## Savings

## How to calculate interest?

Interest can be calculated in two ways - simple interest or compound interest.

**SIMPLE INTEREST**

Simple interest is a quick and easy method of calculating interest charged on loans or investments. The principal remains constant for the whole loan/deposit period.

The formula for calculating simple interest is:

$$P * i * n$$

where:

*P - principal (capital)*
*i - interest rate as a decimal*
*n - term of the loan or deposit*

An example:

Tom wants to invest 150 EUR (called the principal) at a 3% annual rate for three years.

The simple interest calculation is: 150 EUR x 0,03 x 1 = 13,5 EUR for three years.

A task to do:

Anna has to borrow 300 EUR (called the principal) from the bank for two years. The bank wants 9% interest on it. Calculate a simple interest.

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Remark:

Simple interest gives you a quick estimate of the amount that you'll pay or that you'll earn, without using complicated formulas. Remember, it provides only a basic idea of your options. In practice the interest is usually calculated using more sophisticated methods.

**COMPOUND INTEREST**

Compound interest is calculated on the principal amount and also on the accumulated interest of previous periods and is therefore often referred to as "interest on interest". Interest can be compounded on any given frequency schedule, from daily to annually. When calculating compound interest, the number of compounding periods makes a significant difference.[1]

The formula for calculating compound interest is:

$$[P\left(1 + \frac{i}{n}\right)^{nt}] - P$$

where:

*P - principal (capital)*
*i - interest rate as a decimal*
*n - number of compounding periods per year*
*t - total number of years for the investment or loan*

<u>An example:</u>

Mr Bean makes an initial investment of 2000 EUR for a period of 3 years. Find the value of the investment after three years if the investment earns the return of 10% compounded annually.

$$2000 \text{ EUR} \left(1 + \frac{0,1}{1}\right)^{1*3} = 2662 \text{ EUR}$$

The value of investment after 3 years will become 2662 EUR, so the interest will be 662 EUR.

The formula for calculating compound interest **including tax** is:

$$[P\left(1 + \frac{i(1-c)}{n}\right)^{nt}] - P$$

where:

*P - principal (capital)*
*i - interest rate as a decimal*
*n - number of compounding periods per year*
*t - total number of years for the investment*
*c - tax rate as a decimal*

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[1] <u>https://www.investopedia.com/</u>

<u>An example:</u>

Mrs Chau invests 1200 EUR in a bank account which pays interest at the rate of 4% per year. Calculate the value of her investment after four years. A tax rate is 19%.

$$1200 \text{ EUR} \left(1 + \frac{0{,}04(1 - 0{,}19)}{1}\right)^{1*4} = 1363{,}24 \text{ EUR}$$

The value of investment after 4 years will become 1362,24 EUR.

<u>A task to do:</u>

If you deposit 3000 EUR into an account paying 3% annual interest compounded quarterly, how much money will be in the account after 5 years? All earnings will be taxed at an income tax rate of 19%.

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