7.1 Simple Interest

Student Text Pages
418 to 425

Suggested Timing
75 min

Tools
- graphing calculator
- computer with graphing or spreadsheet software
- grid paper

Related Resources
- G–1 Grid Paper
- BLM 7–2 Section 7.1 Practice

Differentiated Instruction
- Start a **word wall** of the key terms: *simple interest*, *principal*, *annual rate of interest*, and *amount*.
- Use **Think-Pair-Share** for the examples. For Example 2, have one student use the graphical method and the other use algebraic reasoning to solve the problem. Partners compare the process and results.

Teaching Suggestions

- For the **Investigate**, have students work in pairs or groups of three or four. The activity should take between 10 and 15 min. The purpose of the investigation, which can be done with or without graphing technology, is to make connections between the following concepts:
  – simple interest, which is an application of percent
  – linear relations, including direct and partial variation
  – arithmetic sequences
  It is important for students to recognize that simple interest growth can be represented in a variety of ways.
- **Example 1** illustrates basic simple interest calculations and terminology. It should be noted that in financial applications, final answers are typically rounded to the nearest cent (two decimal places).
- For **Example 2**, students should see how the different representations complement each other and can be used to confirm each other's results.
- In **Example 3**, students should recognize how the slope of the graph is related to the interest rate (and the variable part of the partial variation), and how the vertical intercept is related to the principal (and the fixed part of the partial variation).
- Use Think-Pair-Share for the **Communicate Your Understanding** questions. Allow for five minutes of discussion.
- Read through the **Key Concepts** with students to ensure they have mastered the skills developed in this lesson.

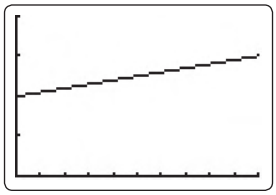
Investigate Answers (pages 418–419)

1. a)

Time, n (years)	Amount, A ($)	First Differences
1	1050	
2	1100	50
3	1150	50
4	1200	50
5	1250	50

b) Answers may vary. Sample answer: The first differences are constant, therefore the relationship between time and amount is linear.

2. a)



b) Answers may vary. Sample answer: The graph supports the fact that the relationship is linear.

3. a) slope = 50, vertical intercept = 1000 **b)** $A = 1000 + 50n$

c) Answers may vary. Sample answer: This is a partial variation, since it does not pass through (0, 0).

4. a) Answers may vary. Sample answer: Consecutive values in the Amount column increase by 50.

b) $a = 1050$, $d = 50$ **c)** $t_n = 1000 + 50n$

d) Answers may vary. Sample answer: When the arithmetic sequence is simplified, it is equal to the equation from step 3b).

5. Answers may vary. Sample answer: Simple interest can be represented graphically, in a table of values, by a linear equation of the form $y = mx + b$, or by an arithmetic sequence of the form $t_n = a + (n - 1)d$.

Communicate Your Understanding Responses (pages 423)

C1 a) Divide the number of months by the number of months in a year, 12; $\frac{1}{3}$ of a year

b) Divide the number of days by the number of days in a year, 365; $\frac{15}{73}$ of a year

c) Divide the number of weeks by the number of weeks in a year, 52; $\frac{15}{52}$ of a year

C2 a) Answers may vary. Sample answer: Yes, the values represent an arithmetic sequence. Consecutive values increase by a common difference.

b) Answers may vary. Sample answer: The annual interest rate is 8% since \$8 is added each time on an initial amount of \$100.

C3 a) Answers may vary. Sample answer: The graph is a straight line with a positive slope.

b) Slope = \$30; it represents the amount of interest added each year.
Vertical intercept = \$600; it represents the initial amount of the investment.

Common Errors

- Some students forget to express interest rates in decimal form before calculating interest.

R_x Have students check for reasonableness of answers. Errors such as this will yield unreasonably high interest values.

Practise, Connect and Apply, Extend

- For **questions 3** and **4**, remind students that GIC is the abbreviation for guaranteed investment certificate. Point out that unlike some other options, a GIC's interest rate does not fluctuate over the term of the investment.
- Have students use graphing technology to check their answers for **questions 5** and **7**.
- In **Question 7** students use their reasoning and connecting skills to write an equation that relates the amount of the investment to time from the given information. Students must select tools and connect mathematical concepts learned previously to graph the function represented by the equation and to answer questions related to the graph.
- Students can check their answer to **question 9** by working backward (i.e., calculating the interest and amount from their calculated rate of interest).
- For **question 11**, students can check their answer by working backward (i.e., calculating the interest and amount from their calculated time).
- **Question 12** provides an opportunity to assess reasoning and proving and communicating skills. Graphing technology is recommended. This question gives students the opportunity to examine the two given options and use reasoning skills to determine an equation for each option. They must select appropriate tools and use connecting skills to graph the amount payable versus time for each option, and then use communicating skills to discuss which option is the better deal.
- Some students may find it helpful to organize the given information in **question 13** in a table.
- For **question 14**, students will need to apply skills related to rearranging equations.
- Use **BLM 7–2 Section 7.1 Practice** for extra practice.

Mathematical Process Expectations

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

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

Compound Interest

Student Text Pages
426 to 435

Suggested Timing
75 min

Tools
- graphing calculator
- computer with graphing software
- TI-Nspire™ CAS graphing calculator (optional)

Related Resources
- BLM 7–3 Section 7.2 Practice

Differentiated Instruction
- Add the terms *compound interest* and *compounding period* to the **word wall**.
- Use **Think-Pair-Share** to complete the Investigate. One partner reads the instructions while the other calculates and enters data.
- Use **jigsaw** to compare various compounding periods. Assign the same problem to each group member. Assign each a different compounding period (annual, semi-annual, quarterly, and monthly) for the problem. Have group members compare and summarize their results in a **journal**.

Teaching Suggestions

- In the **Investigate**, students discover the nature of compound interest. Students should recognize that the amount in a compound interest account grows exponentially. This is in contrast to the linear nature of simple interest growth. Have students work in pairs or groups of three or four. Allow 15 min for the activity. For step 6a) students should consider the first differences.
- The discourse following the investigation provides a general algebraic development of the compound interest formula. This derivation is dependent on an understanding of geometric sequences.
- In **Example 1**, students should begin to understand that the difference between compound interest and the corresponding simple interest becomes more significant as the interest rate or time period increases. Point out to students that the simple interest formula leads to an *interest* calculation from which the amount can then be determined, while the compound interest formula leads to an *amount* calculation from which interest can be determined.
- For **Example 2**, it is important for students to remember to multiply the number of years by the number of compounding periods per year, and to divide the annual interest rate by the number of compounding periods per year prior to substituting into the formula.
- In **Example 3**, two methods for determining annual interest rate are shown. The first uses graphing technology. This method can be used to solve a number of equations that may be difficult to handle algebraically. Refer to the Technology appendix for additional support for the TI-83 Plus/TI-84 Plus graphing calculators. If using the TI-Nspire™ CAS graphing calculator, refer to the Technology Tip. The second method applies algebraic reasoning and requires the fourth root of both sides of the equation to be taken to "undo" the power of 4 that appears. If possible, students should see both methods and make connections between the graphical and algebraic representations.