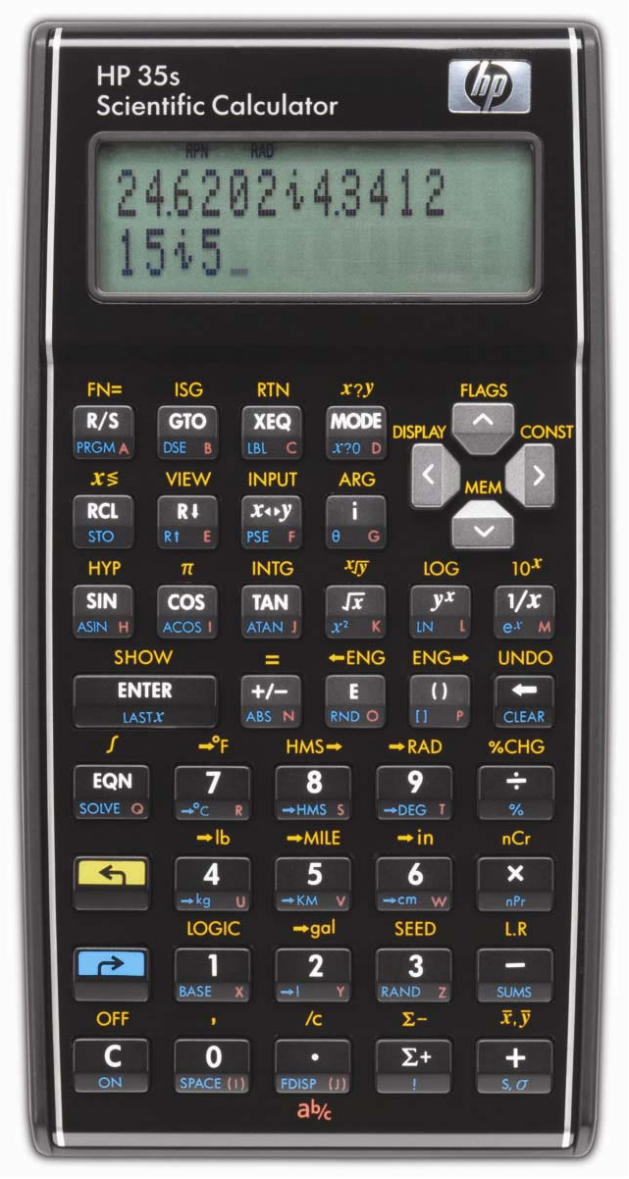
hp calculators

HP 35s Present value

Present value

The Time Value of Money on the HP 35s

Practice solving for the present value of future cash flows



Present value

Many problems involving the time value of money require the conversion of monies to be received in the future into the equivalent monies today. This conversion is the computing of the present value of the monies being received in the future. There are many benefits from this conversion to a present value, including the ability to better visualize the real magnitude of future expenditures or receipts as well as the direct comparison using values today of alternative future receipts or expenditures.

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 problems involving present values.

Practice solving for the present value of future cash flows

Example 1: If you are to pay $50,000 in 6 years, what is this worth in today's dollars, assuming interest is applied at 8%, compounded quarterly?

Solution: First, enter the time value of money equation into the HP 35s solver as described earlier in this document.

Then press [EQN] and press [^] or [v] to scroll through the equation list until the time value of money equation is displayed. Then 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

Since this is a compound interest example and does not have a series of equal-sized, equal-spaced payments, the value or P is zero.

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

Figure 2

In RPN mode, press: [8] [ENTER] [4] [÷] [R/S]
In algebraic mode, press: [8] [÷] [4] [ENTER] [R/S]

Figure 3

In RPN mode, press: 6 ENTER 4 × R/S
In algebraic mode, press: 6 × 4 ENTER R/S

Figure 4

In either RPN or algebraic mode, press: 5 0 0 0 0 +/- R/S
(Since the money is being paid out in the future, it is entered as a negative number)

Figure 5

Answer: The equivalent amount this is equal to in today's dollars is $31,086.07.

Example 2: Darryl has won a contest that will pay him $500 per month for the next 20 years. If interest is 6%, compounded monthly, what is the amount today this prize is worth?

Solution: First, enter the time value of money equation into the HP 35s solver as described earlier in this document.

Then press EQN and press ↑ or ↓ to scroll through the equation list until the time value of money equation is displayed. Then press:

↗ SOLVE B

The HP 35s SOLVER displays the first variable encountered in the equation as it begins its solution. The displays shown in the figures below assume the preceding example has just been worked. Follow the keystrokes shown below and the solution should be found as described.

Figure 6

In either RPN or algebraic mode, press: 5 0 0 +/- R/S

Figure 7

In RPN mode, press: 6 ENTER 1 2 ÷ R/S
In algebraic mode, press: 6 ÷ 1 2 ENTER R/S

Figure 8

In RPN mode, press: 2 0 ENTER 1 2 × R/S
In algebraic mode, press: 2 0 × 1 2 ENTER R/S

Figure 9

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

Figure 10

Answer: The equivalent amount in today's dollars is $69,790.39.

Example 3: Dan will receive $40 per month for the next five years and a single payment 60 months from today of $2,000. If interest is 5.5%, compounded monthly, what is the present value of these cash flows?

Solution: First, enter the time value of money equation into the HP 35s solver as described earlier in this document.

Then press EQN and press ^ or v to scroll through the equation list until the time value of money equation is displayed. Then 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:	4 0 R/S	(Enters P)
	5 . 5 ENTER 1 2 ÷ R/S	(Enters I)
	5 ENTER 1 2 × R/S	(Enters N)
	2 0 0 0 R/S	(Enters F)
In algebraic mode, press:	4 0 R/S	(Enters P)
	5 . 5 ÷ 1 2 ENTER R/S	(Enters I)
	5 × 1 2 ENTER R/S	(Enters N)
	2 0 0 0 R/S	(Enters F)

Figure 11

Answer: The equivalent amount in today's dollars is $3,614.21.