Interest

CONCEPT OF TIME VALUE OF MONEY

The value of money is not constant is not constant. This is one of the principal facts on which the entire economic world is based. A rupee today is not equal to rupee tomorrow. Hence, a rupee borrowed today cannot be repaid by a rupee tomorrow. This is the basic need for the concept of interest. The rate interest is used to determine the difference between what borrowed and what is repaid.
There are two basic on which interest are calculated:

Simple interest it is calculated on the basic of a basic amount borrowed for the entire period at a particular rate of interest. The amount borrowed is the principal for the entire period of borrowing.

Compound interest the interest of the previous year/s is / are added to the principal for the calculation of the compound interest.
This difference will be clear from the following illustration:

A sum of RS. 1000 at 10% per annum will have

Simple interest		compound interest
Rs.100	First year	Rs.100
Rs.100	Second year	Rs.110
Rs.100	Third year	Rs.121
Rs.100	fourth year	Rs.133.1

Note that the previous year's interests are added to the original sum of Rs.1000 to calculate the interest to be paid in the case of compound interest.

Terminology Pertaining to Interest

The men who lends money is the **Creditor** and the man who borrows money is the **Debtor.**
The amount of money that is initially borrows is called the **Capital** or **principal** money.
The period for which money is deposited or borrows is called **Time**.

Interest

The money, that will be paid or received for the use or the principal after a certain period is called the **Total interest** on the capita.
The sum of the principal and the interest at the end of any time is called the **Amount**.
So, Amount = principal + total Interest

Rate of interest is the rate at which the interest is calculated and is always specified in percentage terms.

SIMPLE INTEREST

The interest of 1 year for every Rs.100 is called the **interest rate** per annum. If we say "the rate of interest per annum is r%", we mean that Rs. R is the interest on a principal of Rs. 100 for 1 year.

Relation Among Principal, Time, Rate Percent of Interest Per Annum and Total Interest

Suppose, Principal = Rs. P, Time = t years, Rate of interest per annum = r% and Total interest = Rs . 1

Then $$I \frac{\text{P x t x r}}{100}$$

i.e. Total interest

$$= \frac{\text{Principal x Time x Rate of interest per annum}}{100}$$

Since the Amount = Principal + Total interest, we can write

$$\therefore \quad \text{Amount } (A) = \text{P} + \frac{\text{P x t x r}}{100}$$

$$\text{Time} = \left(\frac{\text{Total interest}}{\text{Interest on the Principal for one year}}\right) \text{years}$$

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COMPOUND INTEREST

In monetary transactions, often, the borrower and the lender, in order to settle an account, agree on a certain amount of interest to be paid to the lender on the basic of specified unite of time. This may be yearly or half-yearly or quarterly, with condition that the interest accrued to the principal at a certain interval of time be added to the principal so that the total amount at the end of an interval becomes the principal for the next interval. Thus, it is different from simple interest.

DEPRECIATION OF VALUE

The value of a machine or any other article subject to wear and tear, decreases which time This decrease is called its depreciation.
Thus if V_o is the value at a certain time and r% per annum is the rate of depreciation per year, then the value V_1 at the end of t years is

$$V_1 = V_0 \left[1 - \frac{r}{100}\right]^t$$

POPULATION

The problems on population change are similar to the problems on Compound Interest. The formula applicable to the problems on compound interest also apply to those on population. The only difference is that in the application replaces the rate or compound interest.
The student should see the chapter on interest essentially as an extension of the concept of percentages. All the rules of percentage calculation, which were elucidated in the chapter of percentage, will apply to the chapter on interest. Specifically, in the case of compound interest, the percentage rule for calculation of percentage values will be highly beneficial for the student.

Besides, while solving the question on interest the student should be aware of the possibility of using the given options to arrive at the solution. In fact, I feel that the formulae on Compound Interest (CI) unnecessarily make a very simple topic overly mathematical. Besides, the CI formulae are the most unusable formulae available in this level of, mathematic since it is virtually imposable for the student to calculate a number like 1.08 raised to the power 3, 4, 5 or more.

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Instead, in my opining you should view CI problems simply as an extension of the concept of successive percentage increases and tackle the calculation required through approximations and through the use of percentage rule of calculations.

Thus, a calculation: 4 years increase at 6% pa CI on Rs.120 x 1.06^4. It would be impossible for an average student to attempt such a question and even if once uses advance techniques of calculation, one will end up using more time than one has. Instead, if you have to solve this problem, you should look at it from the following percentage change graphic perspective:

$$120 \xrightarrow[=7.2]{+6\%} 127.2 \qquad \xrightarrow[6+1.62]{+6\%}$$

$$134.82 \xrightarrow[6+2.1]{+6\%} 142.92 \qquad \xrightarrow[6+2.58]{+6\%} \quad 15.15 \text{ (approx..)}$$