y = 1.

Keys	Display	What it does
‹ENG›	0.00	Opens ENG
‹TOOLS›	0.00	Opens TOOLS
‹SIM2›	0.00	Opens SIM2
2 **‹a1›**	a1=2.00	Stores 2 in a1
3 **‹b1›**	b1=3.00	Stores 3 in b1
13 **‹c1›**	c1=13.00	Stores 13 in c1
1 **‹a2›**	a2=1.00	Stores 1 in a2
1 **[+/−]**	−1	Keys in 1 and makes it negative
‹b2›	b2=-1.00	Stores −1 in b2
1 **‹c2›**	c2=1.00	Stores 1 in c2
‹x›	x=3.20	Calculates x

Result: x = **3.20**, y = 2.20



Appendix A — Messages

Messages appear on the message line, above the result. Error messages are shown in reverse (white on black); press any key to carry on.

Calculations

Message	What it means and what to do
Divide by 0	A division by zero, or a percentage of 0. Check the values.
Invalid	The function can't take that value, for example √ of a negative number, LN of 0 or ASIN of 2.
Overflow	The answer is too large to show (beyond about 10^{308}).
Syntax	The expression is not complete or not written correctly: check brackets and operators.
Complex: a ± bi	QUAD: the quadratic has no real roots; the complex pair is shown.
Nothing to undo	UNDO has already been used, or nothing has been done yet.

Menus with values

Message	What it means and what to do
Missing …	A value the calculation needs hasn't been entered, for example Missing PV. Type it and tap its soft key.
Enter …	The menu tells you which values it needs, for example "Enter two of COST, PRICE, GP, MAR%, MU%" or "Enter a, b and c".
No solution	No answer exists with these values. In finance, check the signs of PV, PMT and FV.
No unique solution	SIM2: the two equations are parallel or the same.
Invalid N / Invalid	TVM: N must not be 0 and P/YR must be more

Message	What it means and what to do
P/YR	than 0.
Invalid #P / Invalid #T	AMORT or CFLO: the number of payments or repeats must be a whole number of 1 or more.
Need cash flows / Add CF1 first	CFLO: enter CF0 and at least one later cash flow first.
Invalid date / Invalid dates	The date isn't valid or isn't in DD.MMYYYY form (MM.DDYYYY with M.DY).
Need DATE1, DATE2 (and similar)	TIME: enter two of DATE1, DATE2 and DAYS first.
Need 1+ points / Need 2+ points	STAT needs at least one (or two) values before it can calculate.
Not in list	Σ−: that value isn't in the data.
Enter BASE amount	ACTIVE: type the base amount and tap BASE (or a TOTAL) first.
Enter a % for A, B, C…	ACTIVE: give at least one active a percentage before CALC.
Enter all actives, then CALC	ACTIVE: amounts are worked out only after CALC.
Actives must total < 100%	ACTIVE: the percentages add up to 100% or more, which leaves no room for the base.
% must be 0–99.99	ACTIVE: each percentage must be below 100.

Solver

Message	What it means and what to do
No equation	There is no equation in the list yet: tap NEW.
Missing …	A value the equation (or the chosen IF branch) needs hasn't been entered.

Message	What it means and what to do
Sign reversal	The two sides cross without ever being equal, usually at a jump (an IF test, IP or a division by zero). The value where it happens is stored. See Appendix D.
No root found	The two sides never meet near the values tried. The closest value found is stored. Try another guess, or check the equation. See Appendix D.
Too many steps	A Σ would add more than 100 000 terms; check the first, last and step values.

The equation screen has its own live check, which explains problems in plain words as you type (for example “Missing) · 1 bracket still open”), so a faulty equation can’t be saved.

