8.5 Effects of Changing Conditions on Investments and Loans

Student Text Pages
446–453

Suggested Timing
80 min

Tools
• graphing calculator

Related Resources
BLM 8-9 Section 8.5 Effects of Changing Conditions on Investments and Loans
BLM 8-10 Section 8.5 Achievement Check Rubric
BLM A-9 Communication General Scoring Rubric

Warm-Up
Use the TVM Solver to solve the following.
1. Find the final value of a $500 loan, at 4% per year, compounded semi-annually for 3 years.
2. Find the present value of $6000, due in 2 years, discounted at 4.2% per year, compounded quarterly.

Warm-Up Answers
1. $563.08
2. $5519.00

Teaching Suggestions

Warm-Up
- Write the Warm-Up questions on the board or on an overhead. Have students complete the questions independently. Then, discuss the solutions as a class.

Section Opener
- Discuss real-world conditions of investments and loans. Conditions such as the term, the number of compounding periods, and interest rate often are hidden in the small print, and can often change. An ability to adjust the calculations is helpful to an educated consumer.

Investigate
- Have students work though the Investigate as an introduction to the lesson. Discuss the outcomes and how changing the terms will affect the value significantly.
- In **question 1, part c)**, students are asked to use technology. The TVM Solver or a scientific calculator can be used.
- In **question 3**, students are asked to predict the value of an investment. Ask them to justify their response.

Investigate Answers (pages 446–447)

1. **a)** $767.27
   b) Answers may vary.
   c) Answers may vary. The value is $1129.62
2. Doubling an interest rate increases the value of the investment. The amount does not double but the total interest is more than double. Explanations may vary.
3. **a)** The value of investment will be more than doubled due to the effects of compounding.
   b) Answers may vary.
4. Doubling the time money is invested increases the value of the investment. The investment does not double but the total interest is more than double. This is the effect of compounding interest.

Examples

- Have students work through Example 1 themselves so they can see the results on the graphing calculator screen. Discuss the differences in the growth as term increases.
- In Example 2, go through both methods (TVM Solver and scientific calculator) so that the students see that either method is appropriate and relatively easy to use.

Key Concepts

- Go over the Key Concepts as a class. Stress that doubling the time or interest rate does not double the value of the investment.

Discuss the Concepts

- **Questions D1 and D2** are good indicators of students' level of understanding of the effects of changes on an investment or loan. Have students discuss these questions with a partner or in small groups before taking them up as a class.

Discuss the Concepts Suggested Answers (page 449)

D1. Quarterly compounding will provide a greater amount of interest because there are more compounding periods in one year than with semi-annual compounding.

D2. No. The debtor actually pays more interest, which benefits the creditor.

Practise (A)

- Assign **questions 1 to 4**, as they cover the basic topics of this section.

Apply (B)

- **Question 5** is a good communication question and allows students to write about what they see.
- **Question 10** is a good example of how interest rates are hidden. Students may be shocked at the results. Remind them to take 10% off the paycheque as the principal and let the total value of the paycheque be the final amount.
- **Question 11** links to the Chapter Problem. Remind students to keep the solution to this question handy as the methods they use may help them with the Chapter Problem Wrap-Up.
- **Question 11, part b)**, and **question 16, part c)**, are Literacy Connects. You may wish to assign these parts as journal entries or to discuss the questions as a class. Literacy Connect questions offer the opportunity to explore literacy issues in the mathematics classroom and within the context of mathematics.
- **Question 14** is an Achievement Check question. You may wish to use **BLM 8-10 Section 8.5 Achievement Check Rubric** to assist you in assessing your students.
- In **question 15**, suggest to students that they reinvest the final amount of the first investment.

Common Errors

- Some students may get confused about whether the question asks for the final amount or present value.

R_x Have students draw a time line to illustrate when the given payment occurs and when the needed payment is calculated.

Accommodations

Visual—allow oral responses

Perceptual—use computer software with colour graphing

Motor—use technology for graphing

Apply (C)

- Assign the Extend questions to students who are not being challenged by the questions in Apply.
- **Question 16** is an excellent application for students planning on going into finance at community college. When making a purchase, you must consider the loss of interest when withdrawing the cash from the bank. The formulas will therefore be the same.

Achievement Check Answers (page 452)

14. a)

	Interest Rate per Year (%)	Compounding Period	Present Value Needed ($)
A	7	monthly	$PV = 10\,000\left(1+\frac{0.07}{12}\right)^{-12\times5}$ $= 7054.05$
B	8	semi-annually	$PV = 10\,000\left(1+\frac{0.08}{2}\right)^{-2\times5}$ $= 6755.64$
C	6.5	daily	$PV = 10\,000\left(1+\frac{0.065}{365}\right)^{-365\times5}$ $= 7225.48$

b) 7.39%

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	8, 9, 11, 14–16
Reasoning and Proving	1–3, 6, 8, 9, 12, 14, 16
Reflecting	12, 14, 16
Selecting Tools and Computational Strategies	1, 4–12, 14–18
Connecting	7, 10, 13, 18
Representing	2
Communicating	2, 5, 9, 11, 16

Ongoing Assessment

- Assess students' ability to communicate mathematically, and to justify their thinking. You may wish to use **BLM A-9 Communication General Scoring Rubric** to assist you in assessing your students.

Extra Practice

- You may wish to use **BLM 8-9 Section 8.5 Effects of Changing Conditions on Investments and Loans** for remediation or extra practice.