Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Principal • Interest • Total amount • Choosing a model

**A. WHAT INTEREST MEANS**

Interest is money added to an initial amount. The **principal** is the initial amount.

1. Define **principal**.
2. Define **interest**.
3. How is the total amount related to principal and interest?

_____

4. State the main difference between simple and compound interest.

_____

_____

**B. IDENTIFY THE QUANTITIES**

For each situation, state the principal, rate, time/periods, and whether the model is simple or compound.

1. 800 dollars at 5% simple interest for 2 years.
2. 1,200 dollars at 3% compound interest for 4 years.
3. 2,000 dollars at 0.6% compound interest per month for 10 months.

_____

_____

_____

**C. RATE AS A DECIMAL**

1. Write 4%, 2.5%, 0.8%, and 12% as decimals.
2. Explain why the percentage rate must be converted before using the formulas.

_____

_____

Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Simple interest • Interest earned • Total amount

**D. SIMPLE-INTEREST FORMULAS**

$I = Prt$

$A = P(1 + rt)$

1. What do P, r, and t represent?
2. Why does simple interest use the same principal in every period?

**E. WORKED SIMPLE-INTEREST EXAMPLE**

Find the simple interest and total amount on 600 dollars at 4% per year for 3 years.

$I = 600 \times 0.04 \times 3 = 72$

$A = 600 + 72 = 672$

1. How much interest is earned each year?
2. Why is the yearly interest the same each year?
3. State the total interest and final amount.

**F. SIMPLE-INTEREST PRACTICE**

1. 800 dollars at 5% for 2 years.
2. 1,200 dollars at 3% for 4 years.
3. 500 dollars at 6% for 3 years.
4. 2,400 dollars at 2.5% for 5 years.

For each, calculate both the interest earned and the total amount.

Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Compound interest • Multiplier • Exponent

**G. COMPOUND-INTEREST FORMULA**

$A = P(1 + r)^n$

1. What does the multiplier 1 + r represent?
2. What does the exponent n count?
3. Why does compound interest use the current balance rather than only the original principal?

_____

_____

**H. WORKED COMPOUND EXAMPLE**

A savings account contains 2,000 dollars and earns 3% per year for 5 years.

$A = 2{,}000 \times 1.03^5 = 2{,}318.55$

1. What multiplier is used?
2. Why is the exponent 5?
3. Find the interest earned.
4. Explain why the balance grows by a different dollar amount each year.

_____

_____

**I. COMPOUND-INTEREST PRACTICE**

1. 800 dollars at 5% for 2 years.
2. 1,200 dollars at 3% for 4 years.
3. 500 dollars at 6% for 3 years.
4. 3,000 dollars at 4% for 6 years.

Calculate the final amount and the interest earned.

_____

_____

_____

Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Comparing simple and compound models

**J. SAME PRINCIPAL, RATE AND TIME**

Compare 600 dollars at 4% for 3 years.

$600(1 + 0.04 \times 3) = 672$

$600 \times 1.04^3 = 674.92$

1. How much larger is the compound amount?
2. Why are the totals different even though P, r, and time are the same?

_____

_____

3. Which model adds the same dollar amount each period?

**K. COMPLETE THE COMPARISON TABLE**

Use a principal of 1,000 dollars and a rate of 5% per year.

| Years | Simple amount | Compound amount | Difference |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

1. What happens to the difference as the number of years increases?
2. Explain the pattern using “interest on interest.”

_____

_____

**L. ERROR CORRECTION**

A student uses $A = P(1 + rt)$ for an account described as earning compound interest.

1. What model has been used incorrectly?
2. Write the correct compound formula.
3. Explain the role of the exponent.

_____

_____

Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Financial contexts • Period consistency • Assumptions

**M. SAVING FOR A GOAL**

A student deposits 1,500 dollars in an account earning 2.5% compound interest per year for 4 years.

$A = 1{,}500 \times 1.025^4 = 1{,}655.72$

1. Find the interest earned.
2. State one assumption made by the model.
3. Explain why the final amount is greater than a simple-interest model with the same rate and time.

_____

_____

**N. MATCH THE COMPOUNDING PERIOD**

An account begins with 2,500 dollars and earns 0.4% **per month** for 12 months.

$A = 2{,}500 \times 1.004^{12} \approx 2{,}622.68$

1. Why is $n = 12$?
2. Why must the rate 0.004 be interpreted as a monthly rate here?
3. Find the compound interest earned.
4. Compare with simple interest at 0.4% per month for 12 months.

