HEWLETT-PACKARD

HP-80

Quick Reference Guide
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Basic Instructions

Clearing
To clear display only, press \textcolor{red}{\textbf{CLx}}.
To clear everything (except constant storage), press \textcolor{red}{\textbf{CLEAR}}.

Constant Storage
To store a constant, press \textcolor{red}{\textbf{STO}}.
To recall a constant, press \textcolor{red}{\textbf{RCL}}.

\begin{itemize}
\item Add-on to annual percentage rate conversion
\item Effective yield of an annuity (loan repayment and sinking fund)
\item Accrued interest and discounted note problems
\item Trend lines (least squares linear regression)
\item Sum-of-the-digits calculations
\item Bond calculations (price and yield)
\item Accumulated interest paid on a loan
\item Discounted cash flow analysis
\end{itemize}

NOTE: Certain important pre-programmed calculations overwrite previous contents of the constant storage. These are:

Except where noted above, a constant remains in the machine until overwritten by another constant or machine is turned off.

Rounding
To round-off (the display only), press \textcolor{red}{\textbf{\[} \textcolor{red}{\text{any desired numeral key between 0 and 6.}}
A numeral key greater than 6 will put display in so-called "scientific notation." Normal turn-on mode is automatic rounding to two decimal places.

**NOTE:** Rounding affects the display only. The full internal accuracy of the machine is maintained.

**Arithmetic Operations**

To perform simple arithmetic operations between two numbers:

1. **Key** in the first number, **press** \( \text{SAVE} \uparrow \)
2. **Key** in the second number, **press** desired operation, \( + \), \( - \), \( \times \) or \( \div \)

To perform chain calculations, only the first number has to be loaded through a \( \text{SAVE} \uparrow \) operation; all subsequent numbers need only be keyed in and the desired function key pressed after each one.

Automatic computation between a displayed number and a stored constant is achieved by pressing \( \text{RCL} \) and the desired function.

**Changing Sign**

To change the sign of a displayed number, **press** \( \text{CHS} \).

To enter a negative number, key in number, **press** \( \text{CHS} \).
Raising a Number to a Power

1. Key in positive base number (to be raised to a power), press $$\text{SAVE}$$
2. Key in power (exponent), press $$\text{yx}$$

Square Root of a Positive Number

Key in number, press $$\sqrt{x}$$.

Percentage Operations

To obtain the percentage amount of a number:

1. Key in the base number, press $$\text{SAVE}$$
2. Key in the percent (as a %), press $$\%$$

To add or subtract the percentage amount to the base number simply press $$+$$ or $$-$$, respectively.

To obtain the percent difference between a base and another number:

1. Key in the base (or reference) number, press $$\text{SAVE}$$
2. Key in the second number, press $$\%$$
   (answer is displayed in percent)

Calendar Functions

Date entry sequence is: month, decimal point, two-numeral day and four-numeral year. Example: May 8, 1972 = 5.081972. Calendar range is from January 1, 1900 to December 31, 2099.
To obtain **difference between two dates:**

1. **Key** in first date, **press** \( \text{SAVE} \)
2. **Key** in second date, **press** \( \text{DAY} \)

To obtain a **date** from a base date:

1. Set rounding to six decimal places, **press** \( \text{DATE} \, 6 \)
2. **Key** in the base date, **press** \( \text{SAVE} \)
3. **Key** in the number of days (*can be positive or negative*), **press** \( \text{DATE} \, \text{DAY} \)

To obtain the **day of the week** of a date:

1. **Key** in today’s date, **press** \( \text{SAVE} \)
2. **Key** in desired date, **press** \( \text{DAY} \, \text{SAVE} \)
3. **Key** in \( 7 \), **press** \( \div \)
4. **Key** in that portion of the display **left** of the decimal point, **press** \( - \)
5. **Key** in \( 7 \) again, **press** \( \times \)

If the date in question is **beyond** today, its day of the week will be today’s day **plus** the number shown in the display.

If the date in question is **before** today, its day of the week will be today’s day **minus** the number shown in the display.

**Error Indication**

An improper or illegal operation (*such as dividing by zero*) will result in a steady blinking display.

**Battery Condition** (*low charge indication*)

All decimal points lighting in the display indicates low battery condition. Plug into recharger.
Compound Interest

NOTE: To use the compound interest keys (top row) simply remember to enter your known values in left-to-right sequence and then press the key which corresponds to the unknown value.

