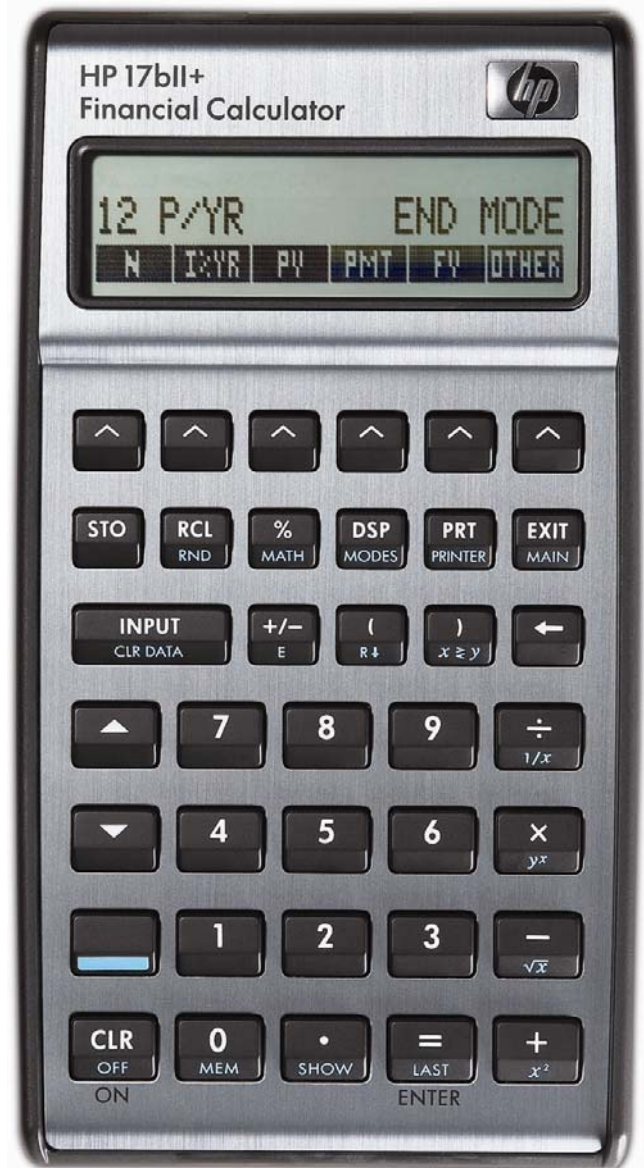# hp calculators

HP 17bII+ Loan Amortizations

The time value of money application

Amortization

Practice amortizing loans

The time value of money application

The time value of money application built into the HP 17bII+ is used to solve compound interest problems and annuities that involve regular, uniform payments. This application is accessed from the main menu level of the HP 17bII+ by pressing [FIN] then [TVM]. Note that to access these menus, you must press the appropriate [↑] key just below the symbols on the screen. If you do not see [FIN] displayed on the screen, you may be inside a different menu. You can return to the main menu and select the [FIN] menu by pressing [▬][EXIT MAIN].

When you enter the TVM environment for the first time, the screen will appear as shown in Figure 1 below.

```
12 P/YR          END MODE
 N | I%YR | PV | PMT | FV |OTHER
```
Figure 1

Compound interest problems require the input of 3 of these 4 values: [N] [I%YR] [PV] [FV]. Annuity problems require the input of 4 of these 5 values: [N] [I%YR] [PV] [PMT] [FV]. Once these values have been entered in any order, the unknown value can be computed by pressing the key for the unknown value.

Interest rates are always entered as the number is written in front of the percent sign, i.e., 5% is entered as a 5 rather than as 0.05. Additional information can be found in the learning module covering time value of money basics.

Special settings

There are several settings that affect the operation of the time value of money application.

Clearing the time value of money registers. The 5 storage registers that hold the time value of money values, [N] [I%YR] [PV] [PMT] [FV], are cleared when [▬][INPUT CLR DATA] is pressed when the calculator is showing the TVM menu.

Begin/End Mode. A special mode setting relates to the solution of problems known as annuities. This mode tells the HP 17bII+ to solve these problems assuming that payments are made either at the beginning of a period or at the end of a period, which is why this mode is called Begin / End mode. The default mode is END as shown in Figure 2.

```
12 P/YR          END MODE
 N | I%YR | PV | PMT | FV |OTHER
```
Figure 2

This mode is changed by pressing [OTHER] from the main TVM menu and then choosing [BEG] or [END]. To return to the previous page of the TVM menu, press [EXIT MAIN].

