

Amortization Tables

Amortization is paying back a debt at regular time intervals with equal payments.

A table which indicates principal payments, interest payments, and the balance on a loan for each time interval is called the amortization table.


Objectives:

- Determine the monthly payment for a loan.
- Create an amortization table for a loan.

Constructing an Amortization Table

Example 1:



You purchase a condominium for \$200,000, pay 20% down, and mortgage the balance. You amortize your debt with monthly payments for 30 years. What is your monthly payment if your interest rate for the loan is 7% compounded monthly? Create an amortization table for this particular example.


1. Press , and select **New** to start a new document. Select **Add Calculator**.

Note: To round computations to two decimal places, change the Display Digits setting in the Documents Settings to **Fix 2**.

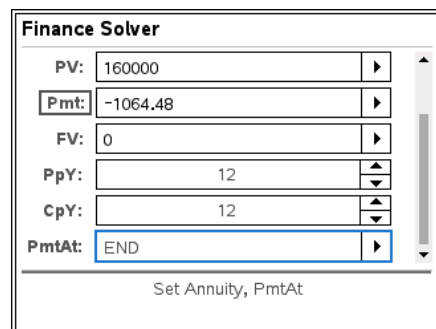
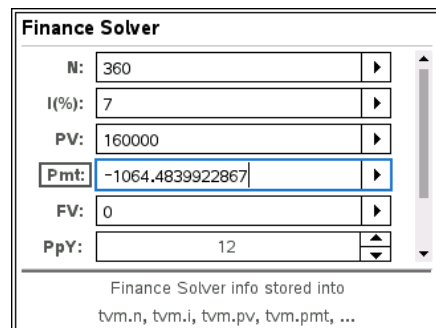
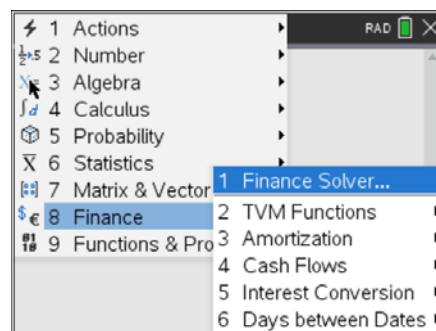
2. Press **Menu > Finance**. Select **Finance Solver**.

To move from row to row in the Finance Solver, press .

3. Enter the values as shown. For PV, enter 200000  0.2  200000. This represents the amount of the loan, \$200,000, minus the 20% down payment.

4. Place the cursor in the Pmt row. Press  to calculate the payment.

The monthly payment is \$1,064.48.



Use the **bal(** command to find the balance after payments 1, 2, and 3.

5. Press **[esc]** to exit the Finance Solver. On the Calculator page, press **Menu > Finance > Amortization > Balance**.

The syntax is **bal(NPmt, N, I, PV, [Pmt], [FV], [PpY], [CpY], [PmtAt], [roundValue])**.

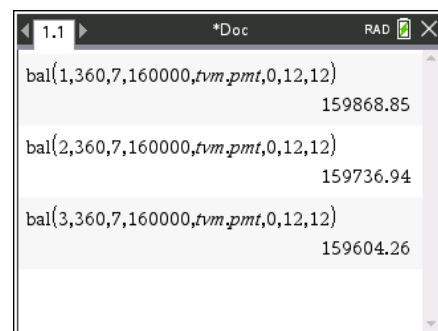
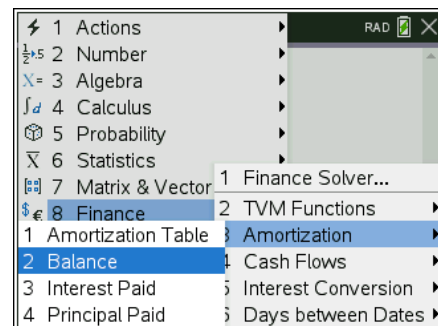
Note: NPmt specifies the payment number after which the balance is calculated. The defaults for PpY, CpY, and PmtAt are 1, 1, and End, respectively. roundValue specifies the number of decimal places for rounding. The default is 2.