Appendix B — Complete function list

Menu	Functions
Main menu	SOLVE, LAB, FIN, STAT, BUS · ENG, TIME, CONV, PROB, PARTS · HYP, MODES, DISP
SOLVE	CALC, NEW, EDIT, DEL; in CALC, one soft key per variable
LAB	ACTIVE (BASE, A–F, TOTAL, CALC), BATCH (BATCH, PCT%, MASS), DILUTE (C1, V1, C2, V2), STOCK (VOL, W/V%, STK%, DENS, STK mL)
FIN	TVM (N, I%YR, PV, PMT, FV, OTHER: P/YR, BEG, END, EXAMPLE), AMORT (#P, INT, PRIN, BAL, NEXT, FIRST), CFLO (CF+, #T, I%, NPV, IRR%, NFV, DEL), BOND (SETT, MAT, CPN%, CALL, YLD%, PRICE, ACCRU, A/A–30/360, SEMI–ANNUAL), DEPRC (BASIS, SALV, LIFE, YR#, FACT %, SL, SOYD, DB), S.INT (DAYS, I%YR, PV, BASIS, INT), ICNV (NOM%, EFF%, P)
STAT	Σ+, Σ−, MEAN, SDEV, TOTAL, N, MEDN, MIN, MAX, RANGE, 1VAR/2VAR, L.R. (SLOPE, INTCP, CORR, Y-EST, X-EST)
BUS	%CHG (OLD, NEW, %CH), %TOTL (TOTAL, PART, %T), MARKUP (COST, PRICE, GP, MAR%, MU%), VAT (NET, VAT%, GROSS)
ENG	CHEM (GAS, MOLAR, pH, HEAT, REYN, DARCY, ARRH), ELEC (OHM, POWER, R‖, VDIV, RC, XC, XL, LC, LED, dB), MECH (TORQUE, KE, STRESS, HEAD), CIVIL (BEAM P, BEAM w, MOMENT, CANTLV, EULER, MANNING, SLAB), CONST (14 constants), TOOLS (QUAD, SIM2), DEFAULT
TIME	NOW, →UNIX, UNIX→, DATE1, DATE2, DAYS, 360D, TODAY, D.MY/M.DY
CONV	→°F, →°C, →MI, →KM, →LB, →KG, →IN, →CM, →GAL, →L, →HMS, HMS→, →RAD, →DEG
PROB	COMB, PERM, n!, RAN#

Menu	Functions
PARTS	IP, FP, RND, ABS, SGN
HYP	SINH, COSH, TANH, ASINH, ACOSH, ATANH
MODES	DEG, RAD, ALG, RPN, DISP, THEME, COMPACT, FONT, RDX, CLICK, BEEP, BUZZ, UPDCHK, ONTOP (Windows), POPOUT (web on a computer), UPDATE (when available), ABOUT, RESET
DISP	FIX, SCI, ENG, ALL, RDX
Keyboard	SIN COS TAN (orange ASIN ACOS ATAN), LN (orange e^x), LOG (orange 10^x), EXIT (orange MAIN), STO (orange CONST), RCL (orange ANS), ((orange π),) (orange LAST), √x (orange x^2), y^x (orange 1/x), ENTER (orange RPN↔ALG), +/− (orange ABS), E (orange SHOW), ← (orange UNDO), x↔y (orange R↓), ▲, ▼, 7 8 9 ÷ (orange FIX SCI ENG ALL), 4 5 6 × (orange DEG/RAD RND →°C/°F n!; °C/°F and H.MS: once one way, twice the other), 1 2 3 − (orange nCr nPr $\sqrt[x]{y}$ →H.MS), 0 . % + (orange . / , RAN# %CHG Σ+), CLR (orange CLR DATA)

Appendix C — Menu map

Every menu and its soft keys. Indented menus are opened from the key named in the line above them; MORE pages are included.

