

# Time Value of Money Calculations Tool

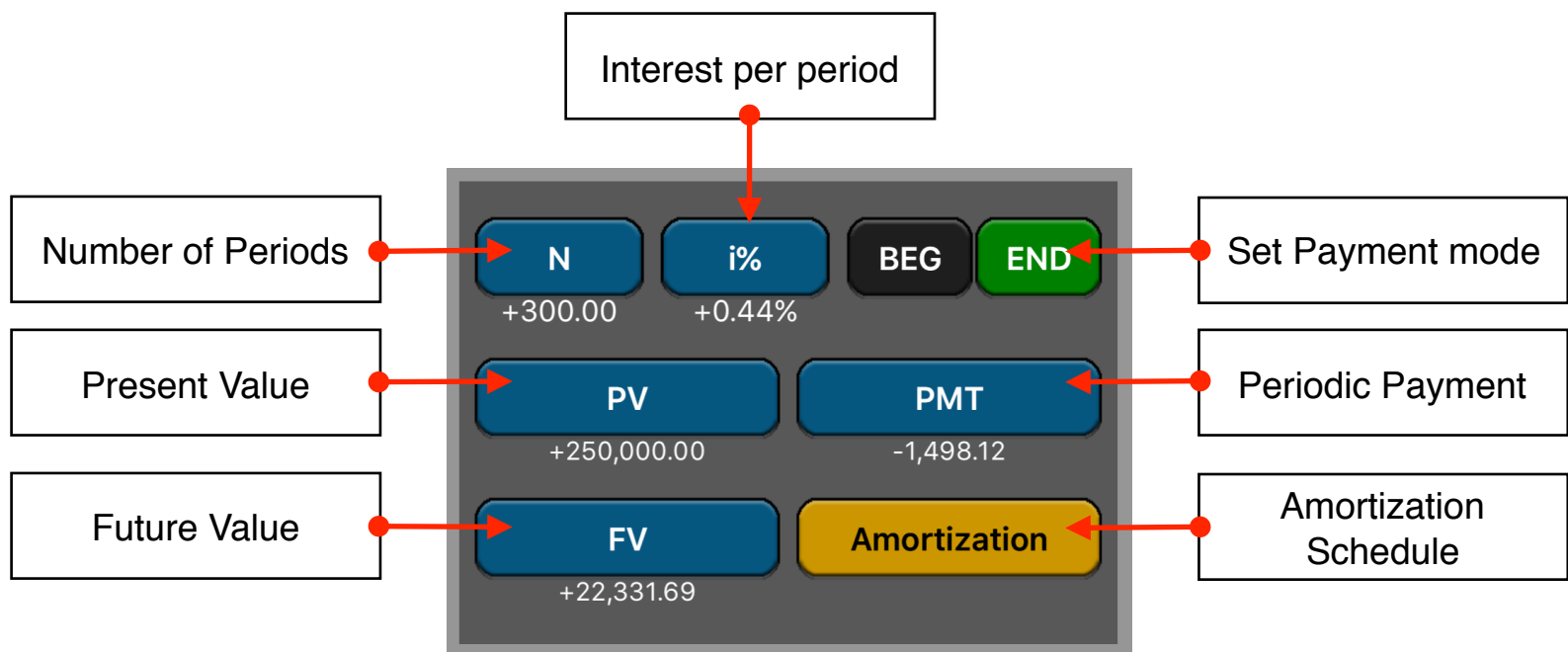
To show it, press the **OPT** key, touch the “**Finance**” menu button, and select the “**TVM Calculations**” option.

The “TVM calculation” tool deals with the common “Compound Interest” problems found in loans, savings, mortgages or leasing calculations.

The keys of the TVM menu represent the variables in the well known “Time Value of Money” equation.

$$PV + (1 + S \cdot i) \cdot PMT \cdot [1 - (1 + i)^{-N}] \div i + FV \cdot (1 + i)^{-N} = 0$$

where “S” is 1 for “BEG” mode and “0” for “END” mode.



Any of the **[N]** , **[i%]** , **[PV]** , **[PMT]** or **[FV]** variables can be calculated if the other four are known. If any other key is pressed before one of these keys, the displayed number is stored in the corresponding variable. Otherwise, the variable is calculated. The colors of the buttons corresponding to each variable changes according the performed action. The buttons turn **Blue** if the value is stored in the variable and, **Red** if the variable was calculated.

