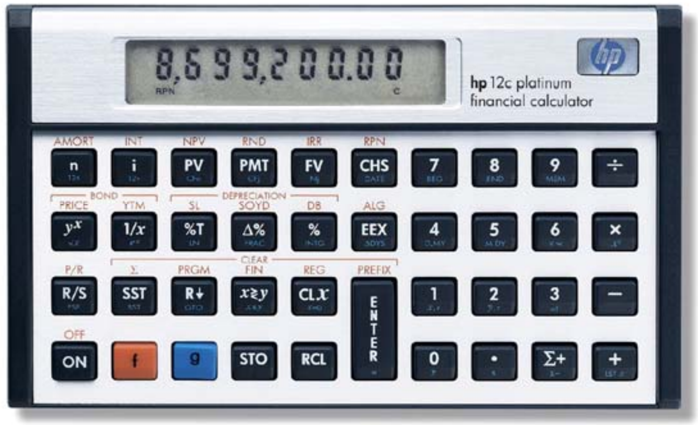
hp calculators



HP 12C Platinum
Refinancing a loan

Loan refinancing

The HP12C Platinum TVM for loan refinancing

Practice solving loan refinancing problems

Loan Refinancing

A loan is an agreement between two parties where one party borrows money and agrees to pay back to the other party (usually a financial institution) over a set period of time with interest. The amount of money that is borrowed is called **principal** and the **interest** is the payment for borrowing the money. The time set to pay back the loan is known as the **term**.

It often turns out to be advantageous to refinance the loan before the end of its term. This may be done because interest rates have fallen enough to make it worthwhile for the borrower. In essence, a new loan is taken out for the payoff amount of the old loan. The proceeds of this new loan are used to extinguish the old loan and payments are begun on the new loan. If the fees are not too high to get the new loan, the periodic payment is often lower than before.

The HP12C Platinum TVM for loan refinancing

Under certain circumstances, original loan plans must be refinanced according to borrower and/or lender needs. In this case, the original loan is interrupted and a new one is taken over. The interest rate, monthly payment amount or term may change with the new loan. Depending on the interruption circumstances, some penalties expressed as percentage points may apply to the remaining loan balance.

The standard HP12C Platinum solves annuity problems with the five TVM keys [n], [i], [PV], [PMT] and [FV] and these allow loan refinancing problems to be solved easily. These TVM keys are associated to five registers: n, i, PV, PMT and FV. To set any of these registers to a known value, calculate or key its value in and press the corresponding key. To calculate any of the unknown values after entering each of the four known TVM values, simply press the key that represents the unknown value. The cash flow diagram shown in Figure 1 represents the borrower viewpoint of the most common loan refinancing problems and their relationship to the TVM variables.

