Simple Interest

There are two different ways of calculating interest: simple and compound. When you pay **simple interest**, you pay interest only on the principal, not on interest that has already been paid.

EXAMPLE: Suppose you borrow $2000 at a simple interest rate of 12% per year. You agree to repay the loan at the end of 2 years. How much interest will you pay? How much will you pay to the bank in all?

To find the amount of interest that you will pay, you can use this formula:

interest (I) = principal (p) · annual rate of interest (r) · time in years (t)

$$I = prt$$
$$= (2000)(0.12)(2)$$
$$= 480$$

12% = 0.12

You will pay $480 in interest. Since the principal is $2000, you will pay $2000 + $480, or $2480, to the bank.

Compound Interest

Unlike simple interest, **compound interest** is paid on the principal *and* on interest that has already been paid.

ONE WAY You can calculate compound interest by making a table.

EXAMPLE 1: Suppose you put $500 in a bank account that pays 8% annual interest and is compounded every month. After each 1-month period, the interest is added to the principal and you earn interest on the new total in your account. How much money will you have in the account at the end of 3 months?

3 months is three 1-month periods.

The rate (r) is 8%, or 0.08. Since the time period is 1 month, which is $\frac{1}{12}$ year, $t \approx 0.083$.

Period	Principal (p)	Interest (I) ($I = prt$)	New Total ($p + I$)
1st month	500.00	(500.00)(0.08)(0.083) ≈ 3.32	503.32
2nd month	503.32	(503.32)(0.08)(0.083) ≈ 3.34	506.66
3rd month	506.66	(506.66)(0.08)(0.083) ≈ 3.36	510.02

So, at the end of 3 months, you will have $510.02 in the account.

MORE ▶

More Help
See 207, 238

ANOTHER WAY You can also calculate compound interest by using a formula.

$$\text{Total Amount} = \text{Original Principal} \times \left(1 + \frac{\text{rate}}{\text{\# yearly compounds}}\right)^{\text{\# yearly compounds} \times \text{years}}$$

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

EXAMPLE 2: Suppose you put $900 in a bank account that pays 6% annual interest. After each 3-month period, the interest is added to the principal and you earn interest on the new total in your account. How much money will you have in the account at the end of 1 year?

$$\begin{aligned} A &= P\left(1 + \frac{r}{n}\right)^{nt} \\ &= 900\left(1 + \frac{0.06}{4}\right)^{4 \cdot 1} \\ &\approx 955.227 \end{aligned}$$

Since the account can't have parts of a cent, round the total to $955.23.

Credit Cards

When you use credit cards, you may pay compound interest without realizing it. So, your annual effective interest—the interest rate you actually pay for the year—may be greater than the simple annual percentage rate listed on the card. How can that be?

The answer comes from how your finance charges are computed. If you don't pay off your balance in full each month, you pay interest both on the unpaid balance *and* on the finance charges that are applied each day. When you pay interest on interest, interest is compounded. So, although the daily rate listed on the bill is accurate, the interest you pay over a year ends up being greater than the annual rate listed on the bill.

CREDIT CARD STATEMENT

Number of Days This Billing Period	31
*Daily Periodic Rate	0.04288%
*Average Daily Balance	$379
=Finance Charge	$5.04
Current Annual Percentage Rate	15.650%

***Daily Periodic Rate*: the interest rate charged each day on the average daily balance (this is $\frac{1}{365}$ of the annual rate)**

***Average Daily Balance*: the sum of the balance owed on each day of the billing period divided by the total number of days in the billing period. The average daily balance is $0 if all of the previous month's balance was paid.**

***Finance Charge*: the total interest charged this month**

***Current Annual Percentage Rate*: rate × 365 (rounded to the nearest hundredth)**