Future Value
1. Key in number of time periods, press $n$
2. Key in interest rate per time period (in %), press $i$
3. Key in present value (principal), press $PV$
4. To obtain future value, press $FV$

NOTE: STO and arithmetic operations must be performed prior to entering any value. A mistaken last entry may be corrected by pressing CLX, then keying in the correct value and pressing the appropriate key.

Present Value
1. Key in number of time periods, press $n$
2. Key in interest rate per time period (in %), press $i$
3. Key in future value amount, press $FV$
4. To obtain present value, press $PV$

Rate of Return (growth rate)
1. Key in number of periods, press $n$
2. Key in present (beginning) value, press $PV$
3 Key in future (ending) value, press \textbf{FV}.
4 To obtain effective rate per period (in \%), press \textbf{i}.

**Number of Time Periods**
(for a compounded amount)

1 Key in interest rate per period (in \%), press \textbf{i}.
2 Key in present (beginning) value, press \textbf{PV}.
3 Key in future (ending) value, press \textbf{FV}.
4 To obtain number of time periods, press \textbf{n}.

**Nominal Rate Converted to Effective Annual Rate**

1 Key in number of time periods per year, press \textbf{STO} \textbf{n}.
2 Key in nominal rate (as a \%), press \textbf{RCL} ÷ \textbf{i}.
3 Key in \(100\), press \textbf{STO} \textbf{PV} \textbf{FV}.
4 To obtain effective annual rate (in \%), press \textbf{RCL} −.

**Effective Annual Rate Converted to Nominal Rate**

1 Key in number of time periods per year, press \textbf{STO} \textbf{n}.
2 Key in \(100\), press \textbf{SAVE} \textbf{PV}.
3 Key in effective annual rate (in \%), press \textbf{+} \textbf{FV} \textbf{i}.
4 To obtain nominal rate (in \%), press \textbf{RCL} \times.
Sinking Fund

Future Value of an Annuity (sinking fund)
1. Key in number of time periods, press \( n \)
2. Key in interest rate per period \( (as \ a \ %) \), press \( i \)
3. Key in payment (installment) amount, press \( PMT \)
4. To obtain future value, press \( FV \)

Sinking Fund Payment Amount
1. Key in number of time periods, press \( n \)
2. Key in interest rate per period \( (as \ a \ %) \), press \( i \)
3. Key in future value, press \( FV \)
4. To obtain payment amount, press \( PMT \)

Effective Yield of a Sinking Fund
1. Key in number of time periods, press \( n \)
2. Key in payment (installment) amount, press \( PMT \)
3. Key in future value, press \( FV \)
4. To obtain interest rate per period \( (as \ a \ %) \), press \( i \)

Number of Periods Required for a Sinking Fund
1. Key in interest rate per period \( (as \ a \ %) \), press \( i \)
2. Key in payment (installment) amount, press \( PMT \)
3. Key in future value, press \( FV \)
4. To obtain number of time periods, press \( n \)
Loan Repayment

Accrued Interest Payment Due (Simple)
1. Key in number of days, press \( n \)
2. Key in annual interest rate (in \( \% \)), press \( i \)
3. Key in the principal (present value), press \( PV \)
4. To obtain interest payment due on a 360-day basis, press \( \text{INTR} \) \( \text{PMT} \)
5. To obtain interest payment due on a 365-day basis, press \( \times \) \( 365 \)

Discounted Note and Effective Annual Yield
1. Key in number of days, press \( n \)
2. Key in annual interest (discount) rate (in \( \% \)), press \( i \)
3. Key in the face (future) value of note, press \( FV \)
4. To obtain the discount amount (i.e., interest portion) of the note on a 360-day basis, press \( \text{INTR} \) \( \text{PMT} \)
5. To obtain the effective annual yield on a 360-day basis, press \( R\# \)
6. To obtain the discount amount of the note on a 365-day basis, press \( R\# \)
7. To obtain the effective annual yield on a 365-day basis, press \( R\# \)

True Equivalent Annual Yield
1. Key in number of days, press \( \text{SAVE} \)
2. Key in 365, press \( \div \) \( n \)
9

3. Key in the principal (present value) of note, press \[ PV \]
4. Key in the face value (future value) of note, press \[ FV \]
3. To obtain true equivalent annual yield, press \[ i \]

