



hp calculators

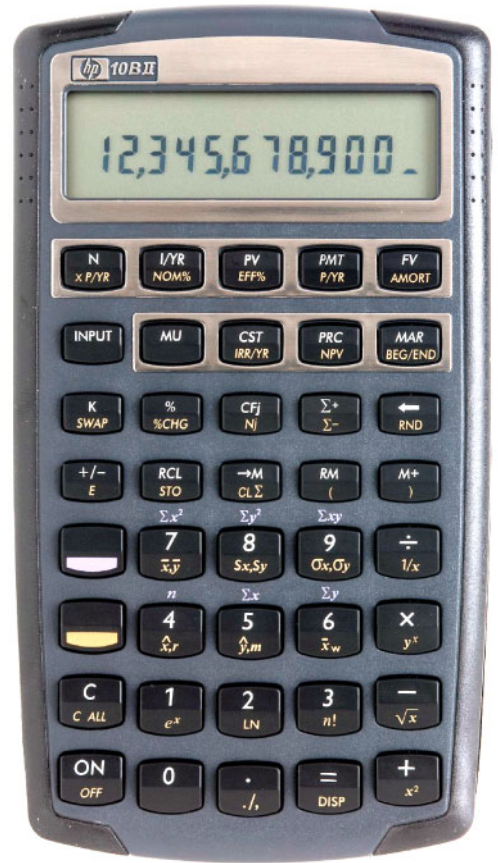
HP 10BII Solving for a required down payment

The time value of money application

Loan down payments

Cash flow diagrams and sign conventions

Practice solving loan down payment problems



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The time value of money application operates on the convention that money invested is considered positive and money withdrawn is considered negative.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 An analysis of the monetary situation should indicate which values are being invested and which values are being withdrawn.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 \blacksquare P/YR .

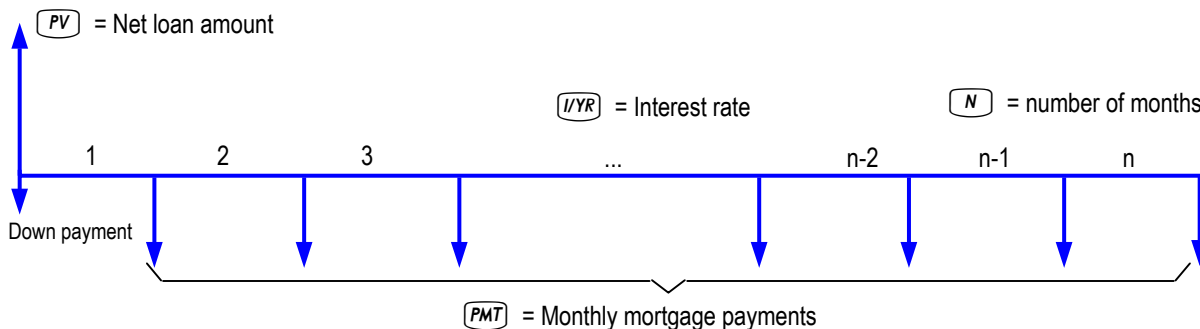
Additional information can be found in the learning module covering time value of money basics.

Loan Down Payments

Down payments are often made on loans to lower the required periodic payment. Down payments are also required to ensure an investment in the property has been made by the loan applicant, thereby reducing the risk to the lender that the loan will be abandoned. The process to be used is to input the payment the applicant can afford and determine the equivalent Present Value (PV). The difference between this PV and the actual loan amount will indicate the down payment necessary to achieve the required payment.

Cash flow diagrams and sign conventions

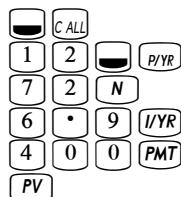
The sign conventions for cash flows on the HP 10BII follow the simple rule: money received is positive (arrow pointing up), money paid out is negative (arrow pointing down). The key is keeping the same viewpoint through each complete calculation. The regular use of cash flow diagrams allows a faster 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 down payments and their relationship with the TVM variables.



Practice solving loan down payment problems

Example 1: Tommy wants to buy a car and can afford a payment of \$400 a month. If the car costs \$25,000 and Tommy can get a 72 month loan at 6.9%, compounded monthly, how much must Tommy give as a down payment to lower his payment to \$400 a month?

Solution:



 C ALL

 1 2 P/YR

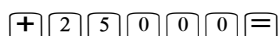
 7 2 N

 6 . 9 I/YR

 4 0 0 PMT

 PV

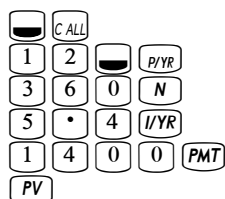
At this point, the display shows $-23,527.99$. Now press:



Answer: To lower his monthly payment to \$400, Tommy needs to make a \$1,472.01 down payment.

Example 2: Jane is looking to buy a house and can afford a payment of \$1,400 a month. If the house costs \$270,000 and Jane can get a 30 year loan at 5.4%, compounded monthly, how much must Jane give as a down payment to lower her payment to \$1,400 a month?

Solution:



 C ALL

 1 2 P/YR

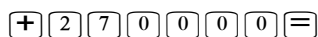
 3 6 0 N

 5 . 4 I/YR

 1 4 0 0 PMT

 PV

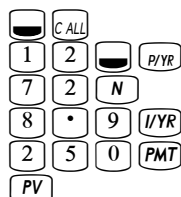
At this point, the display shows $-249,318.47$. Now press:



Answer: To lower her monthly payment to \$1,400, Jane needs to make a \$20,681.53 down payment.

Example 3: Kevin wants to buy a boat and can afford \$250 a month for this purchase. The boat costs \$15,600 and Kevin can get a 72-month loan at 8.9%, compounded monthly. How much must Kevin pay as a down payment to lower his monthly payment to \$250 a month?

Solution:



 C ALL

 1 2 P/YR

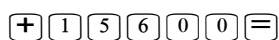
 7 2 N

 8 . 9 I/YR

 2 5 0 PMT

 PV

At this point, the display shows $-13,907.47$. Now press:



Answer: To lower his monthly payment to \$250, Kevin needs to make a \$1,692.53 down payment.