8.2 Compound Interest

Link to Prerequisite Skills
Students should have completed **question 7** before proceeding with this section.

Warm-Up
1. If you received something annually, how often would you receive it?
2. If you received something semi-annually, how often would you receive it?
3. If you received something quarterly, how often would you receive it?
4. Calculate.
   a) one half of $200   b) one half of $300   c) one quarter of $100
   d) one quarter of $700   e) one twelfth of $60   f) one twelfth of $900

Warm-Up Answers

1. once a year
2. twice a year
3. four times a year
4. a $100   b) $150   c) $25   d) $175   e) $5   f) $75

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
• After going through the Warm-Up, discuss the table on page 430. Explain the meaning of each compounding period, and that interest is paid more often, but less interest is paid each time.

Examples
• Have students work through the Examples, stressing the difference between the compounding periods. You may also wish to include examples involving annual and quarterly compounding. The use of a time-line helps the students visualize the compounding periods.
• You should expect students to write down the values of I, P, and n before substituting so that they can look back at what they are substituting into the formula, and why.
• Discuss how banks often offer different compounding periods on loans and investments. Comment that daily interest savings accounts are calculated as simple interest on the minimum daily balance The sum of these daily amounts of interest is added into the account at the end of each month.

Key Concepts
- Review the Key Concepts and suggest that the students write them in their notebooks and highlight the definitions of P, I, and n.

Discuss the Concepts
- **Question D1** is a good exercise in visualizing the compounding periods by drawing time lines.
- For **question D2**, students may have difficulty explaining why this formula can be used for both investing and borrowing. You may need to explain that when you borrow, someone else is lending, or investing in you.

Discuss the Concepts Suggested Answers (page 432)

D1. a) (time line from 2007 to 2010)

b) (time line from 2007 to 2009)

c) (time line from 2007 to 2009)
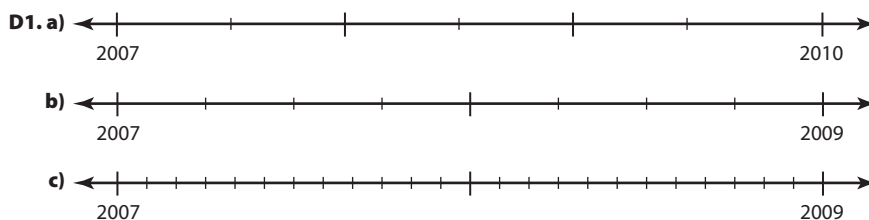
D2. Answers may vary. Sample answer: Interest charged on debts compounds in the same way as investments earn interest.

Practise (A)
- Assign **questions 1 to 5** to give plenty of practice with the compound interest formula, and of understanding the changes in compound interest periods.

Apply (B)
- **Question 8** allows students to compare growth rates in early years with those in later years.
- **Question 9** shows students how greater rates of interest on a smaller investment can provide greater returns than lower rates with a larger investment.
- **Question 11** is important because it has students research current interest rates and gives students a better understanding of real banking situations.
- **Question 14** applies the compound interest formula to population growth. Describe projected growth rate as the rate of growth at which planners are expecting the population to grow. Ask student why the formula would be the same.
- **Question 15** is an excellent opportunity to get students to understand how consumer finance works in many businesses, and the pitfalls of not reading the fine print.
- **Question 16** is an Achievement Check question. You may wish to use **BLM 8-5 Section 8.2 Achievement Check Rubric** to assist you in assessing your students.

Extend (C)
- Assign the Extend questions to students who are not being challenged by the questions in Apply.
- In **question 17**, students should substitute the final value of the initial investment into the compound interest formula, as the principal for the second investment.
- In **question 18**, students will need to determine the rate of interest for the period specified, before multiplying by the appropriate factor to find the rate of interest for the entire year.

- Some students may neglect to convert the time or interest rate relative to the compounding period.

- R_x Remind students to read the problem carefully and to write down key words that will remind them to convert the values appropriately.

Accommodations

Gifted—research current rates of other types of savings bonds and compare to Ontario Savings Bonds

Language—simplify instructions and provide additional scaffolding for Achievement Check

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Achievement Check Answers (page 435)

16. a) Robert: $10 828.57; David: $11 146.21; Donna: $11 728.88. Donna has $900.31 more than Robert and $582.67 more than David. David has $317.64 more than Robert.

    b) As time goes on, all the amounts will increase and the differences between them will also increase.

Literacy Connections

- Distribute copies of **BLM 8-6 Section 8.2 Literacy Connect**. Have students read the article related to compound interest individually, then work in pairs to complete a response to the **After Reading** questions.
- This activity can be assigned at any convenient time within the days allotted for chapter 8 work. You may wish to assign it as a project for pairs, for a mark.
- You may wish to use **BLM A-18 Opinion Checklist** to assess students' responses to this literacy activity.

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	10, 12, 17, 19
Reasoning and Proving	12, 14, 16
Reflecting	16, 19
Selecting Tools and Computational Strategies	1–19
Connecting	11, 12, 15
Representing	n/a
Communicating	8, 12, 16

Ongoing Assessment

- You may wish to collect students' responses to the Discuss the Concepts questions to use as a formative assessment tool.

Extra Practice

- Use **BLM 8-4 Section 8.2 Compound Interest** for extra practice or remediation.