**Present Value of an Annuity**
(Principal Amount of a Loan)
1. Key in the number of time periods (months, years, etc.), press \[ n \]
2. Key in interest rate per period (in %), press \[ i \]
3. Key in the amount of the payment per period, press \[ PMT \]
4. To obtain present value (principal), press \[ PV \]

**Loan Repayment Amount**
1. Key in number of time periods, press \[ n \]
2. Key in interest rate per period (in %), press \[ i \]
3. Key in present value (principal), press \[ PV \]
4. To obtain payment amount per period, press \[ PMT \]

**True Interest Rate of a Loan**
1. Key in number of time periods, press \[ n \]
2. Key in payment amount per period, press \[ PMT \]
3. Key in present value (principal), press \[ PV \]
4. To obtain interest rate per period (in %), press \[ i \]
NOTE: To obtain an annual rate, simply key in the number of time periods per year and press $\times$.

Number of Time Periods Required for a Loan

1. Key in the interest rate per time period, press $i$
2. Key in the payment amount per time period, press $\text{PMT}$
3. Key in the present value (principal), press $\text{PV}$
4. To obtain the number of time periods, press $n$

Accumulated Interest Paid on a Loan
(between two points in time)

1. Key in the payment number (less 1) corresponding to the first point of the time span in question, press $\text{sto}$
2. Key in the payment number corresponding to the last point of the time span in question, press $n$
3. Key in the total number of payments of the loan, press $n$
4. Key in the interest rate per payment (or period), press $i$
5. Key in the payment amount per period, press $\text{PMT}$
6. To obtain the accumulated interest, press $\Sigma+$
7. To obtain the remaining balance (principal), press $\text{x} \div \text{y}$
"Add-on" Interest Converted to Annual Percentage Rate

1. Key in the number of months of the loan, press \( n \)
2. Key in the "add-on" rate (per annum), press \( i \)
3. To obtain annual percentage rate, press \( i \)
4. To obtain the monthly payment amount, press \( x \) \( z \) \( y \)
5. Then key in the principal amount to be loaned, press \( x \)

**Interest Rebate** (Rule of 78's)

1. Key in last payment number, press \( n \)
2. Key in total number of payments for the loan, press \( n \)
3. Key in the total finance charge, press \( PV \)
4. To obtain the unearned interest (rebate), press \( \begin{array}{c} \text{SOD} \\ \text{x} \end{array} \) \( x \) \( z \) \( y \)
To obtain the remaining principal due:
5. Key in the amount of each payment, press \( \begin{array}{c} \text{SAVE} \\ \uparrow \end{array} \)
6. Key in the number of payments remaining, press \( x \) \( x \) \( z \) \( y \) \( \leftarrow \)

**Depreciation Amortization**

**Sum-of-the-years' Digits Depreciation**

1. Key in given year number (or beginning year number), press \( n \)
② Key in life of asset (number of years), press \[n\]
③ Key in depreciable amount (purchase less salvage value), press \[PV\]
④ To obtain given year’s depreciation, press \[SOD\]
⑤ To obtain subsequent year’s depreciation, press \[SOD\]
⑥ Continue step ⑤ as desired
⑦ To obtain the depreciation for a particular year not in sequence, simply key in the year number desired and press \[n\] \[SOD\]
⑧ Continue step ⑦ as desired.

**NOTE:** To obtain the remaining depreciable value after each year’s depreciation press \[x\]<sup>\[\times\]\(2\]\[\times\]\[\times\] .

**Straight Line Depreciation**
① Key in depreciable amount (purchase less salvage value), press \[SAVE\] \[SAVE\]
② To obtain each year’s depreciation, key in life of asset (number of years), press \[\div\]

**NOTE:** To obtain the remaining depreciable value after each year’s depreciation, first press \[STO\] \[-\] for depreciable value after first year then \[RCL\] \[-\] for each subsequent year.
Variable Rate, Declining-Balance Depreciation

1 Key in 1,000, press SAVE
2 Key in life of asset (number of years), press \( \div \)
3 Key in declining factor or rate (i.e., 1.5, 2, etc), press \( \times \) STO
4 Key in original cost
5 To obtain year’s depreciation, press RCL \( \% \)
6 To obtain remaining book value, press –
7 Continue steps 5 and 6 for subsequent years

Diminishing Balance Depreciation

1 Key in life of asset (number of years), press \( n \)
2 Key in beginning value of asset, press PV
3 Key in ending (salvage) value of asset, press \( FV \)

\textbf{NOTE:} Salvage value must be greater than zero.

