

SIMPLE INTEREST

6.7

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.

Write the annual interest rate in decimal form.

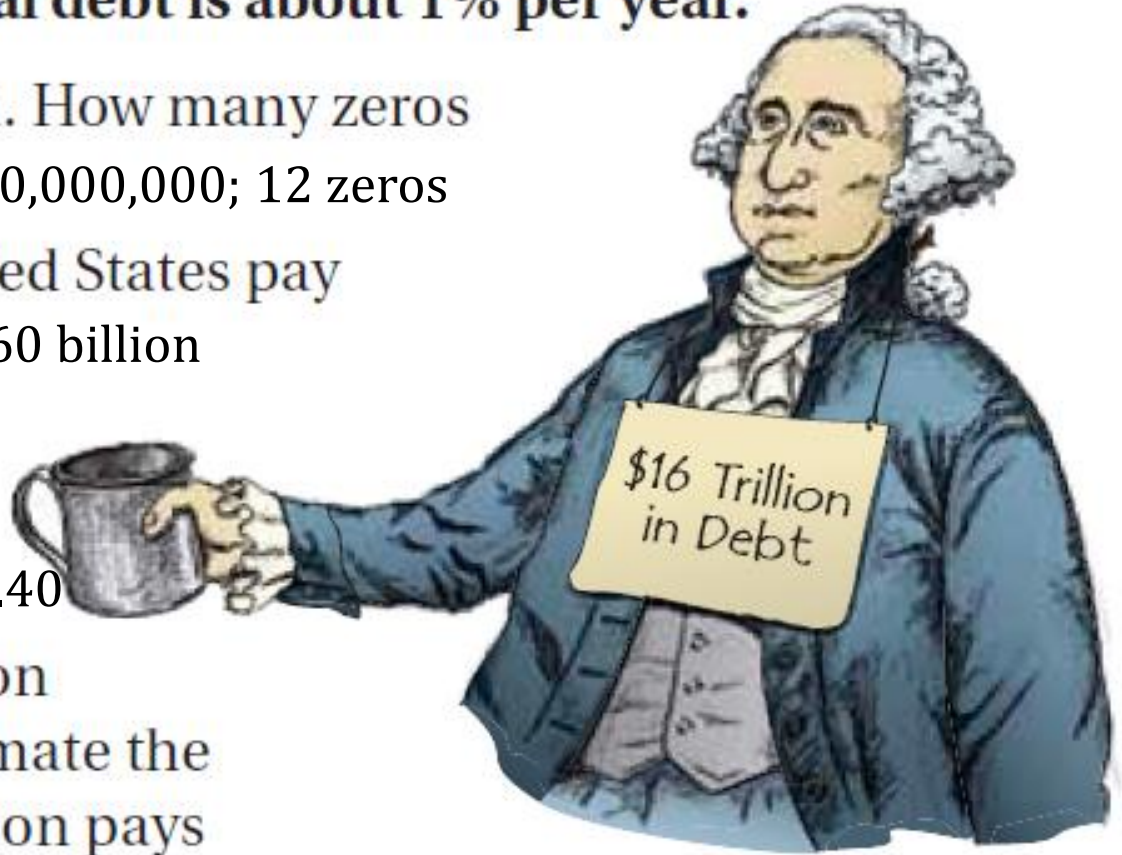
$$\begin{array}{ccccccc} \boxed{\text{Simple}} & = & \boxed{\text{Principal}} & \times & \boxed{\text{Annual interest}} & \times & \boxed{\text{Time}} \\ \boxed{\text{interest}} & & & & \boxed{\text{rate}} & & \\ (\$) & & (\$) & & (\% \text{ per yr}) & & (\text{Years}) \end{array}$$

$$I = Prt$$

ACTIVITY: The National Debt

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.

- Write \$16 trillion in decimal form. How many zeros does this number have? 16,000,000,000,000; 12 zeros
- How much interest does the United States pay each year on its national debt? 160 billion
- How much interest does the United States pay each day on its national debt? \$438, 356,164.40
- The United States has a population of about 314 million people. Estimate the amount of interest that each person pays per year toward interest on the national debt. about \$509.55



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

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. $I = Prt$

$$I = 500(.03)(3)$$

$$I = 45$$

❖ So, 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?

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Write simple interest formula.

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

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Write simple interest formula.

$$100 = 1000(r)(4)$$

Substitute 100 for I , 1000 for P , and 4 for t .

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Write simple interest formula.