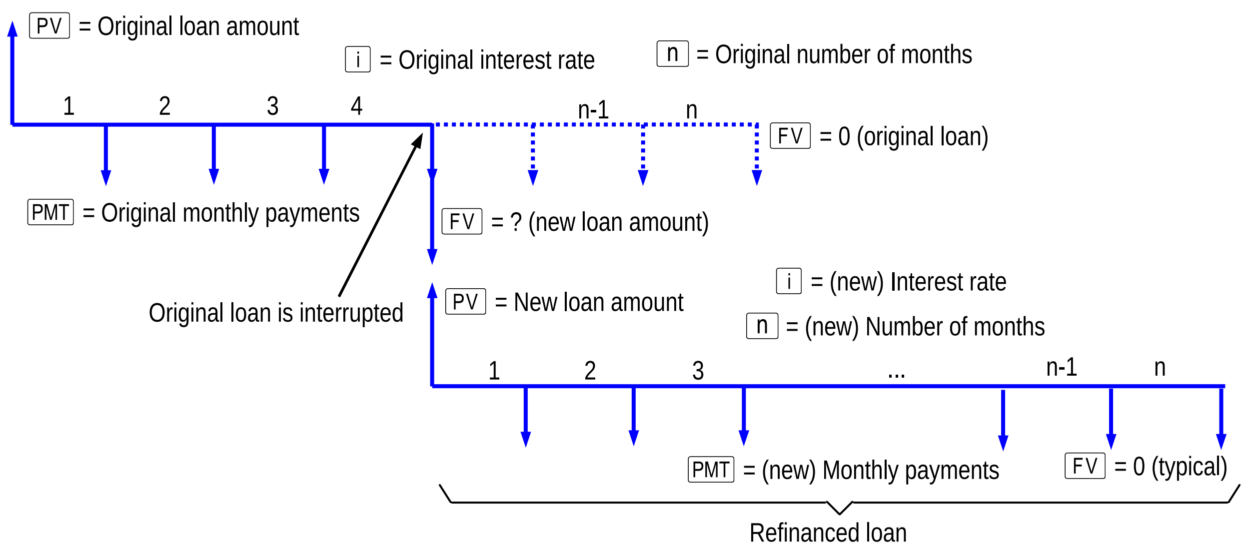


Figure 1

There are also two functions meant to be an aid when entering or retrieving annual values for n and i : 12x and 12÷. Pressing g 12x is the same as pressing ENTER 1 2 × n in RPN mode or × 1 2 = n in algebraic mode, meaning the number of years can be keyed in and stored as number of months automatically. Pressing g 12÷ is the same as pressing ENTER 1 2 ÷ i in RPN mode or ÷ 1 2 = i in algebraic mode, meaning the yearly interest rate can be keyed in and stored as monthly interest rate automatically. It is also possible to retrieve the yearly-related values by pressing RCL g 12x (number of years) and/or RCL g 12÷ (yearly interest rate) whenever necessary.

Practice solving loan refinancing problems

Example 1: A 2-year, $8,000 loan quoted at an 8.5%, compounded monthly interest rate is refinanced 10 months later. The borrower asks for a new 2-year loan where the principal is the current remaining balance of the original loan in order to reduce the monthly payment. Refinancing this loan requires a 0.5% fee of the remaining balance. What are the monthly payments of both the first loan and the refinanced one?

Solution: To calculate the monthly payment of the first loan:

In RPN mode: 8 0 0 0 PV 0 FV 8 • 5 g 12÷ 2 g 12x PMT
In algebraic mode: 8 0 0 0 PV 0 FV 8 • 5 g 12÷ 2 g 12x PMT PMT

-363.65

Figure 2

To calculate the remaining balance after 10 months:

1 0 n FV

-4,830.49

Figure 3

To calculate the principal of the new loan, add 0.5% to this value (take over fee), make it positive (CHS) and store it as PV:

In RPN mode: • 5 % + CHS PV
In algebraic mode: + • 5 % = CHS PV

4,854.64

Figure 4

To calculate the monthly payment of the refinanced loan, FV and n must be updated accordingly:

In RPN mode: 0 FV 2 g 12x PMT
In algebraic mode: 0 FV 2 g 12x PMT PMT

-220.67

Figure 5

Answer: The original loan had a $363.65 monthly payment, and the refinanced has a $220.67 monthly payment.

<u>Example 2:</u> Mark wants to buy a new car for his wife and agrees with a 1.5-year, $12,000 loan. The financial institution quotes this loan at 10.5%, compounded monthly. Six months later, Mark is offered an optional loan from another financial institution. The new loan is quoted at 9.25% and Mark asks that the number of payments be set to 12. A 1% fee will be added to the remaining loan balance for the principal of the new loan. What was the first loan monthly payment and what is the amount Mark is going to pay for the new one? Is it a good idea to change?

<u>Solution:</u> Set the known values for the first loan and calculate the PMT:

[1][2][0][0][0] [PV] [1][0][•][5] [g][12÷] [1][•][5] [g][12x] [0] [FV] [PMT]

Figure 6

To calculate the remaining balance of the original loan after 6 months, press:

[6] [n] [FV]

Figure 7

To calculate the principal of the new loan, add 1% to this value, make it positive ([CHS]) and store it as the PV:

In RPN mode: [1] [%] [+] [CHS] [PV]
In algebraic mode: [+][1] [%][=] [CHS] [PV]

Figure 8

To calculate the monthly payment of the refinanced loan, either FV, i and n must be updated accordingly:

[0] [FV] [9][•][2][5] [g][12÷] [1][2] [n] [PMT]

Figure 9

<u>Answer:</u> Both the original loan and the new loan monthly payments are respectively $723.45 and $725.87. Based on these figures, Mark should not refinance the loan, since his payment would increase.