hp calculators

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The time value of money application

The time value of money application built into the HP 30b is used to solve compound interest problems and annuities that involve regular, uniform payments. 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.

The time value of money application operates on the convention that money invested is considered positive and money withdrawn is considered negative.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 PMT and FV are both negative, then the PV must be positive, etc. An analysis of the monetary situation should indicate which values are being invested and which values are being withdrawn.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 stated annual nominal interest rate is always entered into I/YR, as shown in the examples.

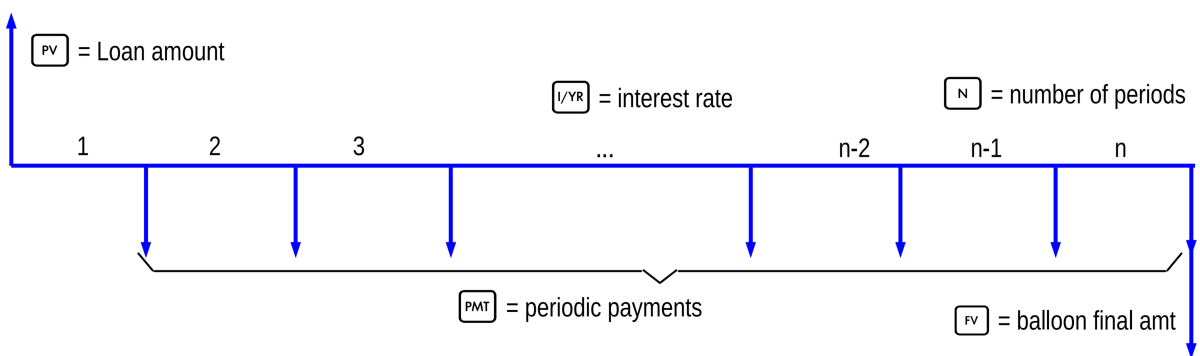
Additional information can be found in the learning module covering time value of money basics.

Balloon payments

A balloon payment is a final payment due on a loan that may often been much larger than a normal payment, hence the idea of a balloon inflating. An example of a balloon loan might be where the payment is computed assuming 30 years of payments will be made, when in fact payments are only made for seven years with the remaining loan balance paid off at that time. Actually, a loan payoff quote is just a balloon payment called by a different name.

Cash flow diagrams and sign conventions

The sign conventions for cash flows in the HP 30b 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 most common borrower viewpoint and their relationship to the TVM variables. A balloon payment would show up as a final amount of FV on this diagram.



Practice solving mortgage problems with balloon payments

Example 1: A home priced at $114,400 is bought with a mortgage with a $900 monthly payment for the next 30 years. The bank quoted an interest rate of 8.75%. If after five years the house must be sold, what is the amount still owed on the house?

Solution:

[■] [Reset] [INPUT] [1] [2] [■] [P/YR]
[3] [6] [0] [N]
[8] [•] [7] [5] [I/YR]
[1] [1] [4] [4] [0] [0] [PV]
[9] [0] [0] [+/-] [PMT]
[FV]

Answer: After five years, a balloon payment of $109,467.03 must be made to bank.

Example 2: A $150,000 house is bought with a 20-year mortgage loan having an annual interest rate of 6.75%, compounded monthly. After eight years the family needs to move to another state and the house must be sold. If they were to pay off the remaining balance on the loan, what would the final balloon payment be?

Solution: The regular payment for the 20-year original mortgage plan must be calculated first:

[■] [Reset] [INPUT] [1] [2] [■] [P/YR]
[2] [4] [0] [N]
[6] [•] [7] [5] [I/YR]
[1] [5] [0] [0] [0] [0] [PV]
[PMT]

The monthly payment is $-1,140.55. Then enter the elapsed time and calculate the balloon payment.

[9] [6] [N]
[FV]

Answer: The final amount owed on the loan, which is a balloon payment, is $-112,357.70

Example 3: The family from previous example was informed (in time) that they would not need to move for two more years. What would the balloon payment be at that time with this unexpected change?

Solution: Assuming that all previous data is kept in the calculator, simply enter the new period and calculate the balloon payment again:

[1] [2] [0] [N]
[FV]

Answer: The balloon payment will then be $99,329.83 after ten years.

Example 4: Joey borrows $1500 and agrees to pay $5 a month for 24 months. Since this will not entirely pay off the loan, he has also agreed to pay off the final balance as a balloon payment also 24 months from today. If the loan is being charged interest at 18%, compounded monthly, what is the size of this balloon payment?

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Solution: Reset INPUT 1 2 P/YR
2 4 N
1 8 I/YR
1 5 0 0 PV
5 +/- PMT
FV

Answer: The balloon payment will then be $2,001.09 after 24 months. Joey does not seem to have made a very wise loan arrangement.