



The rate of interest is..?

Simple Interest

If the interest is calculated on original principal for a certain period is called the Simple Interest (S.I). Simple Interest will be the same for all the years.

If P is the principal, R is the rate of interest, T is the time and S.I is the simple interest, then

$$\text{Simple Interest} = \frac{PTR}{100}$$

$$\text{Amount} = P \left(1 + \frac{TR}{100} \right)$$

e.g.: Find the Simple Interest obtained on an amount of Rs.16800 at the rate of $4\frac{1}{2}$

p.c.p.a. for a period of 3 years?

Sol: Here P = Rs.16,800, T = 3 years

$$R = 4\frac{1}{2}\% = \frac{9}{2}\%$$

$$\text{Simple Interest} = \frac{16800 \times 3 \times 9}{2 \times 100} = \text{Rs.2268}$$

e.g.: What principal will amount to Rs.5700 at 4% per annum in $3\frac{1}{2}$ years?

$$\text{Sol: Amount} = P \left(1 + \frac{TR}{100} \right)$$

$$\Rightarrow \left(1 + \frac{7 \times 4}{2 \times 100} \right) = 5700$$

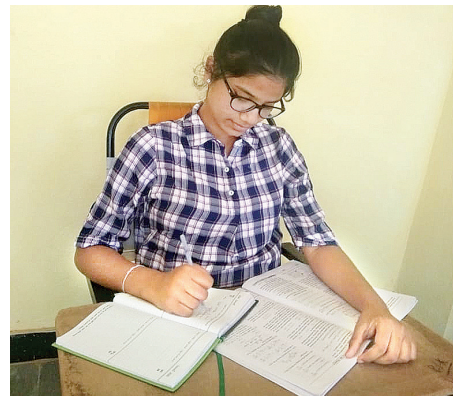
$$\Rightarrow P = \frac{5700 \times 2 \times 100}{228} = \text{Rs.5000}$$

Shortcut: For one year, rate of interest is 4% and for $3\frac{1}{2}$ years it is $4 \times 3\frac{1}{2} = 14\%$

The amount will become 114%.

If 114% money = 5700, then 100% money

$$= \frac{100}{114} = 5700 = \text{Rs.5000}$$



Bank Exams

Quantitative Aptitude

$$\Rightarrow \left[8000 \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100} \right] - 8000 = 1261$$

Shortcut: Amount = 105% of 105% of 105% of 8000

$$= 9261$$

$$\therefore \text{C.I} = 9261 - 8000$$

$$= \text{Rs.1261}$$

Note: If the Interest is paid half yearly, time is doubled and the rate is halved.

If the Interest is paid quarterly, time becomes 4 times and the rate becomes one-fourth.

$$\text{@ } 5\% \text{ Difference} = P \times \frac{61}{8000}$$

$$\text{@ } 10\% \text{ Difference} = P \times \frac{31}{1000}$$

e.g.: What is the difference between Simple and Compound Interest on Rs.42800 for two years at 5% rate?

$$\text{Sol: Difference} = \frac{P \times R^2}{100^2}$$

$$\Rightarrow \frac{42800 \times 25}{10000} = \text{Rs.107}$$

$$\therefore \text{C.I} = 20837.25 - 18000 = \text{Rs.2837.25}$$

3. Interest Rs.650 is 676 - 650 = Rs.26

$$\therefore \text{Rate of interest} = \frac{26}{650} \times 100 = 4\%$$

$$\text{Amount} = P \left(1 + \frac{R}{100} \right)^T$$

$$650 = P \left(1 + \frac{4}{100} \right)^1 \Rightarrow P = \frac{650 \times 100}{104} = \text{Rs.625}$$

$$4. R = \frac{100 \times \text{SI}}{P \times T} \Rightarrow R = \frac{100 \times 252}{1400 \times 3} = 6\%$$