Variable	Description
[N]	Stores or calculates the total number of payments or compounding periods. "N" can be expressed in any unit of time (the interest rate should be in the same unit of time).
[i%]	Stores or calculates the nominal interest rate in percent corresponding to each of the "N" periods.
[PV]	Stores or calculates the Present value of the series of future "PMT" amounts. "PV" always occurs at the beginning of the first period.
[PMT]	Stores or calculates the the amount of each periodic payment. "PMT" can occur at the beginning or end of each period.
[FV]	Stores or calculates the Future value of the series of previous "PMT" amounts. "FV" always occurs at the end of the last period.
[BEG END]	Sets Begin mode; used when payments occur at the beginning of each period. Sets "S = 1" in TVM equation.
[BEG END]	Sets End mode; used when payments occur at the end of each period. Sets "S = 0" in TVM equation.
[Amortization]	Shows the Amortization table view calculating the amount of the payment apply to interest and the amount apply to principal for each period.

### Cash Flow Sign Convention

The values entered in the [PV], [PMT] or [FV] registers must consider the proper sign. Positive numbers correspond to money received (**Cash-In**). Negative numbers correspond to money paid (**Cash-Out**).

### **Example : Calculating [N]**

How long should be a \$25,000.00 loan with an interest rate for 6.7% per year if you can paid only \$500.00 per month?. Solution:

**Solution:** Follow the next sequence:

<b>[BEG END]</b>	Set the END mode.
“6.7”[ENTER]“12”[÷] [i%]	Stores the interest rate per month in percent. <b>i% = 0.5583</b>
“25000” [PV]	Stores the loan amount. <b>PV = 25,000.00</b> (Cash-In)
“500” [CHS] [PMT]	Stores the periodic monthly payment. <b>PMT = -500.00</b> (Cash-Out)
“0” [FV]	Clears the Future Value. <b>FV = 0.0000</b>
[N]	Calculates the number of payments required. <b>N = 58.7929</b> (months)

### **Example : Calculating [i%]**

What annual interest rate must be obtained to accumulate \$10,000 in 8 years on an investment of \$6,000 with quarterly compounding?.

**Solution:** Follow the next sequence:

<b>[BEG END]</b>	Set the END mode.
“8” [ENTER] “4” [x] [N]	Stores the number of periodic payments. <b>N = 32.0000</b> (quarters)
“6000” [CHS] [PV]	Stores the negative loan amount. <b>PV = -6,000.00</b> (Cash-Out)
“0” [PMT]	Clear payment. <b>PMT = 0.00</b>
“10000” [FV]	Stores the future value of the investment. <b>FV = 10,000.00</b> (Cash-In)
[i%]	Calculates the quarterly interest rate percent. <b>i% = 1.6091</b> (% per quarter)

### **Example : Calculating [PV]**

What is the maximum purchase price of an asset that gives a monthly net cash flow of \$1,230 during a period of 5 years and the selling price at that time is \$10,000. Also, you want at least a 15% return per year.

**Solution:** Follow the next sequence:

<b>[BEG END]</b>	Set the END mode.
<b>“5”[ENTER]“12”[x] [N]</b>	Stores the number of periodic payments. <b>N = 60.00</b> (months)
<b>“15”[ENTER]“12”[÷] [i%]</b>	Store the interest rate percent per year. <b>i% = 1.2500</b> (% per month)
<b>“1230” [PMT]</b>	Stores the monthly payments. <b>PMT = 1,230.00</b> (Cash-In)
<b>“10000” [FV]</b>	Stores the selling price. <b>FV = 10,000.00</b> (Cash-In)
<b>[PV]</b>	Calculate the present value. <b>PV = -56,448.2239</b> (Cash-Out)

### **Example : Calculating [PMT]**

What is the monthly payment on 25-year, \$89,560 mortgage at 5.25% annual interest, compounding monthly?.

