

Simple Interest and Compound Interest



Principal (P): The original amount of money that is either invested or borrowed.

Example: If you put ₹1,000 in a bank, then ₹1,000 is the principal.

Rate of Interest (R): The percentage of the principal that is paid as interest over a period (usually per year).

Example: If the bank gives 5% interest, then $R = 5\%$.

Time (T): The duration for which the money is invested or borrowed. It is usually expressed in years.

Amount (A): The total money paid or received after adding the interest to the principal.

$$\text{Amount} = \text{Principal} + \text{Interest}$$

Simple Interest (SI): Simple Interest is the interest calculated only on the principal amount for a specific time at a fixed rate.

$$S.I. = \frac{P \times R \times T}{100}$$

Example: If ₹1000 is invested at 5% for 2 years,

$$S.I. = \frac{1000 \times 5 \times 2}{100} = ₹100$$

Compound Interest (CI): Compound Interest is the interest calculated on the principal and on the accumulated interest.

$$A = P \left(1 + \frac{R}{100} \right)^T, CI = A - P$$

Example: If ₹ 1000 is invested at 5% for 2 years,

$$A = 1000 \left(1 + \frac{5}{100} \right)^2 = 1000 \times 1.1025 = ₹1102.50, C.I. = ₹1102.50 - ₹1000 = ₹102.50$$

Half-Yearly Compounding: Interest is calculated twice a year, rate is halved and time is doubled.

$$A = P \left(1 + \frac{R}{2 \times 100} \right)^{2T}$$

Example: ₹1000 at 8% p.a. for 1 year,

$$A = 1000 \left(1 + \frac{8}{200} \right)^2 = 1000 \times 1.0816 = ₹1081.60$$

Quarterly Compounding: Interest is calculated four times a year; rate is divided by 4 and time is multiplied by 4 .

$$A = P \left(1 + \frac{R}{4 \times 100} \right)^{4T}$$

Example: ₹1000 at 8% p.a. for 1 year,

$$A = 1000 \left(1 + \frac{8}{400} \right)^4 = 1000 \times 1.0824 = ₹1082.43$$

Practice Questions

1. If the simple interest on a sum for 2 years at 8% p.a. is ₹ 320, find the principal.

Sol: Given:

Simple Interest = ₹320

Time = 2 years

Rate = 8% per annum

$$SI = \frac{P \times R \times T}{100}$$

Substituting the values:

$$320 = \frac{P \times 8 \times 2}{100}$$

$$320 = \frac{16P}{100}$$

$$320 = \frac{4P}{25}$$

$$P = \frac{320 \times 25}{4}$$

$$P = 2000$$

2. Find the compound interest on ₹10,000 for 2 years at 5% per annum.

Sol: Given:

Principal = ₹10000

Rate = 5% per annum

Time = 2 years

$$A = P \left(1 + \frac{R}{100} \right)^T$$

$$A = 10000 \left(1 + \frac{5}{100} \right)^2$$

$$A = 10000(1.05)^2$$

$$A = 10000 \times 1.1025$$

$$A = 11025$$

Compound Interest:

$$CI = A - P$$

$$CI = 11025 - 10000$$

$$CI = 1025$$

3. The SI on ₹4,000 in 5 years is ₹600. Find the rate of interest.

Sol: Given:

Principal = ₹4,000

Simple Interest = ₹600

Time = 5 years

$$R = \frac{SI \times 100}{P \times T}$$

$$R = \frac{600 \times 100}{4000 \times 5}$$

$$R = \frac{60000}{20000}$$

$$R = 3\%$$