Business Analyst™ Quick Reference Guide
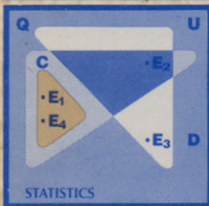
PV PMT = ?   PMT = ? PMT = ?

$$PMT = PV / \left[\frac{1 - (1 + \%i/100)}{\%i/100} \right]$$

$$PMT = PV / (PVIFA_{\%i,N})$$

FINANCE

ACCOUNTING

STATISTICS

BA-35

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Always refer to the *Business Analyst Guidebook* for complete details and examples of calculator operation.

BRIEF KEY TOUR

Basic Operations

[ON/C] —Turns on the calculator. Pressing [ON/C] once immediately after pressing a number key clears the value shown in the display. Pressing [ON/C] twice, or once after an operation or function key (including [=]), clears the display and any pending operation. Pressing [ON/C] when "Error" is shown clears the display and any pending arithmetic calculation. For more details on error conditions, see Appendix C of the *Business Analyst Guidebook*.

[2nd] [Decimal] —Changes the displayed decimal places from fixed two to floating decimal and vice versa. When the decimal point is fixed to two places, the "DEC 2" indicator appears in the display.

[%] —Calculates percentage when you press number [X] percentage [%][=], add-on percentage when you press number [+] add-on percentage [%][=], and discount percentage when you press number [−] discount percentage [%][=].

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`2nd` `Δ%`—Calculates the percentage of change between the first and second numbers with respect to the second number when entered as follows.

$$X_1 \; \text{2nd} \; \text{Δ%} \; X_2 \; = $$

The value found equals

$$\frac{X_1 - X_2}{X_2} \times 100$$

`√x`—Calculates the square root of the displayed number. (The displayed number cannot be negative.)

`2nd` `x²`—Calculates the square of the displayed number.

`1/x`—Computes the reciprocal of the displayed number. (The displayed number cannot be zero.)

`2nd` `ln x`—Calculates the natural logarithm (base e) of the displayed number, x. (x cannot be negative or zero.)

`2nd` `eˣ`—Calculates the natural antilogarithm (raises e to the xth power) of the displayed number.

`yˣ`—Raises any positive number to any power. To use this key:

Enter the number to be raised to a power, y.

Press `yˣ`.

Enter the power, x.

Press `=`.

`2nd` `x!`—Calculates the factorial of any positive integer less than 70.

Memory Operations

[ON/C] [STO] —Clears the display and clears memory by storing a zero. Turning off the calculator does NOT clear the memory.

[STO] —Stores the displayed value in the memory.

[RCL] —Recalls the value in memory to the display. (The value in memory is not changed.)

[SUM] —Adds the displayed value to the value in the memory.

[EXC] —Exchanges the displayed value with the value in the memory.

Statistical Mode

[2nd] [STAT] —Places the calculator in the statistical mode. The "STAT" indicator appears in the display. If the calculator is already in the statistical mode, this key sequence clears the statistical registers.

[Σ+] —Enters data points for statistical calculations. After you press [Σ+], the calculator displays the current number of data points entered.

[2nd] [Σ-] —Removes unwanted data points from the stored data sequence. After you press [Σ-], the calculator displays the current total of stored data points.

[FRQ] —Enters or removes multiple identical data points.

The procedures used to enter and remove statistical data are shown in the following chart.

SINGLE-VARIABLE DATA

1. To Enter Single Occurrence Data Points
- Enter data point.
- Press $\boxed{\Sigma+}$.
- Repeat for next data point.

2. To Remove Single Occurrence Data Points Entered
- Press $\boxed{\text{ON/C}}$.
- Enter unwanted data point.
- Press $\boxed{\text{2nd}}$ $\boxed{\Sigma-}$.

3. To Enter Multiple Occurrence Data Points
- Enter data point.
- Press $\boxed{\text{FRQ}}$.
- Enter number of repetitions.
- Press $\boxed{\Sigma+}$.
- Repeat for next data points.

4. To Remove Multiple Occurrence Data Points Entered
- Press $\boxed{\text{ON/C}}$.
- Enter unwanted data point.
- Press $\boxed{\text{FRQ}}$.
- Enter number of repetitions.
- Press $\boxed{\text{2nd}}$ $\boxed{\Sigma-}$.

$\boxed{\bar{x}}$—Calculates the mean (average) of the entered data.

$\boxed{\sigma n}$—Calculates the standard deviation with n weighting (for populations) of the entered data.

