Lesson Plan -- Simple and Compound Interest

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Simple Interest

**Words to Remember**

Interest: The amount of money that you pay to borrow money or the amount of money that you earn on a deposit.

Annual Interest Rate: The percent of interest that you pay for money borrowed, or earn for money deposited.

Simple interest formula: \( I = Prt \) where \( I \) is the interest earned, \( P \) is the principal or the amount of money that you start out with, \( r \) is the annual interest rate as a decimal, and \( t \) is the time in years.

Balance: The sum of the principal \( P \) and the interest \( Prt \).

**Getting Started**

In Lesson 4-9 you learned how to write percents as decimals. You will use that skill in this lesson to find simple interest.

**Example 1**

Computing Simple Interest Earned

Dianna deposits $725 into a savings account that pays 2.3% simple annual interest. How much interest will Dianna earn after 18 months?

**Solution**

In the simple interest formula, time is measured in years. Write 18 months as \( \frac{18}{12} \), or 1.5 years. Write the annual interest rate as a decimal.

\[ I = Prt \]

Use the formula for simple interest.

\[ I = (725)(0.023)(1.5) \]

Substitute $725 for \( P \), 0.023 for \( r \), and 1.5 for \( t \).

\[ I = $25.01 \]

Multiply.

**ANSWER** Dianna will earn $25.01 in interest.

**Try This**

Find the amount of interest earned.

1. Principal: $550
   Annual rate: 7%
   Time: 4 years
   \[ I = \_\_\_ \cdot \_\_\_ \cdot \_\_\_ \]
   \[ = \_\_\_ \]

2. Principal: $870
   Annual rate: 3.7%
   Time: 30 months
   \[ I = \_\_\_ \cdot \_\_\_ \cdot \_\_\_ \]
   \[ = \_\_\_ \]
Computing Simple Interest Paid

Josh borrowed $250 from his mother to buy an electric scooter. Josh will pay her back in 1 year with 3% simple annual interest. How much interest will Josh pay?

Solution

\[ I = Prt \]

Use the formula for simple interest.

\[ I = (250)(0.03)(1) \]

Substitute $250 for \( P \), 0.03 for \( r \), and 1 for \( t \).

\[ I = $750 \]

Multiply.

ANSWER Josh will pay his mom $7.50 in interest.

Balance When an account earns interest, the interest is added to the money in the account. The balance \( A \) of an account that earns simple annual interest is the sum of the principal \( P \) and the interest \( Prt \).

\[ A = P + Prt \]

Finding the Balance

You deposit $300 in a savings account that pays 4% simple annual interest. Find your account balance after 9 months.

Solution

Write 9 months as \( \frac{9}{12} \) year, or 0.75 year.

\[ A = P + Prt \]

Write the balance formula.

\[ = 300 + (300)(0.04)(0.75) \]

Substitute $300 for \( P \), 0.04 for \( r \), and 0.75 for \( t \).

\[ = 300 + 9 \]

Multiply.

\[ = 309 \]

Add.

ANSWER Your account balance after 9 months is $309.

Try this

Find the amount of interest paid.

3. Principal: $335  
   Annual rate: 5.2%  
   Time: 2.5 years

4. Principal: $1225  
   Annual rate: 8.3%  
   Time: 42 months

5. You deposit $800 in a savings account that pays 3.2% simple annual interest. Find your account balance after 15 months.
Summarize
Computing Simple Interest
Use the formula \( I = Prt \) where \( I \) represents the interest earned or paid, \( P \) represents the principal or the amount that you deposit or borrow, \( r \) represents the interest rate as a decimal, and \( t \) represents the time in years.

Finding the Balance
Use the formula \( A = P + Prt \) where \( A \) represents the sum of the principal and the interest earned.

Practice
Write the given time period as a fraction of a year.

1. 4 months ________ 2. 6 months ________
3. 21 months ________ 4. 32 months ________

Find the simple interest earned.

5. Principal: $135
   Annual rate: 4.3%
   Time: 30 months

6. Principal: $575
   Annual rate: 2.6%
   Time: 3.3 years

7. Principal: $1200
   Annual rate: 1.9%
   Time: 5 years

8. Principal: $850
   Annual rate: 5.1%
   Time: 54 months

Find the simple interest paid.

