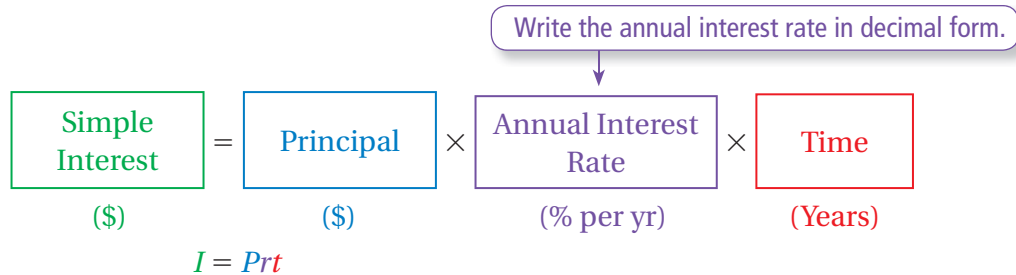


# 4.4 Simple Interest



**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.



## 1 ACTIVITY: Finding Simple Interest

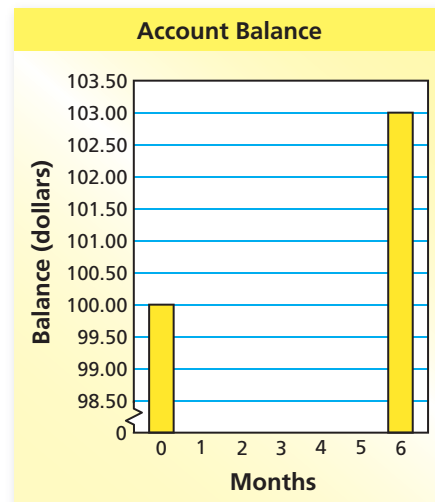
Work with a partner. You put \$100 in a savings account. The account earns 6% simple interest per year. (a) Find the interest earned and the balance at the end of 6 months. (b) Copy and complete the table. Then make a bar graph that shows how the balance grows in 6 months.

- a.  $I = Prt$  Write simple interest formula  
 $= 100(0.06)\left(\frac{6}{12}\right)$  Substitute values.  
 $= 3$  Multiply.

At the end of 6 months, you earn \$3 in interest. So, your balance is  $\$100 + \$3 = \$103$ .

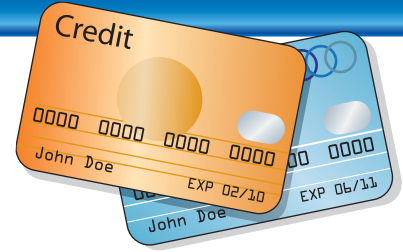
b.

Time	Interest	Balance
0 month	\$0	\$100
1 month		
2 months		
3 months		
4 months		
5 months		
6 months	\$3	\$103



## 2 ACTIVITY: Financial Literacy

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.



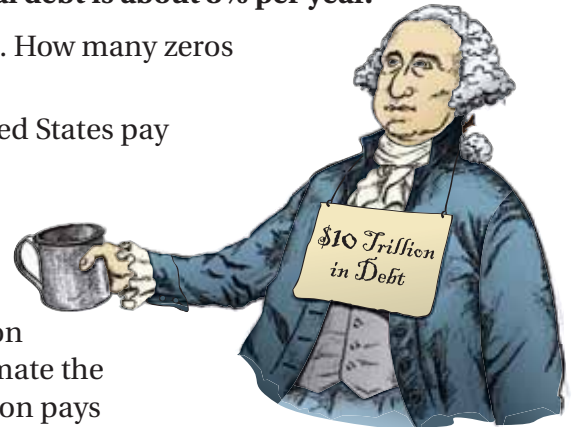
### U.S. Credit Card Data

- A typical family in the United States owes about \$5000 in credit card debt.
- A typical credit card interest rate is 18% to 20% per year. This is called the annual percentage rate.

## 3 ACTIVITY: The National Debt

Work with a partner. In 2010, the United States owed about \$10 trillion in debt. The interest rate on the national debt is about 3% per year.

- Write \$10 trillion in decimal form. How many zeros does this number have?
- How much interest does the United States pay each year on its national debt?
- How much interest does the United States pay each day on its national debt?
- The United States has a population of about 300 million people. Estimate the amount of interest that each person pays per year toward interest on the national debt.



## What Is Your Answer?

- 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.

### Practice

Use what you learned about simple interest to complete Exercises 4–7 on page 182.