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Substitute 100 for I , 1000 for P , and 4 for t .

$$100 = 4000r$$

Simplify.

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Simplify.

$$0.025 = r$$

Divide each side by 4000.

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Write simple interest formula.

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Substitute 100 for I , 1000 for P , and 4 for t .

$$100 = 4000r$$

Simplify.

$$0.025 = r$$

Divide each side by 4000.

So, the annual interest rate of the account is 2.5%.

$$I = Prt$$

On Your Own

1. In Example 1, what is the balance of the account after 9 months?

Principal: \$500, Interest Rate: 3%, Time: 9 months ($\frac{3}{4}$ of a year or 0.75 of a year)

$$I = 500(0.03)(0.75)$$

$$I = 11.25$$

Balance after 9 months will be \$511.25

2. You put \$350 in an account. The account earns \$17.50 simple interest in 2.5 years. What is the annual interest rate?

$$17.50 = 350(r)(2.5)$$

$$17.50 = 875r$$

$$0.02 = r$$

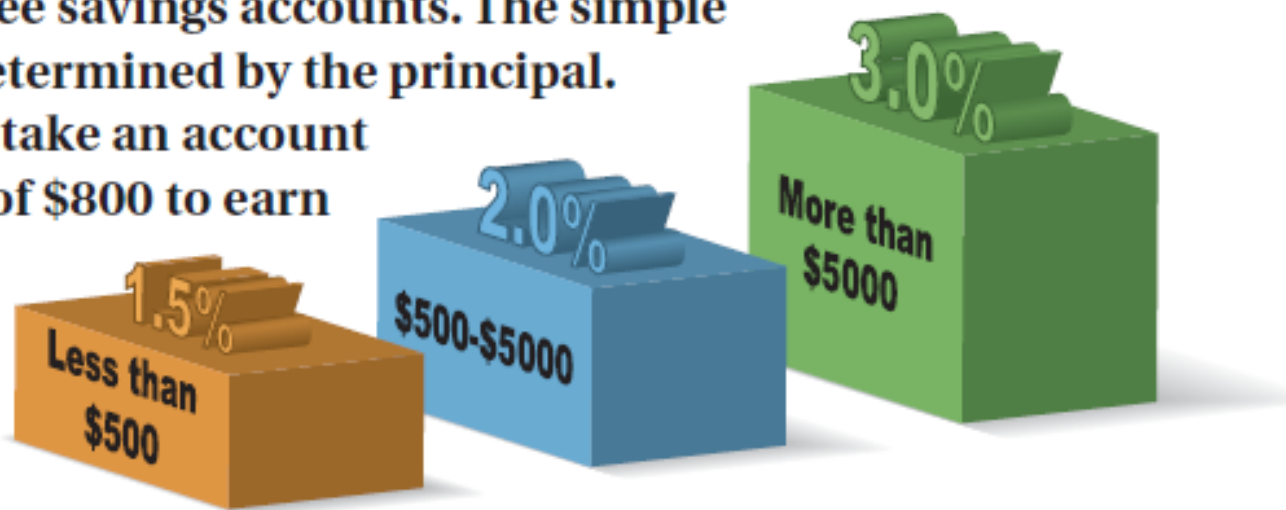
Interest rate is 2%.

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?



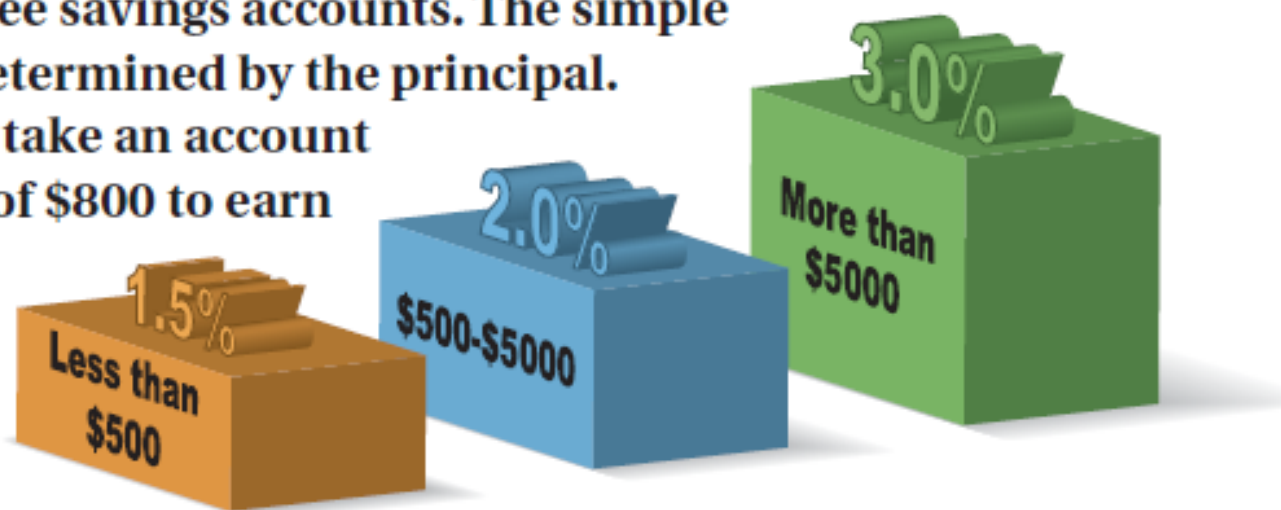
The pictogram shows that the interest rate for a principal of \$800 is 2%.