9. Principal: $350
   Annual rate: 4%
   Time: 3 years

10. Principal: $2575
    Annual rate: 8.2%
    Time: 10 years

11. Principal: $345
    Annual rate: 5.5%
    Time: 42 months

12. Principal: $600
    Annual rate: 6.2%
    Time: 8 years

Find the balance of the account.

13. Principal: $200
    Annual rate: 3%
    Time: 2 years

14. Principal: $1020
    Annual rate: 4.1%
    Time: 18 months

15. Principal: $800
    Annual rate: 2.56%
    Time: 15 months

16. Principal: $1580
    Annual rate: 3.75%
    Time: 2.5 years
21. Fill in the missing words. To find simple interest you use the formula \( I = Prt \) where \( P \) stands for __________, \( r \) stands for annual interest rate written as a __________, and \( t \) stands for ______ in years.

22. Find the balance of the account. Belinda deposits $550 in an account that pays 3.7% simple annual interest. If she keeps the money in the account for 2 years, how much will Belinda have in her account after 2 years?
Answer Key

Lesson 4-14, pp. 54–57

Try this:
1. 550; 0.07; 4; $154.00
2. 870; 0.037; 2.5; $80.48
3. $43.55
4. $355.86
5. $832.00

Practice:
1. \( \frac{1}{3} \) year
2. \( \frac{1}{2} \) year
3. Sample answer: \( \frac{7}{4} \) or \( 1\frac{3}{4} \) years
4. Sample answer: \( \frac{8}{3} \) or \( 2\frac{2}{3} \) years
5. $14.51
6. $49.34
7. $114.00
8. $195.08
9. $42.00
10. $2111.50
11. $66.41
12. $297.60
13. $212.00
14. $1082.73
15. $825.60
16. $1728.13
17. 0.032; $73.60; Sample answer: \( 460 \times 0.032 \times 5 = 73.6 \)
18. 0.057; $32.06; Sample answer: \( 375 \times 0.057 \times 1.5 = 32.06 \)
19. 0.05; $15.00; Sample answer: \( 300 \times 0.05 \times 1 = 15 \)
20. 0.045; $264.38; Sample answer: \( 2350 \times 0.045 \times 2.5 = 264.38 \)
21. principal; decimal; time
22. $590.70
Compound Interest

**Words to Remember**

Compound interest: Interest that is earned on both the principal and any interest that has been earned previously.

Compound interest formula: \( A = P(1 + r)^t \) where \( A \) represents the amount of money in the account at the end of the time period, \( P \) is the principal, \( r \) is the annual interest rate, and \( t \) is the time in years.

Balance: The sum of the principal and the interest

**Getting Started**

In Lesson 4-14 you learned how to find simple interest or the total amount of interest earned or paid over a period of time. In this lesson you will learn how to find compound interest using these methods.

**Computing Compound Interest using Simple Interest**

Simon deposits $400 in an account that pays 3% interest compounded annually. What is the balance of Simon’s account at the end of 2 years?

**Solution**

**Step 1** Find the balance at the end of the first year.

\[
I = Prt \\
= (400)(0.03)(1) \\
= 12
\]

Balance = \( P + Prt \)

\[
= 400 + 12 \\
= 412
\]

The balance at the end of the first year is $412.

**Step 2** Find the balance at the end of the second year.

\[
I = Prt \\
= (412)(0.03)(1) \\
= 12.36
\]

Balance = \( P + Prt \)

\[
= 412 + 12.36 \\
= 424.36
\]

**ANSWER** Simon has $424.36 in his account after 2 years.
**Try this**

Find the balance of the account after $t$ years using the simple interest method.

1. Principal: $600, Annual rate: 4%, Time: 3 years
   Balance at the end of the first year is ________.
   Balance at the end of the second year is ________.
   Balance at the end of the third year is ________.

2. Principal: $850, Annual rate: 2.4%, Time: 4 years
   Balance at the end of the first year is ________.
   Balance at the end of the second year is ________.
   Balance at the end of the third year is ________.
   Balance at the end of the fourth year is ________.