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$\boxed{\sigma_{n-1}}$ —Calculates the standard deviation with n − 1 weighting (for samples) of the entered data.

$\boxed{\sigma_n}$ $\boxed{2nd}$ $\boxed{x^2}$ —Calculates the variance of a population (n weighting).

$\boxed{\sigma_{n-1}}$ $\boxed{2nd}$ $\boxed{x^2}$ —Calculates the variance of a sample (n − 1 weighting).

Financial Mode

$\boxed{2nd}$ $\boxed{FIN}$ —Places the calculator in the financial mode. The "FIN" indicator appears in the display. If the calculator already is in the financial mode, this key sequence clears the financial registers.

$\boxed{N}$ —Enters the number of payment or compounding periods.

$\boxed{\%i}$ —Enters the periodic interest rate per compounding period for compound interest calculations and per payment period for annuities.

$\boxed{PMT}$ —Enters the payment amount in ordinary annuity or annuity due calculations. The payment must be zero in compound interest calculations so the calculator performs the correct financial computation. The "ANN" indicator appears in the display when the payment value is not zero.

$\boxed{PV}$ —Enters the present value.

$\boxed{FV}$ —Enters the future value.

$\boxed{CPT}$ —Used with the unknown value key to calculate compound interest or ordinary annuities.

$\boxed{DUE}$ —Used with the unknown value key to calculate annuities due.

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To use the financial keys, be sure the calculator is in the financial mode by pressing [2nd] [FIN]. This also clears the financial registers. Three of the values N, %i, PMT, PV, or FV, must be entered with the sequence

value, financial key

before an unknown value can be computed by pressing

[CPT] financial key for unknown

for compound interest or ordinary annuity situations, or by pressing

[DUE] financial key for unknown

for annuity due situations.

[2nd] [INT]—Calculates the interest paid for the payment number entered in the display. It may be used with [CPT] for ordinary annuities or [DUE] for annuities due.

[2nd] [BAL]—Calculates the balance remaining on the loan principal after the specified payment. It may be used with [CPT] for ordinary annuities or [DUE] for annuities due.

[2nd] [APR▶]—Converts annual percentage rates to annual effective rates. Enter the number of compounding periods per year, press [2nd] [APR▶], enter the annual percentage rate, and press [=] to calculate the annual effective rate.

[2nd] [◀EFF]—Converts annual effective rates to annual percentage rates. Enter the number of compounding periods per year, press [2nd] [◀EFF], enter the annual effective rate, and press [=] to calculate the annual percentage rate.

COMMON KEYSTROKE SEQUENCES

Monthly Payment for Home Mortgage

Purpose: To find the amount of the monthly payment on a home mortgage loan when payments are made at the end of each month (ordinary annuity).

Time-Line Diagram:

PV	PMT = ?		PMT = ?	PMT = ?
↑	↓	...	↓	↓
0	1		N – 1	N
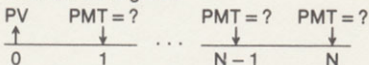
Values You Supply:
- number of years of mortgage
- annual interest rate
- mortgage amount

| Procedure	Key Sequence
1. Clear calculator and select financial mode.	`ON/C` `2nd` `FIN`
2. Enter mortgage amount.	mortgage `PV`
3. Calculate monthly interest rate and enter as %i.	rate `÷` 12 `=` `%i`
4. Calculate number of payments and enter as N.	years `×` 12 `=` `N`
5. Compute monthly payment.	`CPT` `PMT` *

*If payments occur at the beginning of each month (annuity due), press `DUE` `PMT` to compute the monthly payment.

Reference: "Solving for Payment," Chapter 15, *Business Analyst Guidebook*.

Remaining Balance for Home Mortgage

Purpose: To find the remaining balance of a regular mortgage when payments are made at the end of each month (ordinary annuity).

Time-Line Diagram:
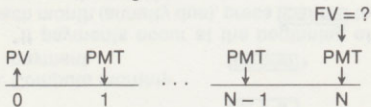
Values You Supply:
- number of payments made
- annual interest rate
- mortgage amount
- amount of payment

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Datamath Calculator Museum

Procedure	Key Sequence
1. Clear calculator and select financial mode.	`ON/C` `2nd` `FIN`
2. Calculate interest rate per payment period and enter as %i.	rate `÷` 12 `=` `%i`
3. Enter payment amount.	payment `PMT`
4. Enter mortgage amount.	mortgage `PV`
5. Enter number of payments made.	`N`
6. Compute remaining balance.* a. Using future value key.	`CPT` `FV`
b. Using balance key.	`CPT` `2nd` `BAL`

*If payments occur at the beginning of each month (annuity due), press `DUE` `FV` or `DUE` `2nd` `BAL` to compute the remaining balance.

