HP 12c Financial Calculator – Loan Amortizations

Amortization

The word 'amortization' comes from a Latin word meaning "about to die". When a loan earning interest has regular, fixed payments, it is said that the loan is being paid off or amortized. Although the debt is reduced by the same periodic payments, different parts of each payment are applied against the principal and against the interest. The interest is deduced from each payment and the remaining amount is used to reduce the debt. Figure 1 illustrates this process.

Figure : Process of amortization
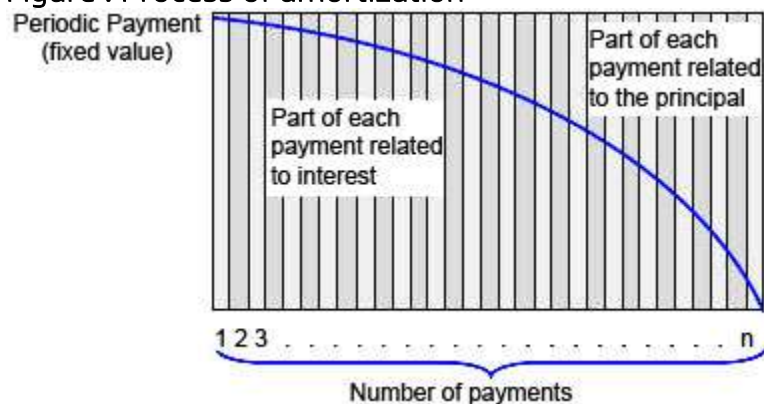
The HP 12c amortization approach

In the HP 12c, amortization uses the contents of the following Time Value of Money (TVM) registers:

Keystroke	Description
n	Used as a reference and contains the number of payments amortized.
i	Periodic interest rate.
PMT	Periodic payment.
PV	Remaining balance.

The display must contain the number of payments to be amortized before executing f AMORT. It is important to keep in mind that on the HP 12c, amortization is a sequenced calculation. This means that once a number of payments is amortized, all subsequent balances refer to the next amortized payments. If it is necessary to go back and review previous balance, some values must be restored to their default values. This is because every time f AMORT is pressed, the following registers have their contents updated:

PV	Contents updated to remaining balance.
n	Contents updated to current number of payments amortized.

The following examples illustrate the HP 12c amortization approach.

Practice amortizing loans

Example 1

Calculate the first year of the annual amortization schedule for a 30-year, $180,000 mortgage at 7.75%, compounded monthly.

Solution

Clear the TVM registers contents to zero and set 'END' mode:

[f] [FIN] [g] [END]

Set the relevant TVM values and calculate the PMT:

Keystroke	Display
[7] [.] [7] [5] [g] [12÷] [3] [0] [g] [12x] [1] [8] [0] [0] [0] [0] [PV] [0] [FV] [PMT]	Figure : Calculating PMT - 1,289.54

To calculate the first year it is necessary to set n to zero and amortize twelve payments:

Keystroke	Display
[0] [n] [1] [2] [f] [AMORT]	Figure : Displaying the total interest - 13,894.66

This is the total interest paid after one year. To see the part of the principal that is paid, press:

Keystroke	Display
[x≷y]	Figure : Displaying part of the principal amount - 1,579.82

To check the loan balance after one year:

Keystroke	Display
RCL PV	Figure : Displaying the loan balance 178,420.18

Answer

After one year, the loan balance is $178,420.18. The amount of principal paid so far is $1,579.82 and $13,894.66 interest has been paid.

Example 2

With all data from the previous example still available in the calculator's memory, calculate the second year of the annual amortization of the same mortgage.

Solution

Just to make sure the calculator is at the proper point in the loan, recall the contents of n to the display:

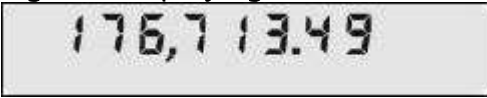| Keystroke	Display
RCL n	Figure : Recalling the contents of n 12.00

Now it is necessary to input the number of payments to be amortized. In this example, twelve more payments must be amortized to calculate the second year:

Keystroke	Display
1 2 f AMORT	Figure : Displaying the total interest - 13,767.79

This is the total interest paid after two years. To see the part of the principal that is paid, press:

Keystroke	Display
$x \gtrless y$	Figure : Displaying part of the principal amount - 1,706.69

To check the loan balance after one year, press:

Keystroke	Display
RCL PV	Figure : Displaying the loan balance 176,713.49

Answer

After two years, the loan balance is $176,713.49. The amount of principal repaid is $1,706.69 and the amount of interest paid is $13,767.79.

Example 3

Amortize the 10th payment of a 4-year car loan. The loan amount is $12,500 and the interest rate is 10.2%, compounded monthly. Assume monthly payments starting immediately.

Solution

Clear the TVM registers contents to zero and set 'BEGIN' mode:

f FIN 9 BEG

Set the relevant TVM values and calculate PMT:

Keystroke	Display
1 0 · 2 9 12÷ 4 9 12x 1 2 5 0 0 PV 0 FV PMT	Figure : Calculating PMT - 315.55 BEGIN

To amortize the 10ᵗʰ payment it is necessary to amortize the first nine payments and then amortize the 10ᵗʰ separately:

Keystroke	Display
0 n 9 f AMORT 1 f AMORT	Figure : Displaying the interest paid - 88.72 BEGIN

This is the interest paid with the 10ᵗʰ payment. To see the part of the principal that is paid:

Keystroke	Display
x⇄y	Figure : Displaying part of the principal amount - 226.83 BEGIN

To check the loan balance after ten payments:

Keystroke	Display
RCL PV	Figure : Displaying the loan balance 10,210.45 BEGIN

Answer

After ten payments, the loan balance is $10,210.45. With the 10th payment, the amount of principal that has been paid is $226.83 and $88.72 interest has been paid.

Example 4

With all data from the previous example still available in the calculator memory, amortize the 22nd payment.

Solution

Just to verify the calculator is still in the proper state, recall the contents of n to the display:

| Keystroke	Display
RCL n	Figure : Recalling the contents of n *10.00* BEGIN

To amortize the 22nd payment it is necessary to amortize the next eleven payments and then amortize the 22nd separately:

Keystroke	Display
1 1 f AMORT 1 f AMORT	Figure : Displaying the interest paid *- 64.47* BEGIN

This is the interest paid with the 22nd payment. To see the part of the principal that is paid:

Keystroke	Display
[x≷y]	Figure : Displaying part of the principal amount - 2 5 1.0 8 BEGIN

To check the loan balance after ten payments, press:

Keystroke	Display
[RCL] [PV]	Figure : Displaying the loan balance 7,3 3 3.2 7 BEGIN

Answer

After twenty-two payments, the loan balance is $7,333.27. With the 22nd payment, the amount paid toward principal is $251.08 and $64.47 interest has been paid.