

INTERESTS

A DEFINITIONS

Definition Principal

The **principal** is the original amount of money that is either invested or loaned.

Definition Interest

Interest is the cost paid for borrowing money or the amount earned from lending or investing money.

B SIMPLE INTEREST

Definition Simple Interest

The **simple interest** is calculated each year as a fixed percentage on the principal (original amount) of money borrowed or invested.

Proposition Simple Interest Formula

The simple interest, denoted by I , is calculated as:

$$I = t \times r \times P$$

where:

- P is the principal (original amount)
- r is the interest rate per year
- t is the time (in years)

The final amount, denoted by A , is:

$$\begin{aligned} A &= P + I \\ &= P + t \times r \times P \\ &= (1 + t \times r) \times P \end{aligned}$$

Ex: Find the simple interest on a principal of \$500 at a rate of 3% per year over 5 years.

Solution:

$$\begin{aligned} \text{Interest} &= 5 \times 3\% \text{ of } 500 \\ &= 5 \times \frac{3}{100} \times 500 \\ &= 75 \text{ dollars} \end{aligned}$$

C COMPOUND INTEREST

Definition Compound Interest

Compound interest is interest that accumulates on both the principal sum and the previously accumulated interest.

Proposition Annual Compound Interest Formula

The final amount of an investment with interest compounded annually is:

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

where:

- P is the principal,
- r is the annual interest rate,
- t is the time (in years).

Ex: Find the final amount for compound interest on a principal of \$500 at a rate of 3% per year over 5 years.

Solution:

$$\begin{aligned}A &= P(1 + r)^t \\&= 500 \times (1 + 0.03)^5 \\&\approx \$580.81\end{aligned}$$

The final amount is approximately \$580.81.