MAIN SOLVE · LAB · FIN · STAT · BUS · ENG · TIME · CONV · PROB · PARTS · HYP · MODES · DISP

- **SOLVE** CALC · NEW · EDIT · DEL
  - **CALC** one soft key for each name in the selected equation
- **LAB** ACTIVE · BATCH · DILUTE · STOCK
  - **ACTIVE** BASE · A · B · C · CALC · D · E · F · TOTAL
  - **BATCH** BATCH · PCT% · MASS
  - **DILUTE** C1 · V1 · C2 · V2
  - **STOCK** VOL · W/V% · STK% · DENS · STK mL
- **FIN** TVM · AMORT · CFLO · BOND · DEPRC · S.INT · ICNV
  - **TVM** N · I%YR · PV · PMT · FV · OTHER
    - **OTHER** P/YR · BEG · END · EXAMPLE
  - **AMORT** #P · INT · PRIN · BAL · NEXT · FIRST
  - **CFLO** CF+ · #T · I% · NPV · IRR% · NFV · DEL
  - **BOND** SETT · MAT · CPN% · CALL · YLD% · PRICE · ACCRU · A/A · SEMI
  - **DEPRC** BASIS · SALV · LIFE · YR# · FACT% · SL · SOYD · DB
  - **S.INT** DAYS · I%YR · PV · BASIS · INT · EXAMPLE
  - **ICNV** NOM% · EFF% · P · EXAMPLE
- **STAT** Σ+ · Σ− · MEAN · SDEV · TOTAL · N · MEDN · MIN · MAX · RANGE · L.R. · 1VAR
  - **L.R.** SLOPE · INTCP · CORR · Y-EST · X-EST
- **BUS** %CHG · %TOTL · MARKUP · VAT
  - **%CHG** OLD · NEW · %CH
  - **%TOTL** TOTAL · PART · %T
  - **MARKUP** COST · PRICE · GP · MAR% · MU%
  - **VAT** NET · VAT% · GROSS · EXAMPLE
- **ENG** CHEM · ELEC · MECH · CIVIL · CONST · TOOLS · DEFAULT
  - **CHEM** GAS · MOLAR · pH · HEAT · REYN · DARCY · ARRH
    - **GAS** P kPa · V L · n mol · T K · EXAMPLE
    - **MOLAR** M mol/L · MW · V L · MASS g · EXAMPLE
    - **pH** [H+] · pH · EXAMPLE
    - **HEAT** MASS kg · Cp · ΔT · Q kJ · EXAMPLE

REYN ρ kg/m3 · v m/s · D m · μ Pa·s · Re · EXAMPLE
DARCY f · L m · D m · ρ · v m/s · ΔP Pa · EXAMPLE
ARRH A · Ea J/mol · T K · k · EXAMPLE
ELEC OHM · POWER · R‖ · VDIV · RC · XC · XL · LC · LED · dB
OHM V · I A · R Ω · EXAMPLE
POWER V · I A · P W · EXAMPLE
R‖ R1 · R2 · R‖ · EXAMPLE
VDIV VIN · R1 · R2 · VOUT · EXAMPLE
RC R Ω · C F · fc Hz · EXAMPLE
XC f Hz · C F · Xc Ω · EXAMPLE
XL f Hz · L H · XL Ω · EXAMPLE
LC L H · C F · f Hz · EXAMPLE
LED VS · VF · I A · R Ω · EXAMPLE
dB V1 · V2 · dB · EXAMPLE
MECH TORQUE · KE · STRESS · HEAD
TORQUE T N·m · RPM · P W · EXAMPLE
KE m kg · v m/s · E J · EXAMPLE
STRESS F N · A m2 · σ Pa · EXAMPLE
HEAD ρ kg/m3 · h m · P Pa · EXAMPLE
CIVIL BEAM P · BEAM w · MOMENT · CANTLV · EULER · MANNING · SLAB
BEAM P P N · L m · E Pa · I m4 · δ m · EXAMPLE
BEAM w w N/m · L m · E Pa · I m4 · δ m · EXAMPLE
MOMENT w N/m · L m · M N·m · EXAMPLE
CANTLV P N · L m · E Pa · I m4 · δ m · EXAMPLE
EULER E Pa · I m4 · K · L m · Pcr N · EXAMPLE
MANNING n · A m2 · R m · S · Q m3/s · EXAMPLE
SLAB L m · W m · T m · VOL m3 · EXAMPLE
CONST R · NA · KB · F · QE · C · H · G · ε0 · μ0 · ATM · σSB · VM · T0
TOOLS QUAD · SIM2
QUAD a · b · c · x1 · x2
SIM2 a1 · b1 · c1 · a2 · b2 · c2 · x · y
DEFAULT CHEM · ELEC · MECH · CIVIL · NONE
TIME NOW · →UNIX · UNIX→ · DATE1 · DATE2 · DAYS · 360D · TODAY · D.MY

CONV →°F · →°C · →MI · →KM · →LB · →KG · →IN · →CM · →GAL · →L · →HMS · HMS→ · →RAD · →DEG

PROB COMB · PERM · n! · RAN#

PARTS IP · FP · RND · ABS · SGN

HYP SINH · COSH · TANH · ASINH · ACOSH · ATANH

MODES DEG · RAD · ALG · RPN · DISP · THEME · COMPACT · FONT:DOT · RDX. · CLICK · BEEP · BUZZ · UPDCHK · ABOUT · RESET

DISP FIX · SCI · ENG · ALL · RDX.

