LESSON 3.8

Simple and Compound Interest

CA Standards NS 1.7

Goal: Use percents to calculate simple and compound interest.

Vocabulary

Interest: The amount earned or paid for the use of money

Principal: The amount of money borrowed or deposited

Simple interest: Interest that is earned or paid only on the principal

Annual interest rate: The percent of the principal paid or earned per year

Balance: The sum of the principal and the interest of an account that earns simple annual interest

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

Simple Interest

Words To find simple interest I, find the product of the principal P, the annual interest rate r written as a decimal, and the time t in years.

Algebra $I =$ Prt

EXAMPLE 1 Multiple Choice Practice

Loans You borrow $2500 and pay a simple interest rate of 3.5% per year. How much interest will you pay after 30 months?

(A) $87.50 (B) $218.75 (C) $1750.00 (D) $2625.00

When you borrow money from a bank, you pay the bank interest as well as the amount you borrowed.

Solution

$I = Prt$ Write formula for simple interest.

$= (\boxed{2500})(\boxed{0.035})(\boxed{2.5})$ Substitute values.

$= \boxed{218.75}$ Multiply.

Answer: You will pay $\boxed{\$218.75}$ in interest.

The correct answer is $\boxed{B}$. (A) (B) (C) (D)

Think: How can 30 months be written in years?

EXAMPLE 2 Finding the Balance

Mowing Lawns You earn $500 mowing lawns. You deposit the money into a savings account that pays 4% simple annual interest. Find your account balance after 6 months.

Solution

To represent t as a time in years, write 6 months as $\boxed{\frac{6}{12}}$ year, or $\boxed{0.5}$ year.

Then substitute values for P, r, and t in the formula $A = P(1 + rt)$ and solve.

$A = P(1 + rt)$ Write formula for finding the balance.

$= \boxed{500}[1 + \boxed{0.04}(\boxed{0.5})]$ Substitute values.

$= \boxed{510}$ Simplify.

Answer: Your account balance after 6 months is $\boxed{\$510}$.

Compound Interest

When an account earns interest compounded annually, the balance A is given by the formula

$A = \boxed{P(1 + r)^t}$

where P is the $\boxed{\text{principal}}$, r is the annual $\boxed{\text{interest rate}}$ (written as a decimal), and t is the $\boxed{\text{time}}$ in years.

EXAMPLE 3 Calculating Compound Interest

Savings Account You deposit $400 into an account that pays 4% interest compounded annually. What is your balance at the end of 3 years?

Solution

Method 1 Solve using a table.

Year	Beginning balance	Interest	Ending balance
1	$400	$I = (400)(0.04)(1)$ $= \boxed{\$16}$	$A = 400 + \boxed{16}$ $= \boxed{\$416}$
2	$\boxed{\$416}$	$I = (416)(0.04)(\boxed{1})$ $= \boxed{\$16.64}$	$A = 416 + \boxed{16.64}$ $= \boxed{\$432.64}$
3	$\boxed{\$432.64}$	$I = (\boxed{432.64})(0.04)(1)$ $= \boxed{\$17.31}$	$A = 432.64 + \boxed{17.31}$ $= \boxed{\$449.95}$

Method 2 Solve using the compound interest formula.

$A = P(1 + r)^t$ Write formula for compound interest.

$= \boxed{400}(1 + \boxed{0.04})^{\boxed{3}}$ Substitute values.

$= \boxed{449.95}$ Simplify.

Answer: Your account balance at the end of 3 years is $\boxed{\$449.95}$.

Guided Practice **Find the specified amount for an account that earns simple annual interest.**

1. $P = \$1200$
$r = 3.5\%$
Find the interest earned after 18 months.

2. $P = \$650$
$r = 5\%$
Find the account balance after 54 months.

3. Suppose the account in Example 3 pays 4.5% interest compounded annually. What is your balance at the end of 2.5 years?

Homework