8.1 Simple and Compound Interest

Student Text Pages
422–429

Suggested Timing
80 min

Tools
- computers with spreadsheet software
- TVM Solver

Related Resources
BLM 8-3 Section 8.1 Simple and Compound Interest

Link to Prerequisite Skills

In this section, students apply skills related to decimals, percents, and exponents to solve problems involving compound interest. Students should complete all the Prerequisite Skills questions before proceeding with this section.

Warm-Up

1. Express each percent as a decimal.
- **a)** 5%
- **b)** 11%
- **c)** 3.5%
- **d)** 0.5%

2. Evaluate each expression.
- **a)** 4% of $600
- **b)** 8% of $100
- **c)** 3% of $1200
- **d)** 4.5% of $500

Warm-Up Answers

1. a) 0.05 **b)** 0.11 **c)** 0.035 **d)** 0.005

2. a) $24.00 **b)** $8.00 **c)** $36.00 **d)** $22.50

Teaching Suggestions

- The ministry expectations state that technology is to be used to compare simple and compound interest. If spreadsheet software, graphing calculators, or graphing software such as *Fathom*™ are available, students can visualize the growth of simple and compound interest better through the use of technology. If technology is not available, a paper and pencil method will need to be used. However, students may get frustrated with calculations and awkward numbers to graph.
- Caution: The word *amount* can confuse students, as it is frequently used to describe, not only the final amount, but also the amount invested. Stress that, when used alone, as in "the amount", it means the final amount, or future value of an investment or loan.

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

- Introduce the topic by discussing the difference between simple and compound interest. Explain that, with simple interest, the calculations are made on the original investment, or principal. With compound interest, interest is paid periodically, added to the principal, and new interest is calculated on the new value of the investment. Ask which type of investment will grow faster.

Investigate

- Ask students to work through one of the methods, preferably one that is technology-based.
- Stress the difference between the growth rates.
- You may need to provide support for those students who have not used, or have forgotten how to use, spreadsheet software. Provide copies of **BLM T-1 Microsoft® *Excel***.

Investigate Answers (pages 422-425)

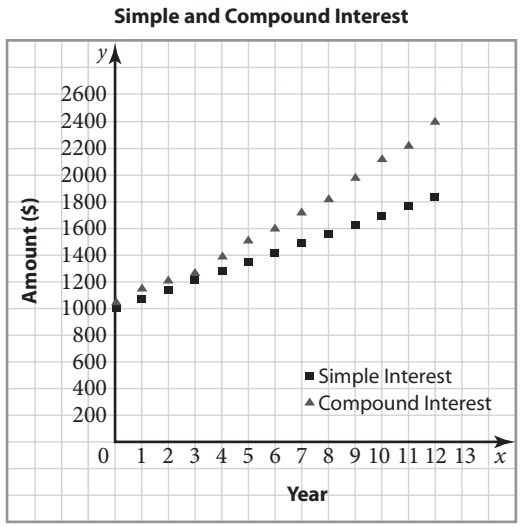
Method 1 and Method 2

1., 2.

Year	Simple Interest ($)	Amount With Simple Interest ($)	Amount At Start Of Year ($)	Interest Earned This Year ($)	Amount With Compound Interest ($)
0	0.00	1000.00	1000.00	70.00	1070.00
1	70.00	1070.00	1070.00	74.90	1144.90
2	140.00	1140.00	1144.90	80.14	1225.04
3	210.00	1210.00	1225.04	85.75	1310.80
4	280.00	1280.00	1310.80	91.76	1402.55
5	350.00	1350.00	1402.55	98.18	1500.73
6	420.00	1420.00	1500.73	105.05	1605.78
7	490.00	1490.00	1605.78	112.40	1718.19
8	560.00	1560.00	1718.19	120.27	1838.46
9	630.00	1630.00	1838.46	128.69	1967.15
10	700.00	1700.00	1967.15	137.70	2104.85
11	770.00	1770.00	2104.85	147.34	2252.19
12	840.00	1840.00	2252.19	157.65	2409.85

3. With simple interest, the amount of money is a linear relation; the amount increases by a fixed amount of $70 each year. With compound interest, the amount of interest earned increases each year. The amount with compound interest grows more quickly and earns more interest than the amount with simple interest. After 12 years, the compound interest investment has earned $569.85 more than the simple interest investment.

