Present Value of an Ordinary Annuity

The present value of an annuity is the single sum of money needed to generate a specific number of payments. Specifically, how much money must be deposited today so that a set amount of money can be withdrawn at regular time intervals?

Objectives:

- Determine the amount of money that must be invested so that a set amount of money can be withdrawn at regular time intervals.
- Determine the cash price of an item when the monthly payment, the number of payments, and the interest rate are known.

Example 1:

What amount of money must be invested today at 6% compounded monthly so that payments of $100 per month can be made from this fund for 5 years?

Method 1: Using the **Finance Solver**

1. Press ⌂on, and select **New** to start a new document. Select **Add Calculator**.

   Note: To round computations to two decimal places, change the Display Digits setting in the Documents Settings to **Fix 2**.
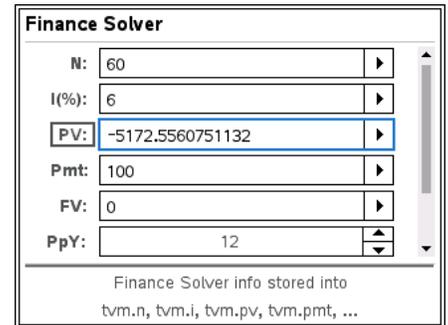
2. Press **Menu > Finance**. Select **Finance Solver**.

   To move from row to row in the Finance Solver, press ⎡tab⎤.

3. Enter N = 60, I(%) = 6, Pmt = 100, FV = 0, PpY = 12, and CpY = 12.

4. Place the cursor in the Present Value (PV) row. Press ⎡enter⎤ to calculate the Present Value.

   Note the presence of the rectangle around PV, which indicates that PV has been calculated for the given input values.

An amount of $5,172.56 must be invested today.

Finance Solver	
N:	60
I(%):	6
PV:	−5172.5560751132
Pmt:	100
FV:	0
PpY:	12

Finance Solver info stored into
tvm.n, tvm.i, tvm.pv, tvm.pmt, …

Method 2: Using the **tvmPV** function

1. Press ⎡esc⎤ to exit the Finance Solver. On the Calculator page, press **Menu > Finance**, and select **TVM Functions**.

2. Select **Present Value**.

   This will paste the **tvmPV** function on the Calculator page.

   The syntax for this function is **tvmPV**(N, I, Pmt, FV, PpY, CpY).

3. For this particular exercise, enter **tvmPV**(60,6,100,0,12,12). Press ⎡enter⎤.

1.1 ▶	*Doc	RAD
tvmPV(60,6,100,0,12,12)		−5172.56
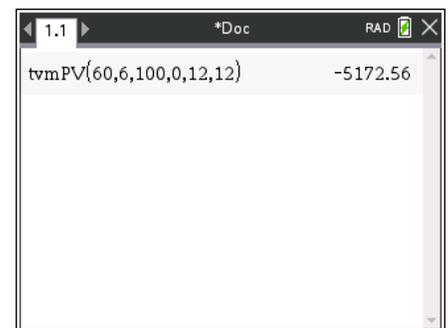
Example 2:

The H Club has decided to hold a raffle. The prize is $100 a month for 5 years. The club can invest at 6% compounded monthly. What does the club need to invest to pay the prize?

1. Press [⌂ on], and select **New** to start a new document. Select **Add Calculator**. Press **Menu > Finance**. Select **Finance Solver**.

2. Enter N = 60, I(%) = 6, Pmt = 100, FV = 0, PpY = 12, and CpY = 12.

    Note: PMT is positive because the investment is viewed as producing $100 per month.

3. Place the cursor in the Present Value (PV) row. Press [enter] to calculate the Present Value.

The present value PV is negative $5,172.56 because that is what the club must pay to "buy" the prize.
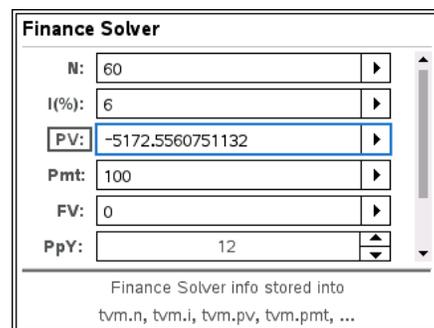
If the Club takes in $10,000, how much profit will it make on the raffle?

Method 1: Using the **PV** variable

The calculation is 10000 + PV because the PV is negative, an expenditure for the club.

1. Press [esc] to exit the Finance Solver.

2. On the Calculator page, enter 10000 [+].

3. To locate the variable PV, press [var], and select **tvm.pv**.

4. This will paste the variable PV on the Calculator page. Press [enter].

The club will make $4,827.44.

    Note: Values entered and calculated in the Finance Solver are saved as variables and accessed by pressing the [var] key.
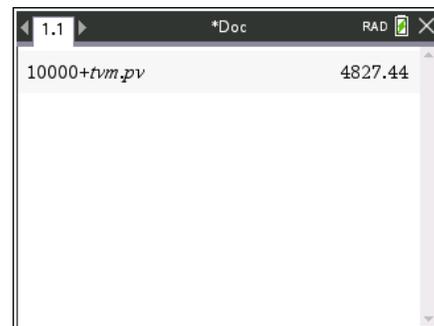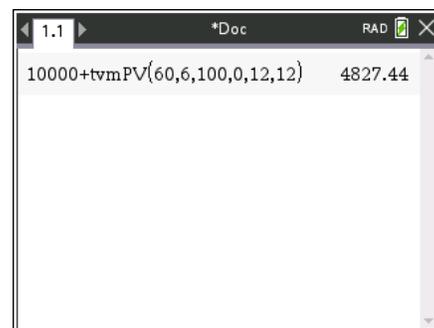
Method 2: Using the **tvmPV** function

1. On the Calculator page, enter 10000 [+].

2. Press **Menu > Finance**, and select **TVM Functions**.

3. Select **Present Value**.

    This will paste the **tvmPV** function on the Calculator page.

    The syntax for this function is **tvmPV**(N, I, Pmt, FV, PpY, CpY).

4. For this particular exercise, enter **tvmPV**(60,6,100,0,12,12), and press [enter].

Example 3:

Newlyweds purchased a television set for $100 down and $30 a month for 12 months. If the finance charge is 15% compounded monthly, find the cash price.

1. Press ⌂on, and select **New** to start a new document. Select **Add Calculator**. Press **Menu > Finance**. Select **Finance Solver**.

2. Enter the values shown. Move the cursor to PV and press enter.

   PV is shown as a negative number, -332.38, because it is a payout. The total cash price is the sum of the present value and the $100 down payment. Since the down payment is also a payout, it must be entered as a negative number. Thus the total cash price is PV + (-100) or PV – 100.

3. Press esc to exit the Finance Solver.

4. On the Calculator page, enter PV. To locate the variable PV, press var, and select **tvm.pv**.

5. Press − 100 enter.

   The total cash price is $432.38. The newlyweds will pay $30 * 12 + $100 = $460 for the television using the installment option.