_____

_____

**O. MODEL CHOICE IN CONTEXT**

For each description, state which model is more appropriate from the information given.

1. “Interest is always calculated from the original 4,000-dollar principal.”
2. “Each month, interest is added to the balance before the next month.”
3. Explain the evidence in the wording that determines your choice.

_____

_____

Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Reverse problems • Comparing financial models

**P. REVERSE A SIMPLE-INTEREST MODEL**

An investment is worth 1,240 dollars after 3 years of simple interest at 4% per year.

1. Write an equation connecting the original principal P to 1,240.
2. Find the original principal.
3. Find the total interest earned.

_____

_____

**Q. REVERSE A COMPOUND-INTEREST MODEL**

An investment is worth 1,240 dollars after 3 years of compound interest at 4% per year.

1. Write an equation connecting P to 1,240.
2. Find the original principal.
3. Compare this original principal with the answer to section P.
4. Explain why the compound model needs a slightly smaller starting amount to reach the same future value.

_____

_____

**R. COMPARING OFFERS**

Two accounts both begin with 2,000 dollars for 5 years.

- **Account A:** 3% simple interest per year.
- **Account B:** 3% compound interest per year.

1. Calculate each final amount.
2. Calculate the difference in interest earned.
3. Which account produces more under the stated models, and why?

_____

_____

Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Extended comparison • Investigation • Final Review

**S. LONG-TERM COMPARISON CHALLENGE**

A principal of 5,000 dollars earns 4% per year.

1. Find the simple-interest amount after 10 years.
2. Find the compound-interest amount after 10 years.
3. Find the difference between the two totals.
4. Explain why the gap becomes more important over longer periods.

_____

_____

**T. BUILD YOUR OWN COMPARISON**

Choose a realistic savings or loan scenario.

1. Choose a principal, rate, and number of periods.
2. Calculate the total amount using simple interest.
3. Calculate the total amount using compound interest.
4. Find the difference in interest earned or charged.
5. Explain which model better matches your scenario and why.

_____

_____

_____

Name: _____ Date: _____

**UNIT 1**

# 4.1.8 - Simple and Compound Interest

Reasoning • Model conditions • Final Review

**U. ALWAYS, SOMETIMES OR NEVER?**

"Simple and compound interest produce the same total amount."

1. Decide whether the statement is always, sometimes, or never true.
2. Test a one-period case and a multi-period positive-rate case.
3. Explain the conditions under which the totals can be equal.

_____

_____

_____

**V. FINAL REVIEW**

1. What is the difference between simple and compound interest?
2. What does n represent in the compound formula?
3. Why must the rate be written as a decimal?
4. Calculate the compound amount for 400 dollars at 5% for 2 years.
5. State one reason why checking the interest period matters.

_____

_____

_____

# ANSWER KEY

Name: _____ Date: _____

**UNIT 1**

# ANSWER KEY - 4.1.8 Simple and Compound Interest

ANSWER KEY • Meaning • Simple interest • Compound interest

### A–C. CORE IDEAS

**Principal = initial amount; interest = money earned or charged; total amount = principal + interest.**
**Simple interest uses the original principal each period. Compound interest uses the current balance.**
**Rates: 4% = 0.04, 2.5% = 0.025, 0.8% = 0.008, 12% = 0.12.**

### D–E. SIMPLE INTEREST

$I = Prt$

$A = P(1 + rt)$

$I = 600 \times 0.04 \times 3 = 72$

$A = 600 + 72 = 672$

**The account earns 24 dollars each year because 4% is repeatedly calculated from the original 600 dollars.**

### F. SIMPLE-INTEREST PRACTICE

**800 at 5% for 2 years: interest 80; amount 880.**
**1,200 at 3% for 4 years: interest 144; amount 1,344.**
**500 at 6% for 3 years: interest 90; amount 590.**
**2,400 at 2.5% for 5 years: interest 300; amount 2,700.**

### G–H. COMPOUND INTEREST

$A = P(1 + r)^n$

$A = 2{,}000 \times 1.03^5 = 2{,}318.55$

**Multiplier = 1.03 and n = 5. Interest earned = 318.55 dollars. The dollar interest changes because each year's rate is applied to the updated balance.**