4 To obtain and store rate of depreciation, press \( i \) CHS STO
5 Key in beginning value of asset
6 To obtain year’s depreciation, press RCL \( \% \)
7 To obtain remaining book value, press –
8 Continue steps 6 and 7 for subsequent years
Bonds

Price of a Bond
1. Key in settlement date, press **SAVE**
2. Key in maturity date, press **DAY**
3. Key in yield-to-maturity (as a %), press **i**
4. Key in annual coupon rate (as a %), press **PMT**
5. To obtain price (percentage), press **BOND PV**

Yield-to-Maturity of a Bond
1. Key in settlement date, press **SAVE**
2. Key in maturity date, press **DAY**
3. Key in annual coupon rate (as a %), press **PMT**
4. Key in the bond price (percentage), press **PV YTM**
5. To obtain bond yield, press **i**

**NOTE:** The mathematical approach used for bond problems as calculated above is more precise than the traditional one established in the 1800's. The reason is that where the intra-coupon period is applicable to the problem, the **actual** number of days per month is used instead of an arbitrary 30 days for all months. The traditional method is quite close to the actual method, and generally, the two differ only beyond the second decimal place. In deference to long standing custom, however, the following option is provided for calculating bond problems in accordance with traditional trade custom.
Conventional Bond Calculations

a) Determine the number of days, months and years to maturity (*in accordance with trade custom*)

b) **Key in number of days, press** SAVE

c) **Key in 3 0 (days/month), press** ÷

d) **Key in number of months, press** +

e) **Key in 1 2 (months/year), press** ÷

f) **Key in number of years, press** +

g) **Key in 3 6 5 (days/year), press** × n

Continue with step 3 of either price or yield calculation above.

**NOTE:** For maturities of less than 6 months, load the number of days to maturity directly into n.

---

**Investment Analysis**

**Discounted Rate of Return**
(for even cash flows)

1. **Key in number of time periods, press** n
2. **Key in amount of cash flow per period, press** PMT
3. **Key in original investment, press** PV
4. To obtain discounted rate of return (*in %*) per period, press i

**Discounted Cash Flow Analysis**
(for uneven cash flows)

1. Clear the entire machine by pressing CLX
② Key in discount rate \((\text{in } \%)\) per period, press \(i\)  
③ Key in original investment, press \(\text{CHS PV}\)  
④ Key in cash flow per period, press \(\text{PV } \Sigma +\)  
⑤ Continue step ④ for subsequent flows.  

**NOTE:** Investment is profitable (to the extent of the discount rate) if the result is positive. Furthermore, the user can determine the “break-even” period by noting the period in which step ④ first yielded a positive result.

### Statistics

**Mean and Standard Deviation**

① Clear the entire machine by pressing \(\text{CLEAR CLx}\)  
② Key in data item, press \(\Sigma +\)  
③ Continue step ② until all data are entered.  
④ To obtain mean (arithmetic average), press \(\bar{x}\)  

**NOTE:** To obtain the standard deviation after each mean calculation, press \(xy\). The \(xy\) key must be pressed again before resuming.

⑤ To return to the summation mode, press \(\text{SUM} \bar{x}\)  
⑥ Continue with step ② if desired

**NOTE:** To correct a data item, key in its value and press \(\Sigma +\).
**Trend Lines** (Least Squares Linear Regression)

1. Clear the entire machine by **pressing** [CLx](#).
2. Sequentially **key in** data item, press [TL](#).

**NOTE:** Each time [TL](#) is pressed, the sequence number for that item is displayed.

3. Continue step 2 until all data are entered.
4. To terminate the data entry sequence, press [TL](#).
5. To obtain a specific value on the trend line **key in** the appropriate time period number, press [N](#) [TL](#).
6. Repeat step 5 as often as desired.

**NOTE:** The user may also "step-along" the trend line by simply pressing [TL](#) as many times as desired. Further, the current time period number may be obtained by pressing [Xy](#). The [Xy](#) key must be pressed again before resuming.

7. To obtain the amount of change of the trend line per period (commonly called "slope"), press [R↑](#) [R↓](#).
8. To resume operation, press [R↑](#) [R↓](#).
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