If you receive an unexpected result when solving an annuity problem, make sure that the calculator is in the proper mode and try resolving the problem.
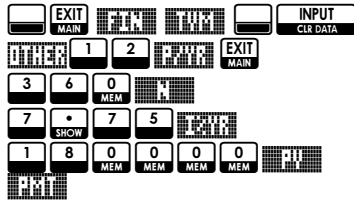
Amortization

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. The figure below illustrates this process.
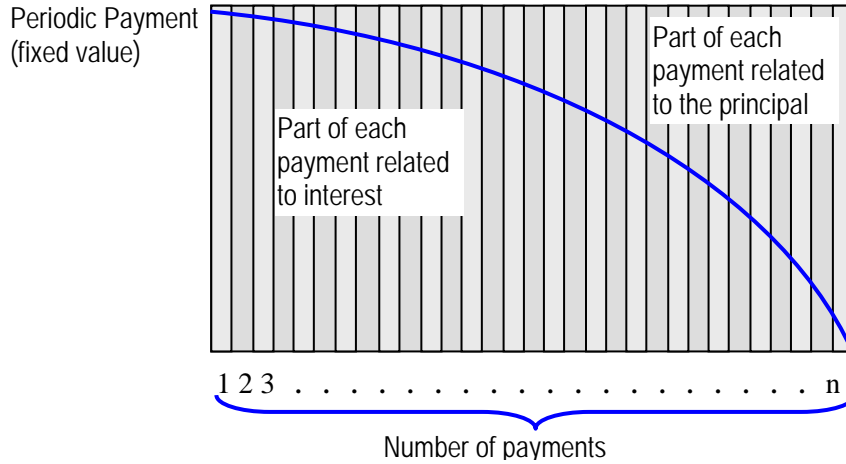
Practice amortizing loans

Example 1:   Calculate the first year of the annual amortization schedule for a 30-year, $180,000 mortgage at 7.75%, compounded monthly.

Solution: By default, the HP 17bII+ will amortize an entire year's worth of payments unless told otherwise by the user. If the number of periods per year is set to 12, then the amortization for the first 12 months will be computed. If the number of periods per year is set to 4, then the amortization for the first 4 quarters will be computed, etc. Later examples indicate how to set the parameters for other time periods, including individual payment amortization.


```
PMT=-1,289.54
  N   I%YR   PV   PMT   FV  OTHER
```
Figure 3

At this point, the HP 17bII+ enters a special amortization mode. The display will appear as shown in Figure 4 below. The display prompts for the number of payments to be amortized, in this case 12 months and indicates which key to press.

```
KEY #PMTS; PRESS {#P}
 #P  INT PRIN  BAL NEXT TABLE
```
Figure 4


```
#P=12 PMTS: 1-12
 #P  INT PRIN  BAL NEXT TABLE
```
Figure 5

The calculator has now amortized the first 12 payments. To see the amount of principal repaid during these periods, press **PRIN**.

PRINCIPAL=-1,579.82
#P | INT | PRIN | BAL | NEXT | TABLE   Figure 6

To display the amount of interest paid during these periods, press **INT**.

INTEREST=-13,894.66
#P | INT | PRIN | BAL | NEXT | TABLE   Figure 7

To display the remaining loan balance at the end of these periods, press **BAL**.

BALANCE=178,420.18
#P | INT | PRIN | BAL | NEXT | TABLE   Figure 8

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: Simply press **NEXT**.

#P=12 PMTS: 13-24
#P | INT | PRIN | BAL | NEXT | TABLE   Figure 9

The numbers in the display change to indicate for which period(s) the amortization is being computed, in this case showing 13-24, or the second year.

To see the amount of principal repaid during these periods, press **PRIN**.

PRINCIPAL=-1,706.69
#P | INT | PRIN | BAL | NEXT | TABLE   Figure 10

To display the amount of interest paid during these periods, press **INT**.

INTEREST=-13,767.79
#P | INT | PRIN | BAL | NEXT | TABLE   Figure 11

To display the remaining loan balance at the end of these periods, press **BAL**.

BALANCE=176,713.49
#P | INT | PRIN | BAL | NEXT | TABLE   Figure 12

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. Note: The **TABLE** button will print an amortization table out on an infrared printer.