hp calculators

HP 35s Loan down payments

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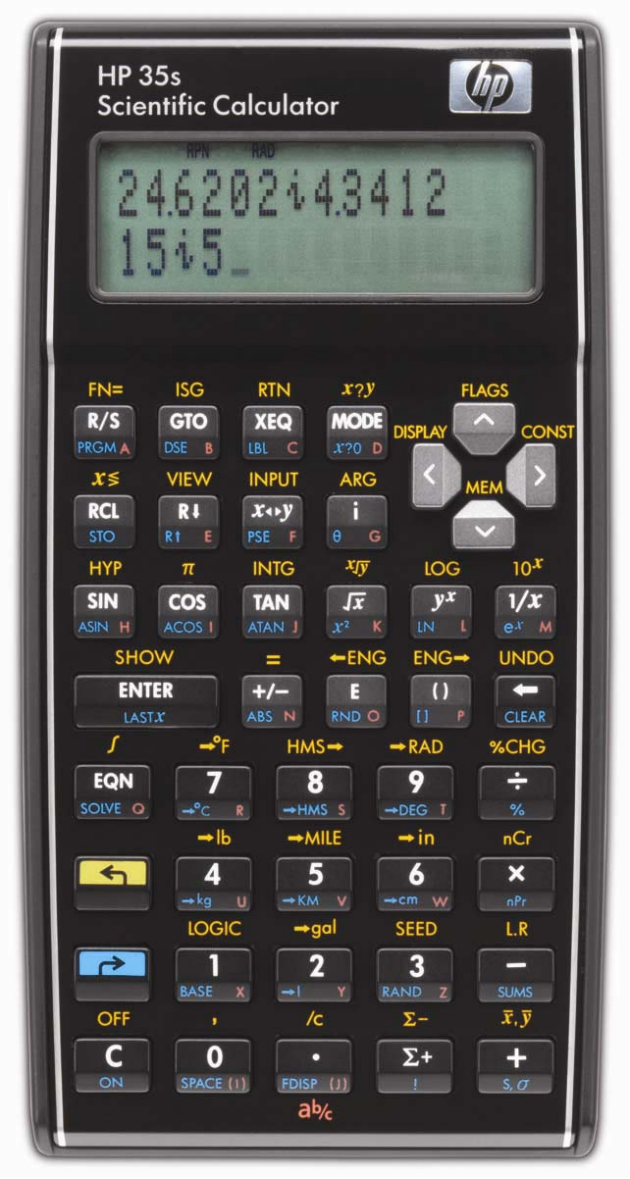

Loan down payments

Down payments are often made on loans to lower the required payment. Other reasons for down payments can be to ensure the loan applicant has an equity interest in the loan collateral, which would make the loan applicant less likely to abandon the property, since the property would be worth more than the loan balance. 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 be the required down payment.

The Time Value of Money on the HP 35s

To solve time value of money problems on the HP 35s, the formula below is entered into the flexible equation solver built into the calculator. This equation expresses the standard relationship between the variables in the time value of money formula. The formula uses these variables: *N* is the number of compounding periods; *I* is the *periodic* interest rate as a percentage (for example, if the *annual* interest rate is 15% and there are 12 payments per year, the *periodic* interest rate, *i*, is 15÷12=1.25%); *B* is the initial balance of loan or savings account; *P* is the periodic payment; *F* is the future value of a savings account or balance of a loan.

Equation: P x 100 x (1 - (1 + I ÷ 100)^ -N) ÷ I + F x (1 + I ÷ 100) ^ -N + B

To enter this equation into the calculator, press the following keys on the HP 35s:

EQN RCL P × 1 0 0 × ( ) 1 − ( ) 1 + RCL I ÷ 1 0 0) y^x
+/− RCL N) ÷ RCL I + RCL F × ( ) 1 + RCL I ÷ 1 0 0) y^x +/−
RCL N + RCL B ENTER

To verify proper entry of the equation, press

↶ SHOW

and hold down the SHOW key. This will display the equation's checksum and length. The values displayed should be a checksum of CEFA and a length of 41.

To solve for the different variables within this equation, the ↷ SOLVE button is used. This key is the right shift of the EQN key.

