hp calculators

HP 17bII+ Saving for retirement

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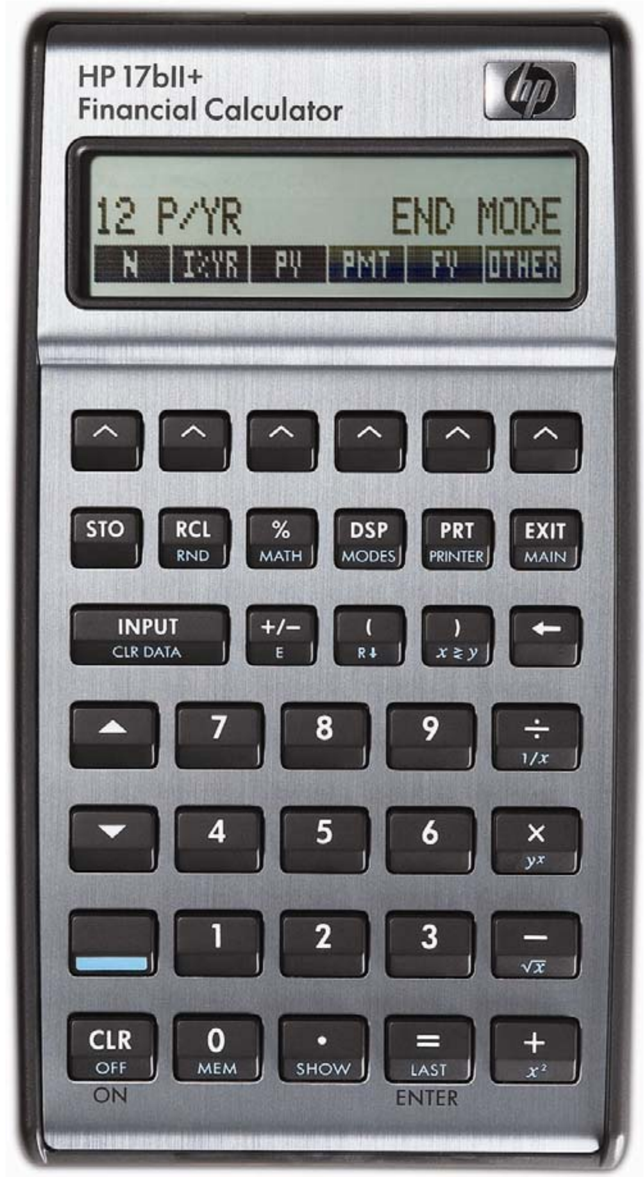


The time value of money application

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.

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.

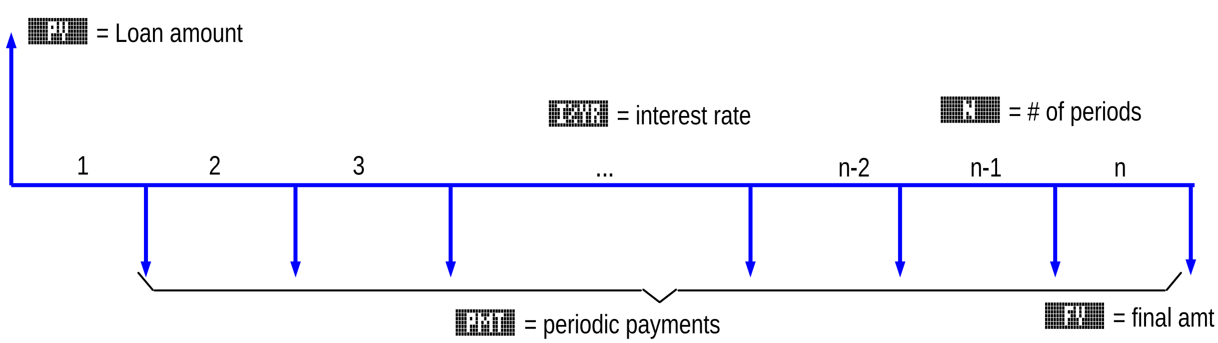
Interest rates are always entered as the number is written in front of the percent sign, i.e., 5% is entered as a 5 rather than as 0.05. Values for N are always the total number of periods – if a problem has an interest rate that is compounded monthly and the time frame is 5 years, the value entered for N would be 60 total periods. Additional information can be found in the learning module covering time value of money basics. Additional information can be found in the learning module covering time value of money basics.

Saving for retirement

Nearly everyone is interested in saving for retirement (or some other similar future goal). This almost always involves making regular deposits into an account. When those deposits are of equal size and spaced apart equally, the problem becomes an annuity. These types of problems may involve solving for a payment required in order to reach an already stated goal or a known, regular deposit but an unknown future amount available at retirement.

