MASTER COACHING

NAME

FINANCIAL MATHEMATICS

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Edition 1

Financial Mathematics

Simple Interest or Fixed Interest.

This type of loan is rare for most lending institutions except Hire Purchase and some time payments. Simple interest charges interest on the full amount borrowed, even though much of the Principal (amount borrowed) has been repaid. For example, if you borrowed $100,000 at 6% pa fixed (simple) interest, and you have repaid $80,000 plus all your interest payments to that date, you are still being charged $6000/year interest even though your effective debt is now $20,000.

The formula for Simple Interest is $I = \frac{\Pr n}{100}$ Where *I* = Interest, P = Amount borrowed (Principal), R = % interest rate, n = number of terms.

Example: Find the interest on $100,000 at 6% pa invested for 7 years (example above)

Answer: $I = \frac{\$100000 \times 6 \times 7}{100} = \$42000$

Compound Interest:

Again this formula implies that the Principal remains fixed. There is another formula to use if the Principal is being repaid during the period of the loan. In this formula P = Principal and A = the accumulated value of the investment. Other terms as above except r is expressed as a decimal, r = .06.

There are two formulae: $A = P(1+r)^n$ and $I = P\left[(1+r)^n - 1\right]$ **in the above example**

$A = \$100000(1+0.06)^7$
$= \$150,363 \cdot 02$

and

$I = \$100000\left[(1+.06)^7 - 1\right]$
$= \$50,363 \cdot 02$

The compound interest is significantly higher than the simple interest.

Future Value:

In this type of investment the amount invested is added to by a fixed value at regular intervals. Life Assurance Policies worked on this principle in the past, the nearest present example is Superannuation, except this is not a true example because the value invested in Superannuation generally changes throughout the term of the investment. However, the formula given here is for a superannuation where there is a fixed amount invested at regular intervals. In this formula M = Term payment (often monthly hence the use of the letter M) paid at the end of each term, other terms as above.

The formula is $A = M\left\{\frac{(1+r)^n - 1}{r}\right\}$

Example: Find the future value of an investment of $2000 which is paid on the first day of the year for a period of ten years. This formula gives the value of the investment immediately after the last (ie 10th) payment. Given that the interest rate is 8% pa compounded yearly. Then:

$A = \frac{\$2000 \times \left(1.08^{10} - 1\right)}{0.08} = \$28,973 \cdot 12$