Notes for using the SOLVE function with this equation:

1) If your first calculation using this formula is to solve for the interest rate I, press 1 ↷ STO I before beginning.
2) Press EQN. If the time value of money equation is not at the top of the list, press ^ or v to scroll through the list until the equation is displayed.
3) Determine the variable for which you wish to solve and press:
   a) ↷ SOLVE N to calculate the number of compounding periods.
   b) ↷ SOLVE I to calculate the periodic interest rate. Note: this will need to be multiplied by the number of compounding periods per year to get the annual rate. If the compounding is monthly, multiply by 12.
   c) ↷ SOLVE B to calculate the initial balance (or Present Value) of a loan or savings account.
   d) ↷ SOLVE P to calculate the periodic payment.

e) [↗] [SOLVE] [F] to calculate the future value of a loan or savings account.

4) When prompted, enter a value for each of the variables in the equation as you are prompted and press [R/S]. The solver will display the variables' existing value. If this is to be kept, do not enter any value but press [R/S] to continue. If the value is to be changed, enter the changed value and press [R/S]. If a variable had a value in a previous calculation but is not involved in this calculation (as might happen to the variable P (payment) when solving a compound interest problem right after solving an annuity problem), enter a zero for the value and press [R/S].
5) After you press [R/S] for the last time, the value of the unknown variable will be calculated and displayed.
6) To do another calculation with the same or changed values, go back to step 2 above.

The SOLVE feature will work effectively without any initial guesses being supplied for the unknown variable with the exception noted above about the variable I in this equation. This equation follows the standard convention that money in is considered positive and money out is negative.

The practice problems below illustrate using this equation to solve a variety of loan down payment problems.

Practice solving loan down payment problems

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

Solution: First, enter the time value of money equation into the HP 35s solver as described earlier in this document. Press [EQN] and press [^] or [v] to scroll through the equation list until the time value of money equation is displayed. Then compute the present value of a loan for 72 months of $400 per month at Leigh Anne's interest rate. To do this, press:

[↗] [SOLVE] [B]

The HP 35s SOLVER displays the first variable encountered in the equation as it begins its solution. The value of 0.0000 is displayed below if this is the first time the time value of money equation has been solved on the HP 35s calculator. If any previous equations have used a variable used in the time value of money equation, they may already have been assigned a value that would be displayed on your HP 35s display. Follow the keystrokes shown below and the solution should be found as described.

Figure 1

In either RPN or algebraic mode, press: [4] [0] [0] [R/S]

Figure 2

In RPN mode, press: [6] [.] [9] [ENTER] [1] [2] [÷] [R/S]
In algebraic mode, press: [6] [.] [9] [÷] [1] [2] [ENTER] [R/S]

Figure 3

In either RPN or algebraic mode, press: 7 2 R/S

Figure 4

In either RPN or algebraic mode, press: 0 R/S

Figure 5

With a payment of $400 per month, Leigh Anne can afford a loan amount of $23,527.99. To buy the car costing $25,000, Leigh Anne must make a down payment of the difference.

In RPN mode, press: 2 5 0 0 0 +
In algebraic mode, press: + 2 5 0 0 0 ENTER

Figure 6

Answer: To lower her monthly payment to $400, Leigh Anne needs to make a $1,472.01 down payment.

Example 2: Jane is looking to buy a house and can afford a payment of $1,200 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: First, enter the time value of money equation into the HP 35s solver as described earlier in this document. Press EQN and press ↑ or ↓ to scroll through the equation list until the time value of money equation is displayed. Then compute the present value of a loan for 72 months of $400 per month at Jane's interest rate. To do this, press:

↻ SOLVE B

The HP 35s SOLVER displays the first variable encountered in the equation as it begins its solution. The displays for these prompts are not shown in this example. Follow the keystrokes shown below and the solution should be found as described.

In RPN mode, press:	1 4 0 0 R/S	(Enters P)
	5 . 4 ENTER 1 2 ÷ R/S	(Enters I)
	3 0 ENTER 1 2 × R/S	(Enters N)
	0 R/S	(Enters F)
In algebraic mode, press:	1 4 0 0 R/S	(Enters P)
	5 . 4 ÷ 1 2 ENTER R/S	(Enters I)
	3 0 × 1 2 ENTER R/S	(Enters N)
	0 R/S	(Enters F)

Figure 7

With a payment of $1,400 per month, Jane can afford a loan amount of $249,318.47. To buy the house costing $270,000, Jane must make a down payment of the difference.

In RPN mode, press:	2 7 0 0 0 0 +
In algebraic mode, press:	+ 2 7 0 0 0 0 ENTER

Figure 8

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