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Chapter 12: Simple and Compound Interest

Topic-wise short notes with solved examples

Interest on borrowed money, simple interest by the formula, compound interest by repeated growth, and the quick shortcut for the difference in two years.

1 Simple interest

- **Interest** is the extra money paid for borrowing. The money borrowed is the **principal** P , the yearly **rate** is $R\%$ and the **time** is T years.
- In **simple interest** the interest is always worked out on the original principal.

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

- A is the **amount**: what has to be paid back in all.
- If any three of P , R , T and SI are known, the fourth can be found by rearranging the formula.

Example 1.1 Find the simple interest on Rs 5000 at 8% per year for 3 years.

SOLUTION

$$SI = \frac{5000 \times 8 \times 3}{100}.$$

Rs 1200

Example 1.2 A sum of Rs 2000 earns a simple interest of Rs 600 in 3 years. Find the rate of interest.

SOLUTION

$$600 = \frac{2000 \times R \times 3}{100}, \text{ so } R = \frac{600 \times 100}{6000}.$$

10% per year

2 Compound interest

- In **compound interest** the interest of each year is added to the principal, and the next year's interest is worked out on the larger amount.
- After n years: $A = P \left(1 + \frac{R}{100}\right)^n$ and $CI = A - P$.
- If the interest is added **half-yearly**, use half the rate and double the number of periods: $A = P \left(1 + \frac{R/2}{100}\right)^{2n}$.

- For depreciation (the value falls each year) use $\left(1 - \frac{R}{100}\right)^n$.

Example 2.1 Find the compound interest on Rs 10 000 at 10% per year for 2 years.

SOLUTION

$$A = 10\,000 \times 1.1 \times 1.1 = 12\,100.$$

$$CI = 12\,100 - 10\,000.$$

Rs 2100

Example 2.2 Find the amount when Rs 8000 is invested for 1 year at 10% per year, interest added half-yearly.

SOLUTION

Rate per half-year = 5% and the number of half-years = 2.

$$A = 8000 \times 1.05 \times 1.05.$$

Rs 8820

Example 2.3 A machine worth Rs 50 000 loses 10% of its value every year. Find its value after 2 years.

SOLUTION

$$50\,000 \times 0.9 \times 0.9.$$

Rs 40 500

3 Comparing the two

- In the **first** year simple interest and compound interest are equal. After that, compound interest is larger.
- For **2 years**, $CI - SI = P \left(\frac{R}{100}\right)^2$.

Example 3.1 Find the difference between the compound interest and the simple interest on Rs 5000 at 10% per year for 2 years.

SOLUTION

$$5000 \times \left(\frac{10}{100}\right)^2 = 5000 \times 0.01.$$

Rs 50

REMEMBER

For compound interest over 2 or 3 years, multiply year by year. You can see each step, and mistakes with powers are avoided.

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