HP 12c Platinum Financial Calculator – Basic Loan Calculations

Loan calculations

A loan is an agreement between two parties where one party borrows money and agrees to pay back to the other party (often a financial institution) over a set period of time with interest. The amount of money that is borrowed is called the principal and the interest is the payment for borrowing the money. The time set to pay back the loan is known as the term. Loan calculations are annuity problems involving TVM (time value of money) calculations involving the concepts of the present value of money (PV), future value of money (FV), periodic payments (PMT), interest rates (i), and number of periods (n).

The HP 12c Platinum TVM

Standard HP 12c Platinum features solve these types of problems with the five TVM keys [n], [i], [PV], [PMT] and [FV]. These keys are associated to the five TVM registers n, i, PV, PMT and FV. To set any of these registers to a known value, calculate or key it in and press the corresponding key. Enter each of the four known TVM values, press its related key, then press the key that represents the unknown, fifth value to calculate it.

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] [X] [n] in RPN mode or [X] [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.

Cash flow diagrams and sign conventions

The sign conventions for cash flows in the HP 12c Platinum 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 common mortgage problems with balloon payment and their relation to the TVM variables.

Figure : Cash flow diagram
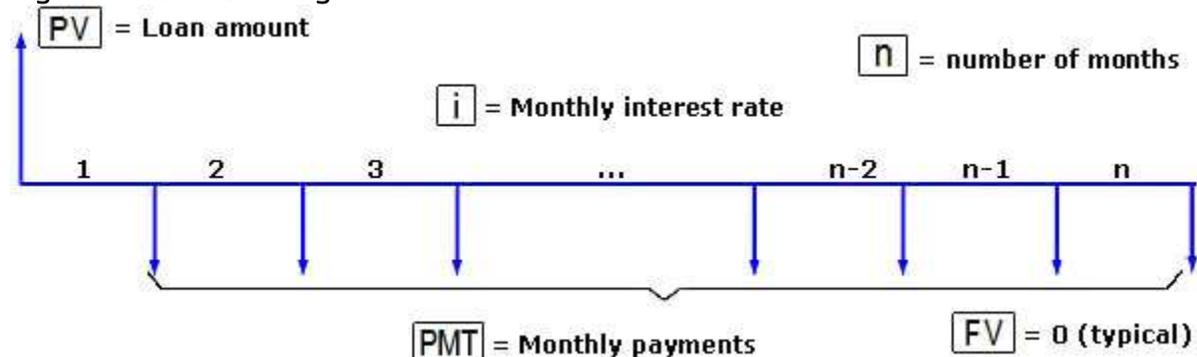
Practice solving loan problems

Example 1

To help sell used cars, a car dealer offers loans with a 10.5% annual percent rate compounded monthly with terms up to 4 years on vehicles from $7,000 to $9,000. Jim wants

to buy his dream $8,000 car and wants to know how much will he pay monthly in a 3-year plan.

Solution

Set the known values and calculate the PMT:

8 0 0 0 PV 1 0 . 5 g 12÷ 3 g 12x 0 FV PMT

Figure : Calculating the monthly payment

- 260.02

Answer

Jim will have to pay $260.02 monthly for the next three years to acquire his dream car.

Example 2

Solution

Since the previous data is still stored in the calculator, let us set only the new values and calculate the FV:

In RPN mode: 2 9 0 CHS PMT 2 g 12x FV

In algebraic mode: 2 9 0 CHS PMT 2 g 12x FV FV

Answer

With the new values, Jim will be able to liquidate the loan by paying back the amount of $2,152.99 after two years.

Example 3

The same car dealer in previous example sells new cars as well, and offers loans with a 13.75% annual percent rate, compounded monthly, with terms up to 3 years on vehicles from $9,000 to $18,000. Mark wants to buy a new $12,000 car for his wife and agrees to pay up to $490 a month. How many payments must be made to pay off the loan?

Solution

Set the known values and calculate n:

| 1 | 2 | 0 | 0 | 0 | PV | 1 | 3 | • | 7 | 5 | g | 12÷ | 4 | 9 | 0 | CHS |

| PMT | 0 | FV | n |

Figure : Calculating the number of monthly payments

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29.00
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Answer

It would require 29 monthly payments to pay for the new car.

Example 4

Mark wants to know if the final (29th) payment has the same amount as all others. Given that the HP 12c Platinum always calculates integers for n, what is the amount of the last payment? Assume that all previous values are still stored in the calculator.

Solution

Set the new n and calculate FV:

| 2 | 9 | n | FV |

Figure : Displaying the excess amount in the 29th payment

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44.82
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This means that 29 actual payments of $490 would actually overpay the loan by $44.82. To calculate the actual amount to be paid in the 29th payment, simply add the value in the display to the payment amount already available in PMT:

In RPN mode: | RCL | PMT | + |

In algebraic mode: | + | RCL | PMT | = |

Figure : Calculating the 29th payment

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-445.18
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Answer

The 29th payment will be $445.18.