4.



5. The graph of compound interest grows more quickly than the graph of simple interest. The differences in the amounts with interest increases as the number of years increases.

6. Simple interest grows by a fixed amount, while compound interest grows by an increasing amount. In the graph, the distance between the compound and simple interest is increasing by year.

7. Simple interest is a linear relation, as it grows by a fixed rate and is represented by a straight line on the graph. Compound interest is an exponential relation, as it grows by an increasing rate and is represented by a graph curving upwards.

Method 3

2. b) The first 1000 is the principal amount; 1000 * 0.07 is the amount of interest earned, and the *L1 is the number of years.

3. b) The values are multiplied by 1.07 because the interest is calculated based on the accumulated total so far, the principal in addition to the interest earned.

4. With simple interest, the amount of money is a linear relation; the amount increases by a fixed amount of interest, $70, each year. With compound interest, the amount of interest earned increases each year. The amount with compound interest grows more quickly and earns more interest than the amount with simple interest. After 12 years, the compound interest investment has earned $569.85 more than the simple interest investment.

6. The graph of compound interest grows more quickly than the graph of simple interest. The differences in the amounts with interest increases as the number of years increases.

7. Simple interest grows by a fixed amount, while compound interest grows by an increasing amount. In the graph, the distance between the compound and simple interest is increasing by year.

8. The simple interest relation is linear, as it grows by a fixed rate and is represented by a straight line on the graph. The compound interest relation is exponential, as it grows by an increasing rate and is represented by a graph curving upwards.

Example

- Work through the Example as a class. Alternatively, have students complete the Example independently or in small groups before reviewing the solution as a class.
- For the Example, explain where the "1" comes from in the formula:
  $A = P + Prt$
  Factor the out P, as a common factor.
  $A = P(1 + rt)$
- It is also important that the students understand the growth factor, 1.04, or $1 + I$ for compound interest, as that is what causes the graph of the relation to grow exponentially.

Key Concepts

- Review the Key Concepts as a class. Ask students to highlight the important formulas in their notebooks, and explain how to use them.

Discuss the Concepts

- Allow the students to discuss these questions with a partner before discussing them as a class.

Discuss the Concepts Suggested Answers (page 427)

D1. The growth is greater at the end of the term, since the interest rate is calculated on the compounded amount, which is increasing each period.

D2. Yes. Given the same interest rate and saving time, a compounded investment always earns more. Examples may vary.

Common Errors

- Some students may have trouble grasping the concept of compound interest.

R_x Have students compare the growth columns in the Investigate. Highlight how the interest is added on to the previous amount with compound interest, but not with simple interest.

Accommodations

Memory—provide a graphic organizer for Key Terms

Visual—use a prepared template for spreadsheet activity

Spatial—give students a handout with charts

Language—provide Investigate instructions on audiotape

Practise (A) and Apply (B)

- Encourage students to refer to the Example before asking for assistance.
- It is important that students answer all of **questions 1 to 9** to get a sound grasp of the difference between simple and compound interest.
- You may wish to take up **questions 1 to 4** in class time before assigning the rest for homework.
- **Question 8** links to the Chapter Problem. It is a good opportunity to encourage information to be displayed with multiple representations—words, graphs, numbers, and algebraic formulas. Remind students to keep the solution to this question handy as the methods they used may help them with the Chapter Problem Wrap-Up.

Extend (C)

- Assign the Extend questions to students who are not being challenged by the questions in Apply.

Literacy Connections

- Encourage students to make a personal dictionary of financial terms as they work through this chapter.

Mathematical Process Expectations

Process Expectation	Questions
Problem Solving	11
Reasoning and Proving	9
Reflecting	3, 5, 9
Selecting Tools and Computational Strategies	1–11
Connecting	6
Representing	1–3, 5, 6, 8–10
Communicating	7–10

Ongoing Assessment

- While students are working, circulate and see how well each works. This may be an opportunity to continue observing and recording individual students' learning skills.

Extra Practice

- You may wish to use **BLM 8-3 Section 8.1 Simple and Compound Interest** for remediation or extra practice.