**Interests**

When a sum of money is lent by A to B, A is called the lender (creditor), B the borrower (debtor).

The sum lent is called the principal (P).

Interest (I) is the extra money paid by the borrower to lender for the use of money for a specified time.

Time for which the money is borrowed is called period (N).

The interest paid per 100 in a year is called rate % per annum (R).

Sum of Interest (I) and principal is called Amount (A); A = P+I

**Simple Interest (SI)**

When interest is paid as it falls due, it is called simple interest, i.e., throughout the loan period, interest is charged on the original sum (principal) borrowed:

SI = PNR/100 (See Example 1)

**Compound Interest (CI)**

When interest is added to the principal over a fix period of time, and new interest is calculated on this increased principal, The difference between the amount and money borrowed is called compound interest. (See Example 2)

Case 1: When interest is compounded annually:

A = P[1+(R/100)]^N

Case 2: When interest is compounded half yearly:

A = P[1+(R/200)]^2N

Case 3: When interest is compounded quarterly:

A = P[1+(R/400)]^4N

**Important Applications:**

1. In CI when rates are different for different years, say R1, R2, R3 then

A = P(1+ R1/100)(1+R2/100)(1+R3/100)

2. Value of machine or any other object decrease with time. This decrease is called depreciation.

Thus if U is the value at a certain time and R% per annum is the rate of depreciation, then the value V at the end of N years

V = U[1- (R/100)]^N

3. The original population of a town is P and the annual increase is R%, then the population of the town in N years

= P[1+(R/100)]^N

If the population decreases by R %, then the population of the town in N years

= P[1- (R/100)]^N

4. In hire purchase, the amount paid at the time of purchase is called down payment. The remainder is paid in equal monthly installments.

Monthly Installment = (Amount to be paid - Down payment)/ Number of installments

**Examples**

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| Example 1 | Calculate how much we will get by investing  1000 for 1 year with a bank that pays 5% p.a. simple interest. |
| Solution | At the end of the year we have Interest=1000×5%=1000×5/100=1000×0.05=50  With an opening balance of  1000 at the start of the year, the closing balance at the end of the year will therefore be  Closing balance=Opening balance+ Interest=1000+50=1050 |

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| Example 2 | Find the compound amount and compound interest on the principal 20,000 borrowed at 6% compounded annually for 3 years. |
| Solution | Let P = 20000 R = 6% N = 3 using A = P[1+(R/100)]^N http://www.emathzone.com/business_math/examples3/clip_image004.gif http://www.emathzone.com/business_math/examples3/clip_image006.gif (compound amount) Compound interest  = 23820.32 – 20000 = 3820.32 |