

The HP 12C Q-Card

The Display

Decimal Places Press \boxed{f} , then specify the # of decimal places: $\boxed{f}\boxed{2}$, $\boxed{f}\boxed{0}$, $\boxed{f}\boxed{9}$, etc. (And $\boxed{f}\boxed{\cdot}$ shows scientific notation.) Keep in mind that this rounds the *displayed version* of the value; $\boxed{f}\boxed{RND}$ rounds the actual value to match the display.

Decimal Point The HP 12C can use either a comma or period as a decimal point. (The comma is conventional in Europe.) To change the current setting, turn off the calculator, press and hold down the $\boxed{\cdot}$ key, then turn on the calculator.

Clearing \boxed{CLX} clears only the X-register. $\boxed{f}\boxed{CLEAR}\boxed{REG}$ clears all data registers. (See page 2 for more about registers.)

Arithmetic and Math

Arithmetic To calculate $2 + 5$, press $\boxed{2}\boxed{ENTER}\boxed{5}\boxed{+}$.
To divide 40 by 200, press $\boxed{4}\boxed{0}\boxed{ENTER}\boxed{2}\boxed{0}\boxed{0}\boxed{\div}$.

Scientific Notation To find $2,000,000 \times 2,000,000$, press $\boxed{2}\boxed{EEX}\boxed{6}\boxed{ENTER}\boxed{2}\boxed{EEX}\boxed{6}\boxed{\times}$. The result, 4000000000000 , is “four times ten to the 12th power” (4 trillion).

Powers and Roots To calculate -19^7 , press $\boxed{1}\boxed{9}\boxed{CHS}\boxed{ENTER}\boxed{7}\boxed{Y^X}$. To calculate $\sqrt{144}$, press $\boxed{1}\boxed{4}\boxed{4}\boxed{\sqrt{x}}$. To find $\sqrt[6]{729}$, press $\boxed{7}\boxed{2}\boxed{9}\boxed{ENTER}\boxed{6}\boxed{1/x}\boxed{Y^X}$.

Logarithms To calculate $\text{LN}(149.5)$, press $\boxed{1}\boxed{4}\boxed{9}\boxed{\cdot}\boxed{5}\boxed{\ln}$. To calculate $e^{1.5}$, press $\boxed{1}\boxed{\cdot}\boxed{5}\boxed{e^x}$.

Factorials To calculate $10!$, press $\boxed{1}\boxed{0}\boxed{n!}$.

Percentages

Finding Percentages To take 75% of 16, press $16 \text{ ENTER } 75 \%$ (or $16 \text{ ENTER } \cdot 75 \text{ X}$).

To find what percent 12 represents out of a *total* of 16, press $16 \text{ ENTER } 12 \%$ (or $12 \text{ ENTER } 16 \div 100 \text{ X}$).

To find the % *change* from 12 to 16, press $12 \text{ ENTER } 16 \Delta\%$ (or $16 \text{ ENTER } 12 \div 1 - 100 \text{ X}$).

Adding Percentages To add 25% to 16, press $16 \text{ ENTER } 25 \%$ $+$. To subtract 25% from 20, press $20 \text{ ENTER } 25 \%$ $-$.

Registers, Storage and Clearing

The Stack Registers The HP 12C display shows the *X*-register, the bottom register of a stack of 4. The other three are (proceeding up from the *X*-register) the *Y*-, *Z*- and *T*- register. This arrangement allows arithmetic without $()$ or $=$; preceding/intermediate results just “float” up above in the stack until you need them, at which time you can rearrange them, if necessary, via $\text{X}\leftrightarrow\text{Y}$ and $\text{R}\downarrow$. To clear the stack, press $0 \text{ ENTER } \text{ENTER } \text{ENTER}$ (or clear all registers via f CLEAR REG).

The Numbered Storage Registers Besides the stack registers, you also have 20 other storage registers, denoted by the numbers 0-9 and .0-.9. Use STO and RCL to access these registers. Thus, to store the result of $789 \div 5$ into register .4, you’d press $789 \text{ ENTER } 5 \div \text{STO} \cdot 4$. You’d then recall this value later when needed, via $\text{RCL} \cdot 4$. To clear any numbered storage register, just store a value of \emptyset there. (To clear all numbered registers, use f CLEAR REG .)

The Financial Registers There are five other storage registers in the HP 12C, used for financial (TVM) calculations—see pages 4-5. STO and RCL work with those registers, too. For example, to recall (i.e. to copy to the *X*-register) the value in the PV register, you’d press RCL PV . To clear the financial registers, press f CLEAR FIN .

Calendar Functions

Date Formatting A date on the HP 12C is represented as a single real number in one of two formats: D.MY or M.DY. For example, the date February 6, 2001, would be expressed as **206200 !** in M.DY format; or **602200 !** in D.MY format. To set the date format, press either **9 DMY** (and **D.MY** will appear in the display) or **9 M.DY** (and **D.MY** will disappear).