DISP FIX · SCI · ENG · ALL · RDX.

Appendix D — More about the solver

This appendix explains how the solver looks for an answer, and what each outcome means. You don't need it for everyday equations, but it helps when an answer is surprising.

How the search works

1. The solver rearranges nothing. It treats the equation as LEFT − RIGHT and looks for the value of the unknown that makes this zero.
2. It starts from the value already stored in the unknown (or 1 if there isn't one) and refines it step by step, which finds most answers in a few steps.
3. If that doesn't settle, it scans outwards from the guess, on both sides and over a wide range of sizes, for a place where LEFT − RIGHT changes sign, and closes in on it.
4. Of the answers it finds, it keeps the one nearest your guess.

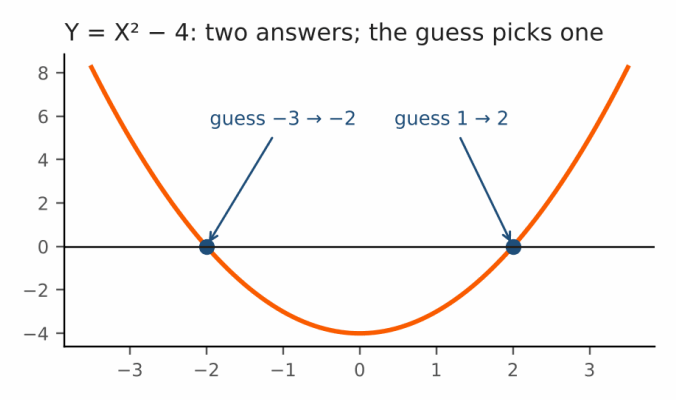
So **your guess matters** when an equation has more than one answer, and it never hurts to store a sensible starting value first.

The four outcomes

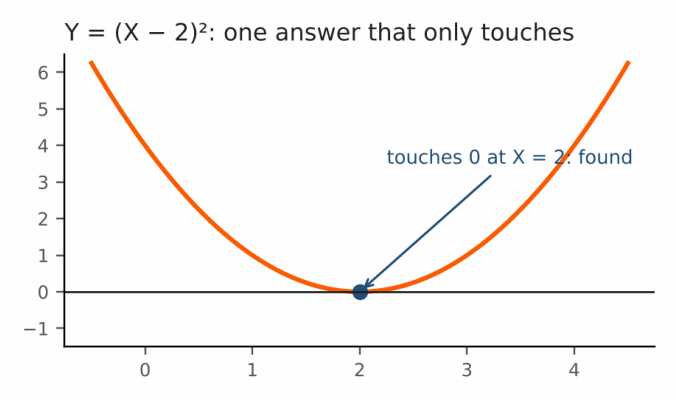
The graphs show LEFT − RIGHT against the unknown. An answer is where the curve meets the axis.

1. An answer is found

The usual case. If there is more than one answer, the guess decides which you get: here, a guess of 1 gives 2 and a guess of −3 gives −2.

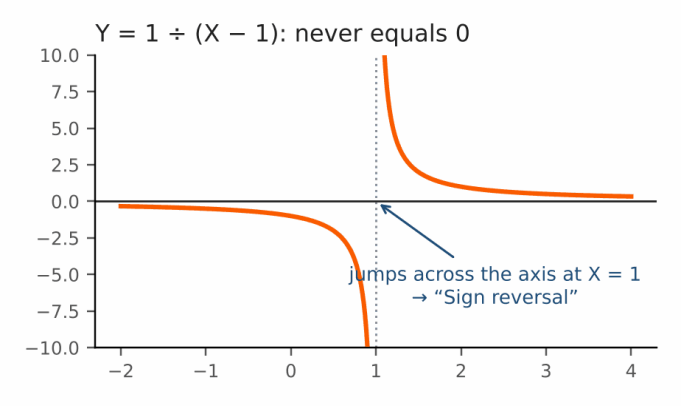


A curve that only touches the axis, without crossing it, still gives its answer:



