6.7 Simple Interest

**Essential Question** How can you find the amount of simple interest earned on a savings account? How can you find the amount of interest owed on a loan?

**Simple interest** is money earned on a savings account or an investment. It can also be money you pay for borrowing money.

Simple interest = Principal × Annual interest rate × Time

\[ I = Prt \]

**ACTIVITY: Finding Simple Interest**

Work with a partner. You put $100 in a savings account. The account earns 6% simple interest per year. (a) Find the interest earned and the balance at the end of 6 months. (b) Copy and complete the table. Then make a bar graph that shows how the balance grows in 6 months.

**a.**

\[ I = Prt \]

Write simple interest formula.

Write the annual interest rate in decimal form.

\[ \frac{6}{100} = 0.06 \]

Substitute values.

\[ = \]

Multiply.

\[ = \]

At the end of 6 months, you earn $\ ] in interest. So, your balance is $\ ].

**b.**

<table>
<thead>
<tr>
<th>Time</th>
<th>Interest</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 month</td>
<td>$0</td>
<td>$100</td>
</tr>
<tr>
<td>1 month</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months</td>
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<tr>
<td>3 months</td>
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<tr>
<td>4 months</td>
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<tr>
<td>5 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td></td>
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</tbody>
</table>

**COMMON CORE**

In this lesson, you will use the simple interest formula to find interest earned or paid, annual interest rates, and amounts paid on loans.

Learning Standard 7.RP.3
Work with a partner. Use the following information to write a report about credit cards. In the report, describe how a credit card works. Include examples that show the amount of interest paid each month on a credit card.

**ACTIVITY: Financial Literacy**

**U.S. Credit Card Data**
- A typical household with credit card debt in the United States owes about $16,000 to credit card companies.
- A typical credit card interest rate is 14% to 16% per year. This is called the annual percentage rate.

Work with a partner. In 2012, the United States owed about $16 trillion in debt. The interest rate on the national debt is about 1% per year.

4. **IN YOUR OWN WORDS** How can you find the amount of simple interest earned on a savings account? How can you find the amount of interest owed on a loan? Give examples with your answer.

Use what you learned about simple interest to complete Exercises 4–7 on page 256.
**Lesson 6.7**

**Key Vocabulary**
- Interest, p. 254
- Principal, p. 254
- Simple interest, p. 254

**Interest** is money paid or earned for the use of money. The **principal** is the amount of money borrowed or deposited.

**Key Idea**

**Simple Interest**

**Words**
- Simple interest is money paid or earned only on the principal.

**Algebra**

\[ I = Prt \]

**EXAMPLE 1**  
**Finding Interest Earned**

You put $500 in a savings account. The account earns 3% simple interest per year. (a) What is the interest earned after 3 years? (b) What is the balance after 3 years?

\[ a. \quad I = Prt \quad \text{Write simple interest formula.} \]

\[ = 500(0.03)(3) \quad \text{Substitute 500 for } P, \text{ 0.03 for } r, \text{ and 3 for } t. \]

\[ = 45 \quad \text{Multiply.} \]

\[ \therefore \text{So, the interest earned is$45 after 3 years.} \]

\[ b. \quad \text{To find the balance, add the interest to the principal.} \]

\[ \therefore \text{So, the balance is$500 +$45 =$545 after 3 years.} \]

**EXAMPLE 2**  
**Finding an Annual Interest Rate**

You put $1000 in an account. The account earns $100 simple interest in 4 years. What is the annual interest rate?

\[ I = Prt \quad \text{Write simple interest formula.} \]

\[ 100 = 1000(r)(4) \quad \text{Substitute 100 for } I, \text{ 1000 for } P, \text{ and 4 for } t. \]

\[ 100 = 4000r \quad \text{Simplify.} \]

\[ 0.025 = r \quad \text{Divide each side by 4000.} \]

\[ \therefore \text{So, the annual interest rate of the account is 0.025, or 2.5%.} \]
EXAMPLE 3 Finding an Amount of Time

A bank offers three savings accounts. The simple interest rate is determined by the principal. How long does it take an account with a principal of $800 to earn $100 in interest?

The pictogram shows that the interest rate for a principal of $800 is 2%.

\[ I = Prt \]

Write simple interest formula.

\[ 100 = 800(0.02)(t) \]

Substitute 100 for \( I \), 800 for \( P \), and 0.02 for \( r \).

\[ 100 = 16t \]

Simplify.

\[ 6.25 = t \]

Divide each side by 16.

\[ t = 6.25 \] So, the account earns $100 in interest in 6.25 years.

EXAMPLE 4 Finding an Amount Paid on a Loan

You borrow $600 to buy a violin. The simple interest rate is 15%. You pay off the loan after 5 years. How much do you pay for the loan?

\[ I = Prt \]

Write simple interest formula.

\[ = 600(0.15)(5) \]

Substitute 600 for \( P \), 0.15 for \( r \), and 5 for \( t \).

\[ = 450 \]

Multiply.