Calculating Days and Dates To find the date 91 days after December 21, 1959, press **1 2 . 2 1 1 9 5 9 * ENTER 9 1 9 DATE**. (The resulting date* has an extra digit on the right, giving the day of the week: 1-7 = Monday-Sunday.) To find the number of days between two dates, type the first date, press **ENTER**, type the second date and press **9 ΔDYS**.

Bonds and Depreciation

Bond Price Type the desired yield (as a percent); press **i**. Type the annual coupon rate (as a percent); press **PMT**. Type the settlement (purchase) date;* press **ENTER**. Type the maturity (redemption) date;* press **f PRICE**. (Then **X<=>Y** will show the corresponding accrued interest.)

Bond Yield-to-Maturity Type the price (as % of par); press **PV**. Type the annual coupon rate (as a percent); press **PMT**. Type the settlement (purchase) date;* press **ENTER**. Type the maturity (redemption) date;* press **f YTM**.

Depreciation Type the asset's original cost; press **PV**. Type the asset's salvage value; press **FV**. Type the asset's useful life (in years); press **n**. For a DB calculation, type the factor (as a percent); press **i**. Type the year # being depreciated; then press **f SL**, **f SOYD** or **f DB** to calculate the depreciation for that year. **X<=>Y** will then show the remaining depreciable value.

*Always use the current date format (either M.DY or D.MY) to key in and to interpret date values.

Time Value of Money (TVM) Calculations

To solve for payment (PMT), Future Value (FV) or Present Value (PV) in a uniform cash flow scenario:

Calculating PMT

- Press **9** **BEG** or **9** **END**, as needed, to set the annuity mode.
- Type the # of periods in the loan term and press **n**.*
- Type the periodic interest rate and press **i**.*
- Type the amount financed** and press **PV**.
- Type the final remaining balance** and press **FV**.
- Calculate the payment amount (PMT) by pressing **PMT**.

Calculating FV

- Press **9** **BEG** or **9** **END**, as needed, to set the annuity mode.
- Type the # of periods in the loan term and press **n**.*
- Type the periodic interest rate and press **i**.*
- Type the amount financed** and press **PV**.
- Type the periodic payment** and press **PMT**.
- Calculate the Future Value (FV) by pressing **FV**.

Calculating PV

- Press **9** **BEG** or **9** **END**, as needed, to set the annuity mode.
- Type the # of periods in the loan term and press **n**.*
- Type the periodic interest rate and press **i**.*
- Type the periodic payment** and press **PMT**.
- Type the final remaining balance** and press **FV**.
- Calculate the Present Value (PV) by pressing **PV**.

*The time period used by n, i and PMT must always agree. For example, if a PMT occurs monthly, then the loan term in years must be *multiplied* by 12 before storing into n; and the loan interest rate in percent must be *divided* by 12 before storing into i. For this common case (monthly periods), there are keystroke shortcuts, **9** **12x** and **9** **12÷**, which accomplish the multiplication or division and then the storage, all in one step.

The signs of the PV, PMT and FV values reflect the direction money is flowing: either *to* you or *from* you. So in any financial transaction, pick one perspective—either the lender's or the borrower's—and stick with it. For example, if PV is a positive number, (i.e. as a borrower, you receive the loan amount), then FV and PMT are usually negative (the amounts you must repay). Use the **CHS key to change the sign of any number.

TVM Calculations (*cont.*)

To solve for periodic interest rate (i) or number of periods (n) in a uniform cash flow scenario, using the TVM formula:

Calculating i

- Press **9** **BEG** or **9** **END**, as needed, to set the annuity mode.
- Type the # of periods in the loan term and press **n**.*
- Type the amount financed** and press **PV**.
- Type the periodic payment** and press **PMT**.
- Type the final remaining balance** and press **FV**.
- Find the periodic interest rate by pressing **i**.

Calculating n

- Press **9** **BEG** or **9** **END**, as needed, to set the annuity mode.
- Type the periodic interest rate and press **i**.*
- Type the amount financed** and press **PV**.
- Type the periodic payment** and press **PMT**.
- Type the final remaining balance** and press **FV**.
- Find the # of payment periods by pressing **n**.

(*Note:* The result is rounded up to the next whole period.)

*/** (See the notes at the bottom of page 4.)

Amortization (AMORT)

To amortize a loan, first do a normal TVM calculation, solving for PMT. Next, press **0** **n**, to set the payment counter to the beginning of the loan term. Then key in the number of payments to be amortized. Then:

- Press **f** **AMORT** to see the interest paid.
- Press **X \leftrightarrow Y** to see the principal paid.
- Press **RCL** **PV** to see the remaining balance.
- Press **RCL** **n** to see the total number of payments amortized.

Repeat for the next set of payments to be amortized: Key in the number of payments in the next set. Then press **f** **AMORT** to see the interest paid, **X \leftrightarrow Y** to see the principal, etc.

Statistics and Data Analysis

Storing Statistical Data To begin, press $\text{f} \text{CL}\Sigma$ to clear the numbered registers 1-6, which are also used for statistics. Then key in each data point and press $\Sigma+$. (For two-variable data, you key in the y value first, press ENTER , then key in the x value, then press $\Sigma+$.) The display will show the number of data points entered so far.

