

Interest

Simple Interest

Interest which is paid only on the principal, P , and not on the additional amount generated by previous interest payments. A formula for computing simple interest is

$$A = P(1 + rt)$$

A is the sum of principal and interest at time t for a constant interest rate r .

Example:

An amount of \$100.00 is deposited in a bank paying simple interest at an annual interest rate of 5%. Find the balance after 2 years.

Solution:

$$A = 100(1 + 0.05(2))$$

$$A = 110$$

After 2 years you have \$ 110.

Yearly Compound Interest

Let P be the principal (initial investment), r be the annual compounded rate and t the number of years.

$$A = P(1 + r)^t$$

where A is the final amount.

Example

An amount of \$100.00 is deposited in a bank paying compound interest at an annual interest rate of 5%. Find the balance after 2 years.

Solution:

$$A = 100(1 + 0.05)^2$$

$$A = 110.25$$

After 2 years you would have \$110.25.

Monthly Compound Interest

Let P be the principal (initial investment), r be the annual compounded rate, n the "nominal rate," n be the number of times interest is compounded per year (i.e., the year is divided into n conversion periods) and t the number of years.

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

where A is the final amount.

Example

An amount of \$100.00 is deposited in a bank paying an annual interest rate of 5%, compounded quarterly. Find the balance after 2 years.

Solution:

$$A = 100\left(1 + \frac{0.05}{4}\right)^{2(4)}$$

$$A = 110.45$$

After 2 years you would have \$110.45.

Example

An amount of \$100.00 is deposited in a bank paying an annual interest rate of 5%, compounded monthly. Find the balance after 2 years.

Solution:

$$A = 100\left(1 + \frac{0.05}{12}\right)^{2(12)}$$

$$A = 110.49$$

After 2 years you would have \$110.49.

Continuous Compound Interest

Let P be the principal (initial investment), r be the annual compounded rate and t the number of years.

$$A = Pe^{rt}$$

Example

An amount of \$100.00 is deposited in a bank paying an annual interest rate of 5%, compounded continuously. Find the balance after 2 years.

Solution:

$$A = 100e^{0.05*2}$$

$$A = 110.51$$

After 2 years you would have \$110.51.