**Computing Compound Interest using the Compound Interest Formula**

Jackie deposits $325 in an account that pays 4.1% interest compounded annually. How much money will Jackie have in her account after 3 years?

**Solution**

$$A = P(1 + r)^t$$  Use the compound interest formula.

$$A = 325(1 + 0.041)^3$$  Substitute 325 for $P$, 0.041 for $r$, and 3 for $t$.

$$A = 325(1.041)^3$$  Add.

$$A = 366.64$$  Simplify.

**ANSWER**  Jackie will have $366.64 in her account after 3 years.

**Try this**

Find the amount in an account after $t$ years using the compound interest formula.

3. Principal: $285
   Annual rate: 1.9%
   Time: 6 years
   $$A = \quad (1 + \quad )^t$$
   $$= \quad$$

4. Principal: $1200
   Annual rate: 8.7%
   Time: 2 years
   $$A = \quad (1 + \quad )^t$$
   $$= \quad$$
Summarize

Computing Compound Interest using Simple Interest

Compute simple interest for 1 year. Add the interest to the principal. This becomes the principal for year 2. Repeat these steps for \( t \) years.

Computing Compound Interest using the Compound Interest Formula

Use the formula \( A = P(1 + r)^t \) to determine the amount of money in an account after \( t \) years.

Practice

1. Fill in the missing information to find the balance of the account.
   Principal: $600, Annual rate: 4%, Time: 3 years
   
   **Step 1** The initial principal \( P \) is ______.
   The interest rate written as a decimal is ______.
   The balance for year 1 is ______.
   
   **Step 2** The principal for year 2 is ______.
   The balance for year 2 is ______.
   
   **Step 3** The principal for year 3 is ______.
   The balance for year 3 is ______.

Find the balance of the account after time \( t \) using the simple interest method.

2. $375 at 4% interest compounded annually for 3 years
3. $975 at 8.2% interest compounded annually for 2 years
4. $135 at 2.3% interest compounded annually for 7 years
5. $250 at 3.1% interest compounded annually for 4 years

Find the balance of the account after time \( t \) using the compound interest formula.

6. $1200 at 2.5% interest compounded annually for 8 years
7. $750 at 4.6% interest compounded annually for 4 years
8. $435 at 1.7% interest compounded annually for 10 years
9. $815 at 5% interest compounded annually for 6.5 years
In Exercises 12 and 13, how many steps of simple interest need to be performed? Solve the problem.

10. Julio deposits $345 in an account that earns 3.1% interest compounded annually. How much money is in the account after 4 years?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

11. Kim deposits $650 in an account that earns 4% interest compounded annually. How much money is in the account after 2 years?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

12. Solve the problem using the compound interest formula. Jong deposits $500 in an account that earns 2.5% interest compounded annually and keeps the money in the account for 3 years. Monty deposits $500 in an account that earns 5.1% interest compounded annually and keeps the money in the account for 2 years. Who has more money when he closes his account? Explain your reasoning.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

DID YOU GET IT?

13. Fill in the missing words. Compound interest is interest that is earned on both the _______ and any _______ that has been earned _________.

14. Use the compound interest formula. Nora deposits $450 in an account that earns 2.4% interest compounded annually. How much money is in the account after 5 years?

________________________________________________________________________
________________________________________________________________________
Answer Key

Lesson 4-15, pp. 58–61

Try this:
1. $624.00; $648.96; $674.92
2. $870.40; $891.29; $912.68; $934.58
3. 285; 0.019; 6; $319.07
4. 1200; 0.087; 2; $1417.88

Practice:
1. $600; 0.04; $624.00; $624.00; $648.96; $648.96; $674.92
2. $421.82
3. $1141.46
4. $158.29
5. $282.47
6. $1462.08
7. $897.82
8. $514.87
9. $1119.15
10. 4; $389.81
11. 2; $703.04

12. Monty; Sample answer: The amount in Jong’s account is $538.45, and the amount in Monty’s account is $552.30.

13. principal; interest; previously

14. $506.65