



# TIME VALUE OF MONEY MATH

“TAKE CHARGE OF YOUR FINANCES” ADVANCED LEVEL

## SIMPLE INTEREST

**Simple interest** is interest earned on the principal investment. **Principal** refers to the original amount of money invested or saved.

### EQUATION

The equation for simple interest involves two steps.

#### Step 1:

$$P * r * t = I$$

Principal \* Interest Rate \* Time Period = Interest Earned

#### Step 2:

$$I + P = A$$

Interest Earned + Principal = Investment is Worth

### EXAMPLE

An individual invests \$1,000 at a 7% annual interest rate for 5 years:

$$\text{Step 1: } \$1,000 \times .07 \times 5 = \$350.00$$

$$\text{Step 2: } \$350 + \$1,000 = \$1,350.00$$

Therefore, \$350 in interest was earned and the investment is now worth \$1,350. The investment earns exactly \$70.00 in interest from the principal investment every year. When completing a simple interest calculation, the interest rate and time period units have to match. For example, if the interest rate is calculated annually, then the time period must be in years. If the interest rate is calculated monthly, then the time period must be in months.

## COMPOUND INTEREST

**Compound interest** is defined as earning interest on interest. There are two equations for compounding interest. The first equation is used to calculate a single sum of money invested:

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

Principal (1 + Interest Rate)<sup>Time Period</sup> = Investment is Worth

For example, an individual invests \$1,000 at 7% annual interest rate for 5 years (rounded to the nearest thousandth):

$$1,000 (1 + .07)^5 = \$1,403.00$$

The second equation is used when an equal number of investments are spread over time, rather than one large investment.

$$PMT * \frac{(1+r)^n - 1}{r} = A$$

Payment \*  $\frac{(1 + \text{Interest Rate})^{\text{Time Period}} - 1}{\text{Interest Rate}}$  = Amount Investment

For example, an individual invests \$1,000 every year at a 7% annual interest rate for 5 years (rounded to the nearest thousandth):

$$\$1,000 * \frac{(1 + .07)^5 - 1}{.07} = \$5,757.00$$

