Finance

Simple Interest

Principal: Note this is the *principal*, **not** the *principle* (which is a rule or law). The principal is the amount of money that has been lent or borrowed.

Interest rate: The interest rate tells you what percentage of the amount borrowed (the principal) needs to be paid at regular time intervals. Often the time interval is a year – so you pay back interest once a year.

Term length: The term length is how long the person who has borrowed the money has to pay interest for.

Per annum: This just means, "per year."

The simple interest formula

You use this to work out how much interest needs to be payed, if you know the principal, the interest rate, and the term length.

Here's the formula:

$$\text{simple interest paid} = \frac{PRT}{100}$$

P = principal, R = % rate, T = term length

Only one important thing to remember with this formula. The units of time you used for the *interest rate* and the *term length* have to be the same. Say I have an interest rate of 5% every *six months*. I would have to write down the term length in terms of blocks of six months. So if the term length was one year, I'd write it down in the formula as '2' – since there are two six month blocks in one year.

Example

Jason has borrowed $4000 from the bank to help pay for a new car. The bank loaned him the $4000 at an interest rate of 7% per annum, with an 18 month term. How much interest will he have to pay back to the bank over the 18 months?

How many years is 18 months? It's 1.5 years. So our term length is 1.5 years:

$$\text{simple interest paid} = \frac{\$4000 \times 7 \times 1.5}{100}$$

$$\text{simple interest paid} = \$420$$

Compound Interest

$$A_{total} = P(1+i)^n$$

A_{total} = final amount at end including principal, i = interest rate, n = number of 'rests' - the times when you stop to calculate interest.

Growth Factor: The growth factor is the *ratio* of the *final amount* to the *principal*.

Example

Sally puts $800 in her savings account at 6% yearly interest, compounding daily. How much does she have after 1 year?

Note – to get 'i' you need to divide the yearly interest rate (as a decimal) by the number of rests per year.

$$A_{total} = 800\left(1+\frac{0.06}{365}\right)^{365}$$

$$A_{total} = \$849.47$$

$$\text{Growth factor} = \frac{849.47}{800} = 1.06$$

Present and Future Values

Future values are simply how much an amount of money now will be worth in a certain number of years.

We can solve for the future value of $2000 in ten years time at 13% per annum by using the compound interest formula:

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

$$A = 2000(1+0.13)^{10}$$

$$A = \$6789.13$$

The future value is $6789.13.

Say you want to have a certain amount of money in 10 years time. The present value of that money is the amount of money you must invest now to get that desired amount in 10 years time.

$$PV = \frac{FV}{(1+i)^n}$$

Example

I want to have $6000 in 10 years time. The current compound yearly interest rate is 5% with yearly rests. What is the present value of that $6000?

$$PV = \frac{FV}{(1+i)^n}$$

$$PV = \frac{6000}{(1+0.05)^{10}}$$

$$PV = \$3683.48$$

So if I want to have $6000 in 10 years time, I must invest $3683.48 now – this is the present value of $6000 in 10 years time.