Cash flow diagrams and sign conventions

The sign conventions for cash flows in the HP 17bII+ follow this simple rule: money received is positive (arrow pointing up), money paid out is negative (arrow pointing down). The key is keeping the same viewpoint through each complete calculation. The regular use of cash flow diagrams allows a faster approach to solve most TVM-related problems. The cash flow diagram below represents the borrower viewpoint of the most problems and their relationship to the TVM variables.



Practice solving problems involving saving for retirement

<u>NOTE:</u> Once you begin working these problems, the keystrokes shown assume you do not leave the TVM menu environment. Should you leave that environment and then decide to work a problem below other than Example 1, you should press ▬ EXIT/MAIN FIN TVM to return to the TVM environment.

<u>Example 1:</u> If you want to retire 40 years from now with $1,000,000 in your account, how much must you deposit beginning next month and continuing for 40 years into the account to achieve this goal? Assume the account earns 6%, compounded monthly.

<u>Solution:</u>
▬ EXIT/MAIN FIN TVM ▬ INPUT/CLR DATA
OTHER 1 2 P/YR EXIT/MAIN
4 8 0 N
6 I%YR
1 0 0 0 0 0 0 +/− FV
PMT

Figure 2

<u>Answer:</u> $502.14 per month. The value at the end of the 40-year period would be a withdrawal and is therefore entered as a negative value.

<u>Example 2:</u> Johnny can save $50 per month. If he is 30 years old today and begins saving next month, how much is in an account paying 8%, compounded monthly, if he continues to save for 35 years?

<u>Solution:</u>
▬ EXIT/MAIN FIN TVM ▬ INPUT/CLR DATA
OTHER 1 2 P/YR EXIT/MAIN
4 2 0 N
8 I%YR
5 0 PMT
FV

Figure 3

<u>Answer:</u> $-114,694.12. Since the $50 is a deposit, it is entered as a positive number. There are 420 months in 35 years.

<u>Example 3:</u> Billy can save $50 per month. If he is 20 years old today and begins saving next month, how much is in an account paying 8%, compounded monthly, if he continues to save for 45 years?

<u>Solution:</u>
▬ EXIT/MAIN FIN TVM ▬ INPUT/CLR DATA
OTHER 1 2 P/YR EXIT/MAIN
5 4 0 N
8 I%YR
5 0 PMT
FV

Figure 4

Answer: $-263,726.99. Since the $50 is a deposit, it is entered as a positive number. There are 540 months in 45 years.

Example 4: Cindy saved $250 per quarter for 10 years and then quit making deposits. How much is in her account 20 years later, if the account earns 8%, compounded quarterly?

Solution:

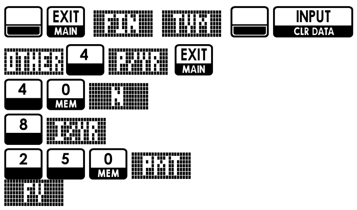


Figure 5

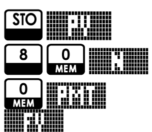


Figure 6

Answer: $73,621.55. Note how the problem is broken up into two pieces, first calculating the balance in the account immediately after the last deposit, which is then stored as the initial amount for the second portion of the problem, which computes the balance in the account after the period in which no additional deposits were being made.

Example 5: What interest rate would an account need to earn so that monthly deposits of $200 over the next 40 years would grow to become $800,000? Assume the account has $5,000 in it today.

Solution:

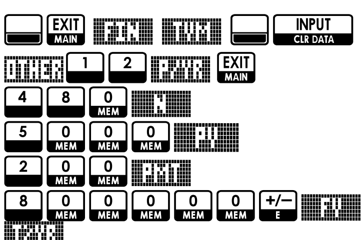


Figure 7

Answer: 7.92%. The initial deposit and the monthly deposit are both entered as positive values, since they are in fact deposits into the account.

Example 6: How many monthly deposits of $400 per month would you need to make in order to accumulate $500,000 in an account that pays 5.5%, compounded monthly?

Solution:

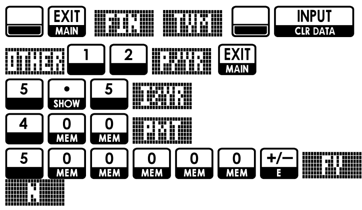


Figure 8

Answer: 416.91 months, or a little under 35 years. If you forget to make the FV negative, you will get a "No solution" message from the HP 17bII+.

Example 7: If Harry plans to make deposits of $120 per month each month for the next 20 years and wishes to accumulate $120,000, how much must he deposit today in order to achieve this goal? Assume the money will earn 6.75%, compounded monthly.

Solution:

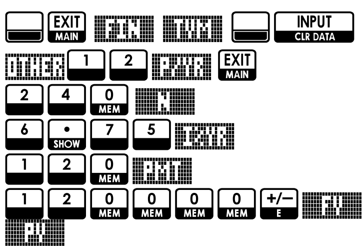


Figure 9

Answer: $15,444.81. In other words, it would require a deposit today of $15,444.81 AND 240 deposits of $120 in order to accumulate $120,000 in 20 years.