

Simple Interest

Simple Interest is interest earned (paid) each year on the original amount invested (borrowed).

Example

I invest \$100 at 10% p.a. simple interest.

Each year I earn 10% of \$100 = \$10

Year	Interest Earned Over the Year	Amount at End of Year
1	\$10	110
2	\$10	120
3	\$10	130
4	\$10	140
5	\$10	150

Simple Interest

1. I earn 4% p.a. simple interest on money in my bank account. How much interest do I earn after one year if my account contains \$8000?
2. I earn 9½% p.a. simple interest on money in my bank account. How much interest do I earn after three years if I have \$5000 in my account?
3. I have \$2000 in my bank account. My money is earning simple interest. What is the simple interest rate per annum if at the end of 3 years I earn \$300?
4. The money in my bank account is earning simple interest. How much money is in my account if the interest rate is 3% p.a. and I earn \$200 interest in the first 2 years?

Compound Interest

With compound interest, each year you earn more interest than in the previous year.

This is because you not only earn interest on your initial investment, but you also earn interest on your interest.

Example

I invest \$100 at 10% p.a. **compound interest**. Interest is compounded once a year.

Each year the money in my account grows by 10%. So each year I multiply the amount in my account by 1.1.

Years	Calculation	Expression	Amount
0	100		100
1	100 x 1.1	100 x 1.1 ¹	110
2	100 x 1.1 x 1.1	100 x 1.1 ²	121
3	100 x 1.1 x 1.1 x 1.1	100 x 1.1 ³	133.10
4	100 x 1.1 x 1.1 x 1.1 x 1.1	100 x 1.1 ⁴	146.41
...			
20	?	?	?

Q1. I deposit \$400 in an account that earns 6% p.a. compounded annually.

Make a table that shows how much is in the account every year for 5 years

Years	Calculation	Expression	Amount
0			
1			
2			
3			
4			
5			

The formula for compound interest *if interest is compounded annually is*

$$\text{Amount} = P(1 + i)^n$$

where

P = principal (amount invested)

i = interest rate per year (as a decimal)

n = number of years

Compound Interest

- Q1. Find the amount of an investment after 6 years if you invest \$800 at 9% p.a. compounded annually.
- Q2. Find the amount of an investment after 4 years if you invest \$12 000 at 6.5% p.a. compounded annually.

Compound Interest

Example

I invest \$100 at 12% p.a. **compound interest**. Interest is compounded **monthly**.

Each month, the money in my account grows by 1%.

Months	Calculation	Expression	Amount
0			100
1	100×1.01	100×1.01^1	101
2	$100 \times 1.01 \times 1.01$	100×1.01^2	102.01
3	$100 \times 1.01 \times 1.01 \times 1.01$	100×1.01^3	103.03
4	$100 \times 1.01 \times 1.01 \times 1.01 \times 1.01$	100×1.01^4	104.06
...			
12		100×1.01^{12}	112.68
...			
120		100×1.01^{120}	303.04

$$\text{Amount} = 100 \times 1.01^{\text{Months}}$$

Compound Interest

The formula for compound interest is

$$\text{Amount} = P(1 + i)^n$$

where

P = the principal (the amount invested)
i = the interest rate per term, as a decimal.
n = number of terms (compounding periods)

- Q1. I put \$2000 into an account that pays 6% interest compounded quarterly. What does it grow to after 4 years?
- Q2. I invest \$4500 into an account that pays 3.2% interest compounded monthly. What does it grow to after 10 years?

Simple Interest Examples

1. I earn 4% p.a. simple interest on money in my bank account. How much interest do I earn after one year if my account contains \$8000?
2. I earn $9\frac{1}{2}\%$ p.a. simple interest on money in my bank account. How much interest do I earn after three years if I have \$5000 in my account?
3. I have \$2000 in my bank account. My money is earning simple interest. What is the simple interest rate per annum if at the end of 3 years I earn \$300?
4. The money in my bank account is earning simple interest. How much money is in my account if the interest rate is 3% p.a. and I earn \$200 interest in the first 2 years?