

## B-19 Analyzing Financial Situations Using the TVM Solver

### Part 1: Introducing the TVM Solver

Press **MODE** and change the fixed decimal mode to 2, because most of the values that you are working with here represent dollars and cents. Scroll down to **Float**, across to **2**, and press **ENTER**.

Press **APPS** and then select **1:Finance**. From the Finance CALC menu, select **1:TVM Solver**. The screen that appears should be similar to the second one shown, but the values may be different.



You will notice eight variables on the screen.

- N** total number of payment periods, or the number of interest conversion periods for simple annuities
- I%** annual interest rate as a percent, not as a decimal
- PV** present or discounted value
- PMT** regular payment amount
- FV** future or accumulated value
- P/Y** number of payment periods per year
- C/Y** number of interest conversion periods per year
- PMT** Choose **BEGIN** if the payments are made at the beginning of the payment intervals. Choose **END** if the payments are made at the end of the payment intervals.

You may enter different values for the variables. Enter the value for money that is *paid* as a negative number, since the investment is a cash outflow; enter the value of money that is *received* as a positive number, since the money is a cash inflow. When you enter a whole number, you will see that the calculator adds the decimal and two zeros.

To solve for a variable, move the cursor to that variable and press **ALPHA** **ENTER**, and the calculator will calculate this value. A small shaded box to the left of the line containing the calculated value will appear.

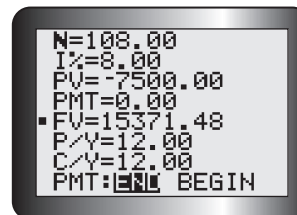
## Part 2: Determining Future Value and Present Value

### EXAMPLE 1

Find the future value or amount of \$7500 invested for nine years at 8%/a, compounded monthly.

#### Solution

The number of interest conversion periods, **N**, is  $9 \times 12 = 108$ , **I%** = 8, and **PV** = -7500. The value for present value, **PV**, is negative, because the investment represents a cash outflow. **PMT** = 0 and **FV** = 0. The payments per year, **P/Y**, and the compounding periods per year, **C/Y**, are both 12. Open the **TVM Solver** and enter these values. Scroll to the line containing **FV**, the future value, and press **ALPHA** **ENTER**.



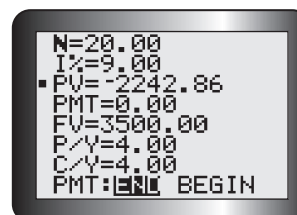
The investment will be worth \$15 371.48 after nine years.

### EXAMPLE 2

Maeve would like to have \$3500 at the end of five years, so she can visit Europe. How much money should she deposit now in a savings account that pays 9%/a, compounded quarterly, to finance her trip?

#### Solution

Open the **TVM Solver** and enter the values shown in the screen, except the value for **PV**. The value for **FV** is positive, because the future value of the investment will be “paid” to Maeve, representing a cash inflow. Scroll to the line containing **PV** and press **ALPHA** **ENTER** to get -2242.86. The solution for **PV** is negative, because Maeve must pay this money and the payment is a cash outflow.



## Part 3: Determining the Future or Accumulated Value of an Ordinary Simple Annuity

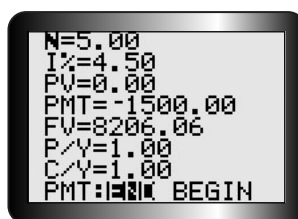
### EXAMPLE 3

Celia deposits \$1500 at the end of each year in a savings account that pays 4.5%/a, compounded annually. What will be the balance in the account after five years?

#### Solution

$N = 5$  and  $I\% = 4.5$ . Because there is no money in the account at the beginning of the term,  $PV = 0$ .  $PMT = -1500$ . The payment,  $PMT$ , is negative, because Celia makes a payment, which is a cash outflow.  $P/Y = 1$  and  $C/Y = 1$ . Open the **TVM Solver** and enter these values.

Scroll to the line containing **FV** and press **ALPHA** **ENTER**.



The balance in Celia's account at the end of the year will be \$8206.06.

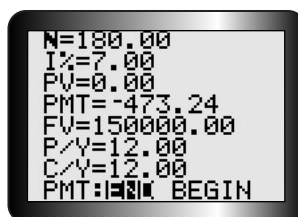
### EXAMPLE 4

Mr. Bartolluci would like to have \$150 000 in his account when he retires in 15 years. How much should he deposit at the end of each month in an account that pays 7%/a, compounded monthly?

#### Solution

Open the **TVM Solver** and enter the values shown, except for  $PMT$ . Note that  $N = 12 \times 15 = 180$ , and the future value,  $FV$ , is positive, since he will receive the money at some future time. Scroll to the line containing  $PMT$  and press

**ALPHA** **ENTER**.



Mr. Bartolluci must deposit \$473.24 at the end of each month for 15 years. The payment appears as  $-473.24$ , because it is a cash outflow.

## Part 4: Determining Present or Discounted Value of an Ordinary Simple Annuity

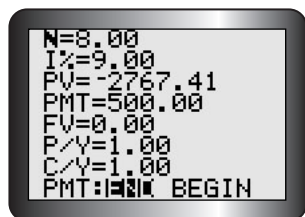
### EXAMPLE 5

Northern Lights High School wishes to establish a scholarship fund. A \$500 scholarship will be awarded at the end of each school year for the next eight years. If the fund earns 9%/a, compounded annually, what does the school need to invest now to pay for the fund?

#### Solution

Open the **TVM Solver** and enter 8 for **N**, 9 for **I%**, and 500 for **PMT**. The value for **PMT** is positive, because someone will receive \$500 each year. Enter 0 for **FV**, since the fund will be depleted at the end of the term. Enter 1 for both **P/Y** and **C/Y**. Scroll to the line containing **PV** and press **ALPHA** **ENTER**.

The school must invest \$2767.41 now for the scholarship fund. The present value appears as  $-2767.41$ , because the school must pay this money to establish the fund. The payment is a cash outflow.



### EXAMPLE 6

Monica buys a snowboard for \$150 down and pays \$35 at the end of each month for 1.5 years. If the finance charge is 16%/a, compounded monthly, find the selling price of the snowboard.

#### Solution

Open the **TVM Solver** and enter the values as shown in the screen, except the value for **PV**. The payment, **PMT**, is positive, because the payments are a cash inflow for the snowboard's seller. Scroll to the line containing **PV** and press **ALPHA** **ENTER**.

The present value is \$556.82. The present value appears as a negative value on the screen, because it represents what Monica would have to pay now if she were to pay cash.

The selling price is the sum of the positive present value and the down payment. Since the down payment is also a payment, add both numbers. The total cash price is  $PV + \$150 = \$706.82$ . Under this finance plan, Monica will pay  $\$35 \times 18 + \$150 = \$780$ .