To find the amount you pay, add the interest to the loan amount.

\[ \text{So, you pay } 600 + 450 = 1050 \text{ for the loan.} \]

1. In Example 1, what is the balance of the account after 9 months?
2. You put $350 in an account. The account earns $17.50 simple interest in 2.5 years. What is the annual interest rate?

3. In Example 3, how long does it take an account with a principal of $10,000 to earn $750 in interest?
4. WHAT IF? In Example 4, you pay off the loan after 2 years. How much money do you save?
6.7 Exercises

Vocabulary and Concept Check:

1. **VOCABULARY** Define each variable in \( I = Prt \).
2. **WRITING** In each situation, tell whether you would want a *higher* or *lower* interest rate. Explain your reasoning.
   - a. you borrow money  
   - b. you open a savings account
3. **REASONING** An account earns 6% simple interest. You want to find the interest earned on $200 after 8 months. What conversions do you need to make before you can use the formula \( I = Prt \)?

Practice and Problem Solving:

An account earns simple interest. (a) Find the interest earned. (b) Find the balance of the account.

4. $600 at 5% for 2 years
5. $1500 at 4% for 5 years
6. $350 at 3% for 10 years
7. $1800 at 6.5% for 30 months
8. $700 at 8% for 6 years
9. $1675 at 4.6% for 4 years
10. $925 at 2% for 2.4 years
11. $5200 at 7.36% for 54 months

12. **ERROR ANALYSIS** Describe and correct the error in finding the simple interest earned on $500 at 6% for 18 months.
   
   \[ I = (500)(0.06)(18) = 540 \]

Find the annual interest rate.

13. \( I = 24 \), \( P = 400 \), \( t = 2 \) years
14. \( I = 562.50 \), \( P = 1500 \), \( t = 5 \) years
15. \( I = 54 \), \( P = 900 \), \( t = 18 \) months
16. \( I = 160.67 \), \( P = 2000 \), \( t = 8 \) months

Find the amount of time.

17. \( I = 30 \), \( P = 500 \), \( r = 3\% \)
18. \( I = 720 \), \( P = 1000 \), \( r = 9\% \)
19. \( I = 54 \), \( P = 800 \), \( r = 4.5\% \)
20. \( I = 450 \), \( P = 2400 \), \( r = 7.5\% \)

21. **BANKING** A savings account earns 5% simple interest per year. The principal is $1200. What is the balance after 4 years?
22. **SAVINGS** You put $400 in an account. The account earns $18 simple interest in 9 months. What is the annual interest rate?
23. **CD** You put $3000 in a CD (certificate of deposit) at the promotional rate. How long will it take to earn $336 in interest?
Find the amount paid for the loan.

24. $1500 at 9% for 2 years
25. $2000 at 12% for 3 years
26. $2400 at 10.5% for 5 years
27. $4800 at 9.9% for 4 years

Copy and complete the table.

<table>
<thead>
<tr>
<th>Principal</th>
<th>Interest Rate</th>
<th>Time</th>
<th>Simple Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>28. $12,000</td>
<td>4.25%</td>
<td>5 years</td>
<td></td>
</tr>
<tr>
<td>29. $15,500</td>
<td>8.75%</td>
<td>54 months</td>
<td>$4252.50</td>
</tr>
<tr>
<td>30. $18,000</td>
<td>6.5%</td>
<td>18 months</td>
<td>$828.75</td>
</tr>
<tr>
<td>31. $20,000</td>
<td>3%</td>
<td>3 years</td>
<td>$600.00</td>
</tr>
</tbody>
</table>

32. **Zoo** A family charges a trip to the zoo on a credit card. The simple interest rate is 12%. The charges are paid after 3 months. What is the total amount paid for the trip?

33. **Money Market** You deposit $5000 in an account earning 7.5% simple interest. How long will it take for the balance of the account to be $6500?

34. **Loans** A music company offers a loan to buy a drum set for $1500. What is the monthly payment?

35. **Reasoning** How many years will it take for $2000 to double at a simple interest rate of 8%? Explain how you found your answer.

36. **Problem Solving** You have two loans, for 2 years each. The total interest for the two loans is $138. On the first loan, you pay 7.5% simple interest on a principal of $800. On the second loan, you pay 3% simple interest. What is the principal for the second loan?

37. **Critical Thinking** You put $500 in an account that earns 4% annual interest. The interest earned each year is added to the principal to create a new principal. Find the total amount in your account after each year for 3 years.

**Fair Game Review** What you learned in previous grades & lessons

Solve the inequality. Graph the solution.  \((\text{Section 4.2})\)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>38. (x + 5 &lt; 2)</td>
<td>(x &lt; -3)</td>
</tr>
<tr>
<td>39. (b - 2 \geq -1)</td>
<td>(b \geq 1)</td>
</tr>
<tr>
<td>40. (w + 6 \leq -3)</td>
<td>(w \leq -9)</td>
</tr>
<tr>
<td><strong>41. MULTIPLE CHOICE</strong> What is the solution of (4x + 5 = -11)? ((\text{Section 3.5}))</td>
<td>(A) (x = -4)</td>
</tr>
</tbody>
</table>