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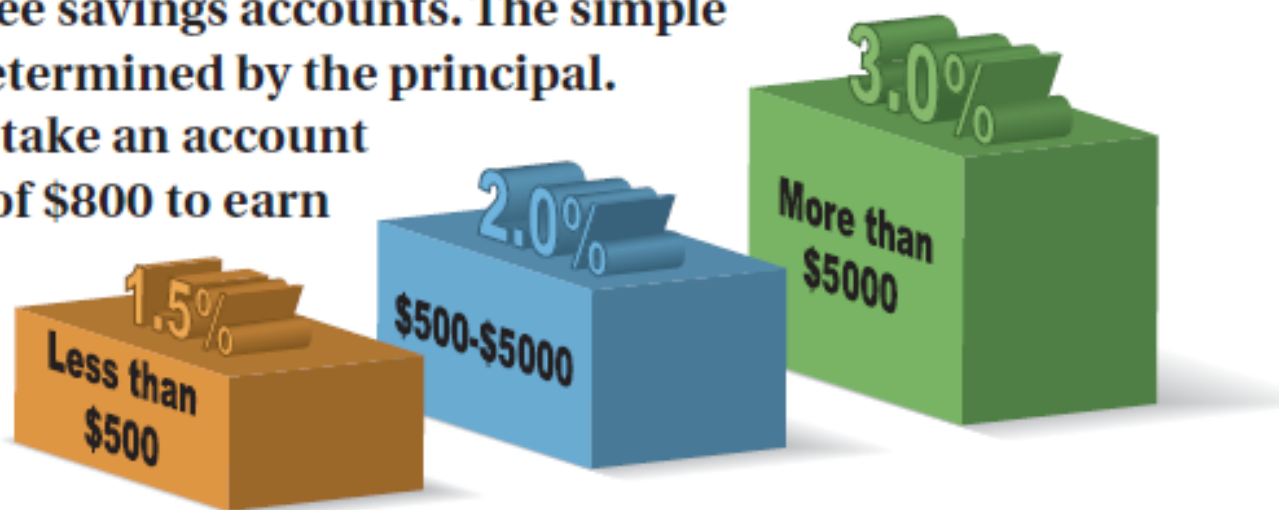
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$$I = Prt$$

Write simple interest formula.

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 .

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.

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.

••• 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?



EXAMPLE**4****Finding an Amount Paid on a Loan**

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$$I = Prt$$

Write simple interest formula.

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?



$$I = Prt$$

$$= 600(0.15)(5)$$

Write simple interest formula.

Substitute 600 for P , 0.15 for r , and 5 for t .

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?



$$I = Prt$$

$$= 600(0.15)(5)$$

$$= 450$$

Write simple interest formula.

Substitute 600 for P , 0.15 for r , and 5 for t .

Multiply.

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?



$$I = Prt$$

$$= 600(0.15)(5)$$

$$= 450$$

Write simple interest formula.

Substitute 600 for P , 0.15 for r , and 5 for t .

Multiply.

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

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.

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

On Your Own

3. In Example 3, how long does it take an account with a principal of \$10,000 to earn \$750 in interest?

$$750 = 10,000(0.03)t$$

$$750 = 300t$$

$$2.5 = t$$

It would take 2.5 years 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?

$$I = 600(0.15)2$$

$$I = 180$$

$450 - 180 = 270$. So, you would save \$270 if you paid off your loan in 2 years instead of 5 years.

