

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.

Answer:

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

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.

Answer:

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

The final amount is approximately \$580.81.