7.4 Solve Financial Problems Using Technology

Student Text Pages
367–371

Suggested Timing
75–110 min

Materials and Technology Tools
- graphing calculators with TVM Solver
- calculators (if TVM Solver is not available)
- overhead projector (optional)
- computers with Internet access (optional)

Related Resources
- BLM 7–8 Section 7.4 Solve Financial Problems Using Technology

Teaching Suggestions

- Ask students how easy it would be for them to solve for the interest rate and the compounding period of an investment using the compound interest formula. Tell students that computer software and graphing calculators have built-in applications to overcome these difficulties.
- Introduce to students that with the TVM Solver they can move from a formula-based algorithmic method to a more efficient technology-based method of problem solving. Technology speeds up the financial calculations, allowing more time to concentrate on their implications, which results in more efficient decision making.

Investigate

- Have students work through the Investigate. Ensure that the use of the TVM Solver is clearly understood.
- Ensure that students know the meaning of each variable in the TVM Solver.
- Explain to students that N represents the term of the investment in years, and is different from the exponent n in the formula $FV = PV(1 + i)^n$. Student should enter I% as a percent and not as a decimal.
- Students must also be very clear about how C/Y links N to n and I% to i.

Investigate Responses (page 367)

3. When a TVM solver is used to solve financial problems, the values entered for present value and future value are always taken from the perspective of the participant in the transaction. In this case, the perspective is that of the person who is investing the money. At the beginning the money (present value) is given to the bank, so it is a cash out or negative transaction for the investor. At the end of the 3 years, the investor gets the money back (future value) from the bank, so it is a cash in or positive transaction.

4. If the same transaction is considered from the point of view of the bank, the present value will be positive because the bank is getting the money. At the end of 3 years, the bank has to pay the investor, so the future value will be considered negative.

Examples

- You may wish to go through the solution to each example using an overhead projector or other appropriate technology (for example, a SmartBoard).
- In **Example 2**, go through both methods (TVM Solver and calculator) so students can see that either method is appropriate.
- You might need to work through more examples with students to ensure student understanding.

Communicate Your Understanding

- See notes on Investigate.
- You may wish to use **BLM 7–8 Section 7.4 Solve Financial Problems Using Technology** for remediation or extra practice.

Common Errors

- Some students may have difficulty in using a TVM Solver.

R_x Have students take time to work through the steps in the Investigate or the examples. Provide additional problems for more practice on the skills.

Ongoing Assessment

- Assess students' ability to translate word problems into a sequence of keys that they can input into their calculator. Have them write the key sequences to verify understanding.

Accommodations

Gifted and Enrichment–compare the use of a spreadsheet to the use of a TVM Solver; give advantages and disadvantages of each

Memory–use index cards with calculator sequences

Student Success

- Encourage students to write on index cards the calculator sequences required to access the TVM Solver and the meaning of each variable in order to correctly determine the future value, the time it takes an investment to grow, and the interest rate of a loan.

Communicate Your Understanding Responses (page 370)

C1 In the compound interest formula, the variable i represents the percent interest, in decimal form, for each compounding period. Based on the simple interest formula, the value of i is the product of r, the annual rate of interest, and t, the time in years.

In the TVM Solver, I% also represents an interest rate, but there are two key differences. The first is that I% is not given in decimal form. For an annual interest rate of 6% per year, compounded annually, the i in the compound interest formula will be 0.06 and the I% in the TVM Solver will be 6. The second is that the i in the compound interest formula changes with the compounding period for the same annual interest rate r. For the annual interest rate of 6%, compounded quarterly, i will be 0.015. However, the I% in the TVM Solver will still be 6. The quarterly compounding is taken care of by the P/Y or C/Y in the TVM Solver.

C2 In the compound interest formula, the variable n represents the number of compounding periods per year. If the number of compounding periods per year is 1, then the value of C/Y will be 1. In this case, the N in the TVM Solver, which represents the term of investment, in years, will be the same as n in the compound interest formula.

However, if the number of compounding periods per year is not 1, the n in the compound interest formula will be different from the N in the TVM Solver. For example, if the compounding is monthly over a term of 5 years. N = 5 and C/Y = 12 in the TVM Solver, whereas $n = 60$ in the compound interest formula.

Practise, Connect and Apply, Extend

- Have students read each question carefully.
- For **questions 1 to 4**, ask students to identify which variable to solve for before they make the calculations.
- **Question 5** encourages students to use a TVM Solver, if it is available, to find the value of N, and thus the value of n, the number of compounding periods.
- Without a TVM Solver, students may use guess and check or systematic trial to find how long it takes an investment to grow to a desired amount at a given interest rate.
- Stress the importance of **question 12**. On-line calculators abound. Anyone with Internet access can have the answers to common financial problems in seconds!
- An alternative to a TVM Solver is to visit the Internet and use the on-line calculators. Most financial institutions have on-line calculators on their Web sites. Students can search the financial institution that their family often deals with.

Mathematical Processes Integration

The table shows questions that provide good opportunities for students to use the mathematical processes.

Process Expectations	Selected Questions
Problem Solving	11, 12, 15–18
Reasoning and Proving	16, 18
Reflecting	17, 18
Selecting Tools and Computational Strategies	1–18
Connecting	7, 8, 11, 12, 15, 17, 18
Representing	18
Communicating	16, 18