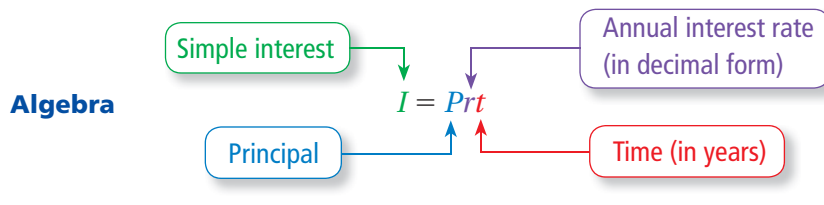
**Key Vocabulary**

interest, p. 180  
principal, p. 180  
simple interest,  
p. 180

**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.


**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.  $I = Prt$  Write simple interest formula.  
 $= 500(0.03)(3)$  Substitute 500 for  $P$ , 0.03 for  $r$ , and 3 for  $t$ .  
 $= 45$  Multiply.

∴ The interest earned is \$45 after 3 years.

- b. To find the balance, add the interest to the principal.

∴ 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?

- $I = Prt$  Write simple interest formula.  
 $100 = 1000(r)(4)$  Substitute 100 for  $I$ , 1000 for  $P$ , and 4 for  $t$ .  
 $100 = 4000r$  Simplify.  
 $0.025 = r$  Divide each side by 4000.

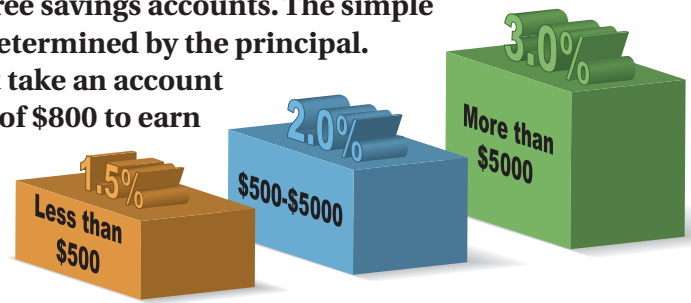
∴ The annual interest rate of the account is 0.025, or 2.5%.

### On Your Own

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

### 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 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.

∴ The account earns \$100 in interest in 6.25 years.

### EXAMPLE 4 Finding 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.

∴ So, you pay  $\$600 + \$450 = \$1050$  for the loan.

### On Your Own

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


**Vocabulary and Concept Check**


- VOCABULARY** Define each variable in  $I = Prt$ .
- WRITING** In each situation, tell whether you would want a *higher* or *lower* interest rate. Explain your reasoning.
  - You borrow money
  - You open a savings account
- 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.

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

- 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 simple interest rate.

- $I = \$24$ ,  $P = \$400$ ,  $t = 2$  years
  - $I = \$562.50$ ,  $P = \$1500$ ,  $t = 5$  years
  - $I = \$54$ ,  $P = \$900$ ,  $t = 18$  months
  - $I = \$160.67$ ,  $P = \$2000$ ,  $t = 8$  months

Find the amount of time.

- $I = \$30$ ,  $P = \$500$ ,  $r = 3\%$
  - $I = \$720$ ,  $P = \$1000$ ,  $r = 9\%$
  - $I = \$54$ ,  $P = \$800$ ,  $r = 4.5\%$
  - $I = \$450$ ,  $P = \$2400$ ,  $r = 7.5\%$

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

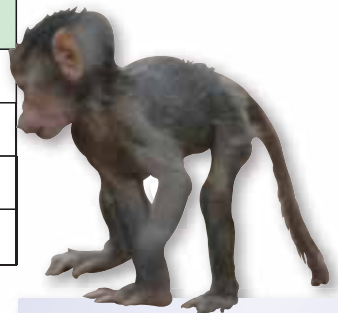


**Find the amount paid for the loan.**

- 4 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.**

	Principal	Interest Rate	Time	Simple Interest
28.	\$12,000	4.25%	5 years	
29.		6.5%	18 months	\$828.75
30.	\$15,500	8.75%		\$5425.00
31.	\$18,000		54 months	\$4252.50



**Zoo Trip**

Tickets	67.70
Food	62.34
Gas	45.50
Total Cost	?

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?



**11.8% Simple Interest**  
 Equal monthly  
 payments for 2 years.

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. **LOANS** 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 proportion.**

38.  $\frac{4}{9} = \frac{12}{x}$

39.  $\frac{15}{36} = \frac{n}{12}$

40.  $\frac{m}{6.5} = \frac{14}{26}$

41.  $\frac{2.4}{z} = \frac{3}{11.25}$

42. **MULTIPLE CHOICE** What is the solution of  $4x + 5 = -11$  ?

(A) -4

(B) -1.5

(C) 1.5

(D) 4