Name: _____ Date: _____

**UNIT 1**

# ANSWER KEY - 4.1.8 Simple and Compound Interest

ANSWER KEY • Compound practice • Model comparison

## I. COMPOUND-INTEREST PRACTICE

**800 at 5% for 2 years: amount 882.00; interest 82.00.**

**1,200 at 3% for 4 years: amount ≈ 1,350.61; interest ≈ 150.61.**

**500 at 6% for 3 years: amount ≈ 595.51; interest ≈ 95.51.**

**3,000 at 4% for 6 years: amount ≈ 3,795.96; interest ≈ 795.96.**

## J. SAME PRINCIPAL, RATE AND TIME

$600(1 + 0.04 \times 3) = 672$

$600 \times 1.04^3 = 674.92$

**Difference = 2.92 dollars. Compound interest earns interest on the increasing balance; simple interest adds the same 24 dollars each year.**

## K. COMPARISON TABLE

| Years | Simple amount | Compound amount | Difference |
|---|---|---|---|
| 1 | 1,050.00 | 1,050.00 | 0.00 |
| 2 | 1,100.00 | 1,102.50 | 2.50 |
| 3 | 1,150.00 | 1,157.63 | 7.63 |
| 4 | 1,200.00 | 1,215.51 | 15.51 |

**The gap grows because compound interest repeatedly earns interest on previous interest.**

## L. ERROR CORRECTION

**$A = P(1 + rt)$ is the simple-interest total formula. For compound interest use $A = P(1 + r)^n$; n counts the number of compounding periods.**

Name: _____ Date: _____

**UNIT 1**

# ANSWER KEY - 4.1.8 Simple and Compound Interest

ANSWER KEY • Context • Periods • Reverse problems

### M. SAVING FOR A GOAL

$A = 1{,}500 \times 1.025^4 = 1{,}655.72$

**Interest earned = 155.72 dollars. The model assumes the stated rate remains unchanged and is applied once per stated yearly period.**

### N. MATCH THE COMPOUNDING PERIOD

$A = 2{,}500 \times 1.004^{12} \approx 2{,}622.68$

$A = 2{,}500(1 + 0.004 \times 12) = 2{,}620$

**Compound interest ≈ 122.68 dollars; simple interest = 120 dollars. n = 12 because the rate is stated per month for 12 months.**

### O. MODEL CHOICE

**Original principal every time → simple interest. Interest added before the next month → compound interest.**

### P. REVERSE SIMPLE INTEREST

**$1{,}240 = P(1 + 0.04 \times 3)$.**

$P = 1{,}240 \div (1 + 0.04 \times 3) = 1{,}107.14$

**Original principal ≈ 1,107.14 dollars; total interest ≈ 132.86 dollars.**

### Q. REVERSE COMPOUND INTEREST

**$1{,}240 = P(1.04)^3$.**

$P = 1{,}240 \div 1.04^3 \approx 1{,}102.36$

**Original principal ≈ 1,102.36 dollars. Compound growth needs a slightly smaller starting amount because the balance earns interest on interest.**

Name: _____ Date: _____

**UNIT 1**

# ANSWER KEY - 4.1.8 Simple and Compound Interest

ANSWER KEY • Comparison • Investigation • Final Review

## R. COMPARING OFFERS

**Account A: simple amount = 2,300.00 dollars; interest = 300.00.**

**Account B: compound amount = 2,318.55 dollars; interest = 318.55.**

**Compound earns 18.55 dollars more because interest is added to the balance before later interest is calculated.**

## S. LONG-TERM COMPARISON CHALLENGE

**Simple amount = $5{,}000(1 + 0.04 \times 10) = 7{,}000.00$ dollars.**

**Compound amount = $5{,}000(1.04)^{10} \approx 7{,}401.22$ dollars.**

**Difference ≈ 401.22 dollars. The gap grows because repeated compounding acts on an increasing balance.**

## T. BUILD YOUR OWN COMPARISON

**Answers vary.** Check consistent periods, decimal rate, correct model choice, total amount, interest earned/charged, and a context-based explanation.

## U. ALWAYS, SOMETIMES OR NEVER?

**Sometimes.** The totals are equal after one period, and also in zero-rate cases. With a positive rate over more than one period, compound interest is greater because interest is earned on previous interest.

## V. FINAL REVIEW

**Simple uses the original principal; compound uses the current balance. n is the number of compounding periods. Percent rates are divided by 100 before use.**

**$400 \times 1.05^2 = 441$ dollars.**

## SUMMARY

**Principal → choose simple or compound model → make rate and period units consistent → calculate interest and total amount → interpret the financial result.**