Editing/Correcting Statistical Data If you enter a data point in error or wish to delete a point for any other reason, just enter it again (using ENTER to separate y and x values for two-variable data), but then use $\Sigma-$ rather than $\Sigma+$. This will delete its contribution to the statistical accumulation. (The display reflects this, decrementing the point count).

Statistical Sums and Calculations Once you have entered a correct set of data, here are the calculations you can do:

$\text{RCL} \ 1$ shows the total number of points accumulated.

$\text{RCL} \ 2$ shows the sum of all the x data.

$\text{RCL} \ 3$ shows the sum of the squares of all the x data.

$\text{RCL} \ 4$ shows the sum of all the y data.

$\text{RCL} \ 5$ shows the sum of the squares of all the y data.

$\text{RCL} \ 6$ shows the sum of the products of each x and y .

$\text{g} \ \bar{x}$ shows the simple mean (average) of the x data;

$\text{X}\bar{Y}$ then shows the simple mean of the y data.

$\text{g} \ \bar{x}_w$ shows the weighted mean of the x data.

(The y data are used as the respective weight factors.)

$\text{g} \ S$ shows the *sample* standard deviation of the x data;*

$\text{X}\bar{Y}$ then shows the *sample* stand. dev. of the y data.

Linear Regression: Key in an x value, then use $\text{g} \ \hat{y}_r$ to get a corresponding y value estimate; $\text{X}\bar{Y}$ gives the correlation coefficient, r . Or, key in a y value, then use $\text{g} \ \hat{x}_r$ to get a corresponding x value estimate; again, $\text{X}\bar{Y}$ gives r . So, to find b and m in the linear equation $y = mx + b$, press $0 \ \text{g} \ \hat{y}_r (= b)$, then $\text{STO} \ 0 \ 1 \ \text{g} \ \hat{y}_r \ \text{RCL} \ 0 \ - (= m)$.

*To get the *population* standard deviation(s) of the data, accumulate the mean(s) of the data as an extra point (via $\Sigma+$), then use $\text{g} \ S$ as above.

Cash Flow Lists

Creating a Cash Flow List A cash flow list is a description of the amounts and signs (income is +; outlay is -) of the cash flows in an investment scenario. The flow amounts may differ, but they must be periodic in occurrence. The list consists of an initial cash flow and then up to 20 *groups* of identical consecutive cash flows (up to 99 flows per group).

To start a new list, key in the initial cash flow amount

("Group 0"), including its sign (\pm), and press **9** **CFo**.

Key in the flow amount and sign of Group 1; press **9** **CFj**.

Key in the number of consecutive occurrences of the cash flow amount in Group 1; press **9** **Nj**.

Key in the flow amount and sign of Group 2; press **9** **CFj**.

Key in the number of consecutive occurrences of the cash flow amount in Group 2; press **9** **Nj**.

...And so on—for all such groups (up to 20) in the scenario.

NPV and IRR

Calculating NPV After you have completely entered a cash flow list (see above), to find the Net Present Value (*NPV*), key in the periodic discount rate and press **i**.^{*} Then press **f** **NPV**.^{*}

Calculating IRR After you have completely entered the desired cash flow list (see above), to find an Internal Rate of Return (*IRR*), press **f** **IRR**.^{*} (Keep in mind that *IRR* is an iterative calculation that sometimes has either no solution or multiple solutions, including possible negative values. If you encounter such a situation, you'll usually get an error message. See page 8 here for more about such errors.)

^{*}The time period used by the discount rate (stored in *i*), the cash flows (stored via **9** **CFo**, **9** **CFj** and **9** **Nj**), *NPV* and *IRR* must all agree. Thus, for example, if the cash flows are monthly, the annual discount rate (for *NPV*) must be *divided* by 12 before it's stored into *i*; and any *IRR* result for those cash flows must be *multiplied* by 12 to get an annualized rate.

Errors and Troubleshooting

Common Errors

Error 5 Check the signs of PV, PMT and FV—at least one of them must be negative! And if solving for n , be sure that PMT is enough to cover the interest accruing each period.

Error 3: The IRR calculation needs your help: Key in a guess as to the periodic IRR and press **RCL** **9** **PSE**. The machine will try to find the nearest IRR solution. There are often other solutions, too, so be sure to try other guesses.

Error 1: There is no solution to the IRR calculation you are attempting. (Check the signs of your cash flows!)

Verifying Proper Operation With the power off, press and hold down the **⊗** key, then power **ON**, then release **⊗**. The display should show **running** for some seconds, then halt with all items lit. (This will *not* reset memory. To do that, use the same press-and-hold procedure as above, but with **⊖** rather than **⊗**. Then press any key to clear the **Pr Error**.)

Contents

Arithmetic, Math and the Display	1
Percentages	2
Registers, Storage and Clearing	2
Calendar Functions, Bonds and Depreciation	3
TVM Calculations: PMT, FV and PV	4
TVM Calculations: i , n and AMORT	5
Statistics and Data Analysis	6
Cash Flow Lists, NPV and IRR	7
Errors and Troubleshooting	8

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