6. To compute the balance after payment 1, enter 1 **[,]** 360 **[,]** 7 **[,]** 160000 **[,]** **tvm.pmt** **[,]** 0 **[,]** 12 **[,]** 12 and press **[enter]**.

Note: Select **tvm.pmt** from the **[var]** menu.

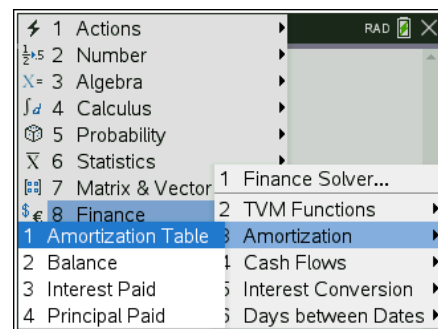
Note: If **tvm.pmt** is omitted, Pmt defaults to **tvm.pmt**, and the syntax for this example would be **bal(1,360,7,160000,,0,12,12)**. (Note the two commas between 160000 and 0.)

7. Arrow up to highlight the balance command. Press **[enter]** to paste the command to the entry line. Change the payment number to 2, and press **[enter]** to compute the balance after payment 2.
8. Repeat Step 7 to edit the payment number and compute the balance after payment 3.



Constructing an Amortization Table

1. Press **[ctrl]** **[doc]** to insert a new page in the document. Select **Add Calculator**.
2. **Menu > Finance > Amortization > Amortization Table**.



TEACHER NOTES

3. The syntax is **amortTbl**(NPmt, N, I, PV, [Pmt], [FV], [PpY], [CpY], [PmtAt], [roundValue]).
4. Enter 360 360 7 160000 tvn.pmt 0 12 12 and press .

Note: Select **tvm.pmt** from the var menu.

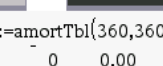
The screenshot shows a spreadsheet window titled "1.1 1.2 *Doc RAD". The formula bar contains the function `amortTbl(360,360,7,160000,tvm,pmt,0,12,12)`. The spreadsheet displays an amortization table with the following data:

	0	0.00	0.00	160000.00
1	-933.33	-131.15	159868.85	
2	-932.57	-131.91	159736.94	
3	-931.80	-132.68	159604.26	
4	-931.02	-133.46	159470.80	
5	-930.25	-134.23	159336.57	
6	-929.46	-135.02	159201.55	
7	-928.68	-135.80	159065.75	
8	-927.88	-136.60	158929.15	

- Press the arrow keys to see values for the different months in the payment schedule.

	1.1	1.2	*Doc	RAD
352	-54.32	-1010.16	8301.04	
353	-48.42	-1016.06	7284.98	
354	-42.50	-1021.98	6263.00	
355	-36.53	-1027.95	5235.05	
356	-30.54	-1033.94	4201.11	
357	-24.51	-1039.97	3161.14	
358	-18.44	-1046.04	2115.10	
359	-12.34	-1052.14	1062.96	
360	-6.20	-1058.28	4.68	

6. If the amortization table is stored as a variable, it can be used in other computations. The variable *tbl* is used in this example.
7. Enter a variable name (such as *tbl*), and press **ctrl** [=]. Arrow up to the *amortTbl* command, and press **enter** to select it. Press **enter** again to create the amortization table and store it to the variable.



tbl:=amortTbl(360,360,7,160000,tvm,pmt,0,1)

	0	0.00	0.00	160000.00
1	-933.33	-131.15	159868.85	
2	-932.57	-131.91	159736.94	
3	-931.80	-132.68	159604.26	
4	-931.02	-133.46	159470.80	
5	-930.25	-134.23	159336.57	
6	-929.46	-135.02	159201.55	
7	-928.68	-135.80	159065.75	
8	-927.88	-136.60	158929.15	

8. As an example, the balance after a certain number of payments can be computed using the alternative syntax for the **bal()** command.
- bal(NPmt,amortTable)**

The balance after payment 8 is calculated by entering `bal(8,tb)`.