Reference: "Solving for Remaining Balance (Balloon)," Chapter 15, *Business Analyst Guidebook*.
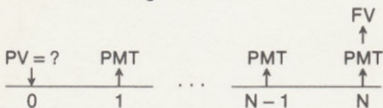
Purchasing a Commercial Bond on an Interest Date

Purpose: To calculate the purchase price of a bond sold on an interest date with more than one coupon payment remaining.

Time-Line Diagram:

Values You Supply:
- number of years until bond matures
- number of coupon periods per year
- required yield to maturity
- par (face) value of bond
- bond's coupon rate

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Datamath Calculator Museum

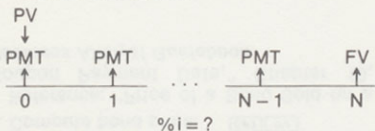| Procedure	Key Sequence
1. Clear calculator and select financial mode.	`ON/C` `2nd` `FIN`
2. Calculate and enter yield per coupon period.	yield `÷` coupon periods/year `=` `%i`
3. Calculate and enter coupon payment.	coupon rate `%` `÷` number of coupon payments per year `X` par `=` `PMT`
4. Calculate and enter number of coupon payments.	years `X` number of coupon payments per year `=` `N`
5. Enter redemption (par) value.	par `FV`
6. Compute bond price.	`CPT` `PV`

Reference: "Price of a Bond Sold on a Coupon Payment Date," Chapter 10, *Business Analyst Guidebook*.

Implicit Interest Rate of a Lease

Purpose: To find the interest rate that discounts the lease payments and residual value back to an amount equaling the asset's market value.

Time-Line Diagram:

PV
↓

PMT   PMT   . . .   PMT   FV
↑   ↑   ↑   ↑
0   1   N − 1   N

%i = ?

Values You Supply:

- market value or cost of asset
- periodic lease payment
- number of lease payments
- residual value

Procedure	Key Sequence
1. Clear calculator and select financial mode.	`ON/c` `2nd` `FIN`
2. Enter asset market value.	cost `PV`
3. Enter periodic payment.	payment `PMT`
4. Enter number of payments.	number of payments `N`
5. Enter residual value.	value `FV`
6. Compute implicit interest rate per payment period.*	`DUE` `%i`

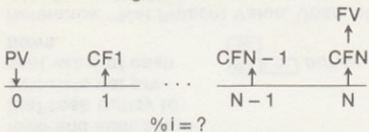*If payments occur at the end of each month (ordinary annuity), press `CPT` `%i`.

Reference: "Implicit Interest Rate," Chapter 14, *Business Analyst Guidebook*.

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Net Present Value for Variable Cash Flows

Purpose: To find the net present value of an asset with variable cash flows.

Time-Line Diagram:

```
                                        FV
                                        ↑
PV      CF1              CFN − 1       CFN
↓       ↓          . . .   ↑            ↑
0       1                N − 1          N
            %i = ?
```

Values You Supply:

- hurdle rate
- period number when cash flow occurs
- amount of operating cash flow for each period
- initial cash outlay to purchase asset

Procedure	Key Sequence
1. Clear calculator and select financial mode.	ON/C 2nd FIN
2. Enter hurdle rate.	rate %i
3. Calculate present value of first cash flow.	
a. Enter period number when cash flow occurs as N.	period N
b. Enter amount of cash flow as FV.	cash flow FV
c. Compute and store present value.	CPT PV STO
4. Calculate present value of other cash flows. Repeat this step until you compute present value of all cash flows. Add results to memory.	
a. Enter period number when cash flow occurs.	period N
b. Enter amount of cash flow.	cash flow FV
c. Compute present value and add to memory.	CPT PV SUM
5. Recall present value total and subtract initial cash outlay to calculate net present value of cash flows.	RCL − outlay =

Reference: "Net Present Value, Unequal Cash Flows," Chapter 11, *Business Analyst Guidebook*.

BATTERY INFORMATION

The calculator uses two of any of the following batteries for as many as 1000 hours of operation: Panasonic LR-44, Ray-O-Vac RW-82, Union Carbide (Eveready) A-76, or the equivalent. For as many as 2500 hours of operation, use Mallory 10L14, Union Carbide (Eveready) 357, Panasonic WL-14, Toshiba G-13, Ray-O-Vac RW-42, or the equivalent. Refer to the Appendix of the *Business Analyst Guidebook* for battery replacement instructions.