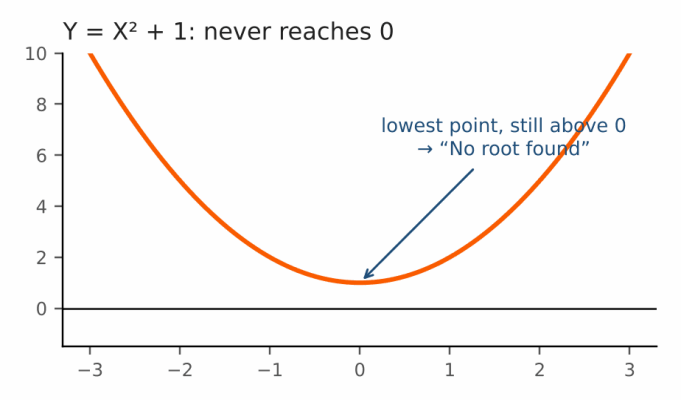
2. Sign reversal

The curve jumps from one side of the axis to the other without ever touching it. This happens at a division by zero, at an IF test, or with IP, INT and RND. The solver stores the value where the jump happens and shows **Sign reversal**. Check whether the equation really has an answer there; with IF equations it usually means the answer you want lies in the other branch.



3. No root found

The curve never reaches the axis near any value tried, for example $X^2 + 1 = 0$ has no real answer. The solver stores the value where the two sides came closest and shows **No root found**. Check the other values and the equation; if you expected an answer, try a guess nearer to it.



4. A value the equation can’t use

If a function in the equation can’t take a value the search tries (√ of a negative number, LN of 0), that point is simply skipped. If every point is like that, you’ll see **No root found**: check that the other values are sensible.

Notes about guesses

- The stored value of the unknown is the guess: type a value, tap the key to store it, then tap the key again to solve.
- For equations with several answers (quadratics, angles, periodic functions), store a guess near the one you want.
- After Sign reversal or No root found, the stored value is where the search ended, not an answer.
- If you’re not sure where the answers are, solve a few times from different guesses and compare.

Appendix E — Common questions

My trig answers are wrong.

Check the angle mode on the status line: DEG or RAD. Switch with DEG/RAD (orange 4) or in MODES.

How do I see all 12 digits of a result?

Press SHOW (orange E) for the full precision, or choose ALL (orange ÷) to display all digits all the time.

The decimal point has become a comma.

Press ./, (orange 0), or RDX in DISP, to switch between 1,234.56 and 1.234,56.

How do I switch between ALG and RPN?

Press RPN↔ALG (orange ENTER). The status line shows which mode is on.

How do I get back to the main menu?

Press MAIN (orange EXIT). EXIT alone goes back one menu.

How do I clear the values in a menu?

Open the menu and press CLR DATA (orange CLR). It clears only that menu's values.

I pressed the wrong key. Can I go back?

UNDO (orange ←) restores the state before the last action.

TVM gives a negative or unexpected answer.

Money you pay out is negative and money you receive is positive. Check the signs of PV, PMT and FV, P/YR, and BEG/END.

The solver gave a different answer from the one I wanted.

Some equations have more than one answer. Store a guess near the answer you want, then solve again (Appendix D).

The solver asks for a value I don't think it needs.

Every name used in the branch being calculated needs a value. With IF, only the chosen branch is checked.

Which version am I running?

The start screen shows it, and so does ABOUT in MODES. Please quote it if you report a problem.

How do I update?

When a newer version is out the app says so; tap UPDATE in MODES to open the download page. Turn the check on or off with UPDCHK.

Can the calculator stay on top of other windows?

On Windows, switch on ONTOP in MODES. In the web app on a computer, use POPOUT in MODES (Chrome and Edge). On iPad with iPadOS 26 or later, open it in a window.

Are my values kept when I close the app?

Yes. Equations, menu values, statistics and settings are saved on your device. Uninstalling the app, or clearing its data, erases them.

Appendix F — Specifications

Item	Detail
Precision	12 significant digits
Keyboard	35 keys, each with an orange second function
Display	400 × 300 dot-matrix, touch soft keys
Entry modes	Algebraic and RPN (4-level stack: X, Y, Z, T)
Storage	10 registers (0–9); menu values, equations, statistics and settings are kept between sessions
Platforms	Android (APK), Windows (installer), iPhone, iPad and any browser (web app)
Version	Guide 0.7.4 · app 0.7.4 beta and later bug-fix updates