hp calculators

HP 10BII Mortgages with loan fees (points)

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The time value of money application

The time value of money application built into the HP 10BII is used to solve annuities that involve regular, uniform payments. 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.

The time value of money application operates on the convention that money invested is considered positive and money withdrawn is considered negative. In a compound interest problem, for example, if a positive value is input for the PV , then a computed FV will be displayed as a negative number. In an annuity problem, of the three monetary variables, at least one must be of a different sign than the other two. For example, if the PV and PMT are positive, then the FV will be negative. If the PV and FV are both negative, then the PMT must be positive. An analysis of the monetary situation should indicate which values are being invested and which values are being withdrawn. This will determine which are entered as positive values and which are entered as negative values. 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.

The number of periods per year is set using the yellow-shifted P/YR function. Problems involving annual compounding or annual payments should be solved with this value set to 1. Problems involving monthly compounding or monthly payments should be solved with this value set to 12. To set this value to 4 for quarterly payments / quarterly compounding, for example, you would press 4 P/YR .

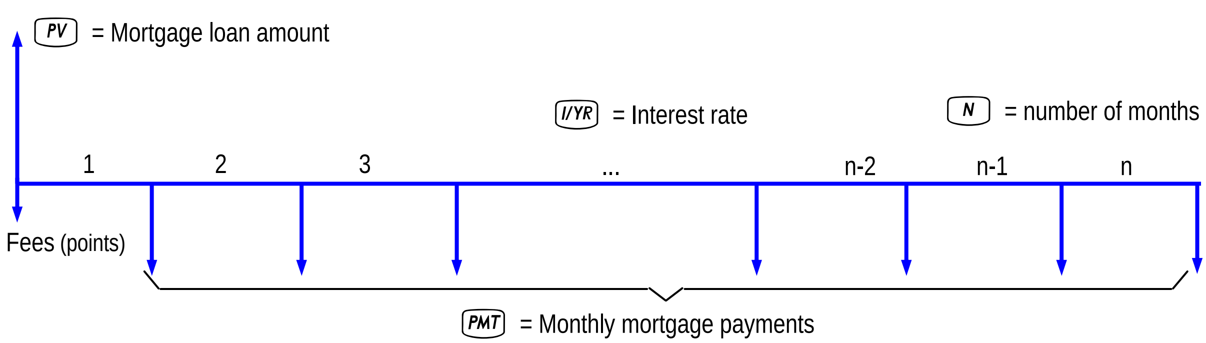
Additional information can be found in the learning module covering time value of money basics.

Mortgages with loan fees (points)

It is not unusual that, in some mortgage loans, there are related fees charged at the moment the loan amount is disbursed. These fees are often taken as percentages ("points") of the loan amount. In essence, these fees are an instant repayment of part of the loan. However, the periodic payment is computed on the loan amount before these fees are repaid. This has the effect of raising the effective interest rate being paid on the loan. For example, a $100,000 loan with 2 points would have the payment calculated on the $100,000 amount even though 2 points (2% or $2,000 in this instance) would be repaid immediately. The payment would be made as if $100,000 were owed when in fact only $98,000 is owed on the loan.

Cash flow diagrams and sign conventions

The sign conventions for cash flows on the HP 10BII follow the 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 the solution in most TVM-related problems. The cash flow diagram below represents the borrower viewpoint of the most common mortgage problems with fees and their relationship with the TVM variables.



Practice solving mortgage problems with points

Example 1: A family wants to settle a mortgage to buy a home rated $400,000. The bank offers a 30-year mortgage loan with a 2-point fee, and with an annual interest rate of 6.75%. What is the monthly payment?

Solution:

▬ C ALL
1 2 ▬ P/YR
3 6 0 N
6 • 7 5 I/YR
4 0 0 0 0 0 PV
PMT

Answer: For this 2-point fee mortgage, the monthly payment is $-2,594.39

Example 2: Having all data from previous example still in the calculator memory, calculate the effective annual percentage rate (APR).

Solution: To find the effective APR, change the PV to the amount disbursed from the loan transaction and solve for the interest rate.

4 0 0 0 0 0 × 0 • 9 8 = PV
I/YR

Answer: The effective APR is 6.95%. . Note that the reason the $400,000 is multiplied by 0.98 is that it represents 2% less than the actual amount used to calculate the payments.

Example 3: A small commercial building needs improvements and a local bank offers a 25-year, $350,000 mortgage at 6.85%, compounded monthly, with a 2.5-point fee. What is the payment? What is the APR?

Solution:

▬ C ALL
1 2 ▬ P/YR
2 5 × 3 0 = N
6 • 8 5 I/YR
3 5 0 0 0 0 PV
PMT

Then to calculate APR:

3 5 0 0 0 0 × 0 • 9 7 5 = PV
I/YR

Answer: The regular monthly payment will be $2,440.34 and the APR is 7.13%.