TIME VALUE OF MONEY MATH

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 = FV

Interest Earned + Principal = Amount Investment is Worth

EXAMPLE

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

Step 1: $1,000 x .07 x 5 = $350.00

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 when a single sum of money is invested:

$$P\left(1+\frac{r}{n}\right)^{nt}=FV$$

P = principal
r = interest rate
n = # of times interest is compounded annually
t = number of years

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

$$1000\left(1+\frac{.07}{1}\right)^{1x5}=\$1402.55$$

The second equation is used when an investment amount is made periodically over time, for example every year, rather than just one large investment.

$$P\frac{\left(1+\frac{r}{n}\right)^{nt}-1}{\frac{r}{n}}=FV$$

P = principal
r = interest rate
n = # of times interest is compounded annually
t = number of years

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

$$1000\frac{\left(1+\frac{.07}{1}\right)^{1x5}-1}{\frac{.07}{1}}=\$5750.74$$

Funded by a grant from Take Charge America, Inc. to the Norton School of Family and Consumer Sciences Take Charge America Institute at The University of Arizona