Note: Type *tbl* or select the variable *tbl* from the var menu.




A screenshot of a MATLAB command window. The title bar shows the file name as '*Doc' and the MATLAB logo. The command window has tabs for '1.1', '1.2', and '1.3', with '1.3' being the active tab. The command 'bal(8,tbl)' is entered in the command line, and the output '158929.15' is displayed to the right of the command.

Example 2:

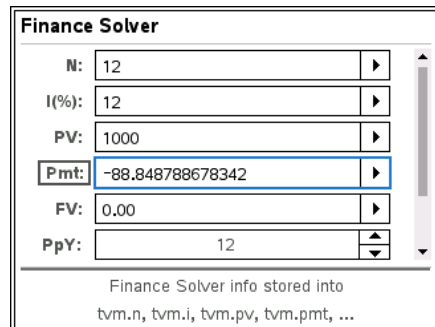
Find the payment needed each month for 1 year to pay off a debt of \$1,000 at 12% compounded monthly. Show the amortization schedule.

1. Press , and select **New** to start a new document. Select **Add Calculator**.

Note: To round computations to two decimal places, change the Display Digits setting in the Documents Settings to **Fix 2**.

2. Press **Menu > Finance**. Select **Finance Solver**.
3. Enter the values as shown.
4. Place the cursor in the Pmt row. Press  to calculate the payment.

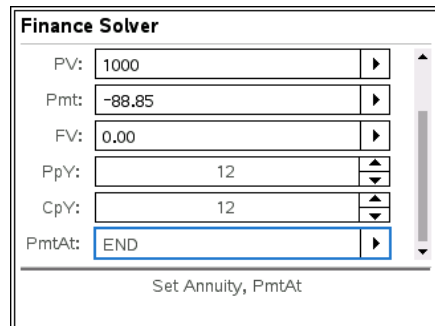
The monthly payment is \$88.85.



Finance Solver

N:	12
I(%):	12
PV:	1000
Pmt:	-88.848788678342
FV:	0.00
PpY:	12










Finance Solver info stored into
tvm.n, tvm.i, tvm.pv, tvm.pmt, ...



Finance Solver

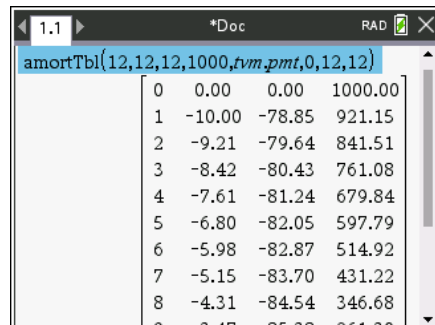
PV:	1000
Pmt:	-88.85
FV:	0.00
PpY:	12
CpY:	12
PmtAt:	END

Set Annuity, PmtAt

5. Press  to exit the Finance Solver.
6. **Menu > Finance > Amortization > Amortization Table.**
7. Enter 12 , 12 , 12 , 1000 , tvm.pmt , 0 , 12 , 12 and press .

Note: Select **tvm.pmt** from the  menu.

8. Press the arrow keys to see values for the different months in the payment schedule.



1.1 *Doc RAD X

amortTbl(12,12,12,1000,tvm.pmt,0,12,12)

0	0.00	0.00	1000.00
1	-10.00	-78.85	921.15
2	-9.21	-79.64	841.51
3	-8.42	-80.43	761.08
4	-7.61	-81.24	679.84
5	-6.80	-82.05	597.79
6	-5.98	-82.87	514.92
7	-5.15	-83.70	431.22
8	-4.31	-84.54	346.68