**Solution:** Follow the next sequence:

<b>[BEG END] “0” [FV]</b>	Set the END mode & clear future value
<b>“25”[ENTER]“12”[x] [N]</b>	Stores the number of periodic payments. <b>N = 300.00</b> (months)
<b>“5.25”[ENTER]“12”[÷] [i%]</b>	Stores the monthly interest rate percent. <b>I%YR = 5.25</b> (% per year)
<b>“89560” [PV]</b>	Stores the mortgage amount. <b>PV = 89,560.00</b> (Cash-In)
<b>[PMT]</b>	Calculates the periodic payment. <b>PMT = -536.69</b> (Cash-Out)

## Example : Calculating **[FV]**

A saving account offers a nominal rate of 4%. If you open that account with a initial deposit of \$2,000.00 and each month for now on you will save \$300. What is the balance of the account after 5 years?.

**Solution:** First set **P/YR** to 12 and **END** mode in the secondary menu, then follow the next sequence in the primary menu:

Keystrokes	Description
<b>[BEG END]</b>	Set the END mode.
“5” <b>[ENTER]</b> “12” <b>[x] [N]</b>	Stores the number of periodic payments. <b>N = 60.0000</b> (months)
“4” <b>[ENTER]</b> “12” <b>[÷] [i%]</b>	Stores the monthly interest rate percent. <b>i% = 0.3333</b>
“2000” <b>[CHS] [PV]</b>	Stores the loan amount with negative sign. <b>PV = -2,000.00</b> (Cash-Out)
“300” <b>[CHS] [PMT]</b>	Stores the payment with negative sign. <b>PMT = -300.00</b> (Cash-Out)
<b>[FV]</b>	Calculates the future value. <b>FV = 22,331.6866</b> (Cash-In)

## Amortization Table [Amortization]

The RLM-11CX “TVM Calculations” tool allows you to see a complete Amortization Schedule of the current values stored in the **[i%]**, **[PV]** and **[PMT]** variables. The calculation allows to obtain the amount of the payment applied toward principal and toward interest from a single loan payment or from several payments at once. It also calculates the remaining balance of the loan after the payment amortizations are made.

### Example : Amortization Schedule

You can obtain a 25-year mortgage for \$250,000 at 5.25% annual interest. This requires payments of \$1,498.12 (at the end of each month). Find the amounts that would be applied to interest and to the principal from the first and second year’s payments.

**Solution:** Follow the next sequence:

Keystrokes	Description
<b>[BEG END]</b>	Set the END mode.
“25” <b>[ENTER]</b> “12” <b>[x] [N]</b>	Stores the number of periodic payments. <b>N = 300.00</b> (months)
“5.25” <b>[ENTER]</b> “12” <b>[÷] [i%]</b>	Stores the monthly interest rate percent. <b>i% = 0.4375</b> (% per month)
“250000” <b>[PV]</b>	Stores the loan amount with negative sign. <b>PV = 250,000.00</b> (Cash-In)
“1498.12” <b>[CHS] [PMT]</b>	Stores the payment with negative sign. <b>PMT = -1,498.12</b> (Cash-Out)
“12”	type the number of months to amortize at once.
<b>[Amortization]</b>	Shows the amortization schedule
<b>[Group]</b> “12”	Shows the periods grouping input. Type 12 & “Group” to show 12 payments at once.

Amortization Schedule

<b>Payments: 1 to 12</b>	
Interest=	-13,006.53
Principal=	-4,970.91
Balance=	+245,029.09
<b>Payments: 13 to 24</b>	
Interest=	-12,739.18
Principal=	-5,238.26
Balance=	+239,790.83
<b>Payments: 25 to 36</b>	
Interest=	-12,457.47
Principal=	-5,519.97
Balance=	+234,270.86
<b>Payments: 37 to 48</b>	
Interest=	-12,160.58
Principal=	-5,816.86
Balance=	+228,454.00
<b>Payments: 49 to 60</b>	
Interest=	-11,847.72
Principal=	-6,129.72
Balance=	+222,324.28
<b>Payments: 61 to 72</b>	
Interest=	-11,518.04
Principal=	-6,459.40

Group    [Email Icon]    [Printer Icon]    Done

Periods Amortized

Interest amount

Amortization amount

Remaining balance

Shows the Grouping input view to group payment in the amortization schedule

Close the amortization schedule

Send an Email with the amortization schedule as tab delimited text

Print the amortization schedule (if an AirPrint printer is available)