Now the rate of interest is 6 + 3 = 9%

$$\therefore \text{New amount is } P \left(1 + \frac{TR}{100} \right) = 1400$$

$$\left(1 + \frac{3 \times 9}{100} \right) = \text{Rs.1778}$$

Shortcut: If the rate of interest is increase by 3% then the amount will also increase by that much

$$\text{New interest is } \frac{1400 \times 3 \times 3}{100} = 126$$

$$\therefore \text{New amount is } 1652 + 126 = \text{Rs.1778}$$

Model Questions

1. A certain sum of money becomes Rs.1250 in a span of 5 years and further to Rs.1700 in the span of 8 years at the same rate of simple interest. What would be the amount at the end of 12 years?

$$\text{Sol: Interest for 3 years (8 - 5 years)} = 1700 - 1250 = \text{Rs.450}$$

$$\text{Interest for 5 years} = \frac{5}{3} \times 450 = 750$$

$$\text{Principal} = 1250 - 750 = \text{Rs.500}$$

$$\text{Interest for 12 years} = \frac{12}{3} \times 450 = \text{Rs.1800}$$

$$\therefore \text{Amount after 12 years} = 500 + 1800 = \text{Rs.2300}$$

2. An amount of Rs.15600 is to be divided in two parts such that the simple interest on the first part at 8% p.a for 3 years is equal to the simple interest on the second part at 6% p.a for 4 years. What is the difference between the two parts?

Sol: Let the first part be Rs.x and 2nd will be Rs.(15600 - x)

$$\frac{x \times 8 \times 3}{100} = \frac{(15600 - x) \times 6 \times 4}{100}$$

$$2x = 15600 \Rightarrow \frac{15600}{2} = \text{Rs.7800}$$

Both parts are equal so, there is no difference

Short cut: If we can observe 8% for 3 years on 1st part is 24% and 6% for 4 years on 2nd part is also 24%. Interest on both parts are equal means both 1st and 2nd parts are equal.

3. A sum of money amounts to Rs.1488 in 3 years at a simple interest. If the rate of interest is raised by 25%, the sum amounts to Rs.1560 during the same period. Find the sum and the rate of interest.

Sol: Rs.1560 - Rs.1488 = 72.

$$25\% \text{ of interest} = \text{Rs.36}$$

$$\therefore 100\% \text{ interest} = \frac{100}{25} \times 72 = \text{Rs.288}$$

The interest for three years = Rs.288.

Therefore Principal = 1488 - 288 = Rs.1200

$$\therefore \text{Rate} = \frac{288 \times 100}{1200 \times 3} = 8\%$$

4. A sum of money invested at compound interest amounts to Rs.650 at the end of first year and Rs.676 at the end of second year. Find the rate of interest.

Sol: Interest in 2nd year = 676 - 650 = 26

As this is compound Interest, 2nd year interest is calculated on 1st year amount

$$\therefore \text{Rate of interest} = \frac{26}{650} \times 100 = 4\%$$

5. A sum of money invested at compound interest doubles itself in 4 years. In what time will it amount to 8 times itself?

Sol: Let the sum be Rs.100.

It becomes Rs.200 in 4 years

(∴ compound interest)

Rs.200 will become Rs.400 in another 4 years (after 8 years) and Rs.400 will become Rs.800 after another 4 years that is after 12 years.

6. What will be the amount on Rs.25000 in 2 years at compound interest, if the rates for the successive years be 4% and 5% per year?

$$\text{Sol: Amount is } 25000 \left(1 + \frac{4}{100} \right) \left(1 + \frac{5}{100} \right)$$

$$\Rightarrow A = \frac{25000 \times 104 \times 105}{100 \times 100} = \text{Rs.27300}$$

Compound Interest

When the interest that has become due at the end of a period is not paid to the lender, but is added to the sum lent which then becomes the principal for the next period, then the money is said to be lent at Compound Interest. Thus the amount at the end of period becomes the principal for the next period.

If A is the amount, C.I. is the compound interest, P is the principal, R is the rate, and T is the time, then

$$A = P \left(1 + \frac{R}{100} \right)^T$$

$$\text{C.I} = P \left(1 + \frac{R}{100} \right)^T - P$$

e.g.: What is the compound interest accrued on an amount of Rs.8000, at the rate of 5% per annum at the end of 3 years?

$$\text{Sol: C.I} = P \left(1 + \frac{R}{100} \right)^T - P$$

$$\text{C.I} = 8000 \left(1 + \frac{5}{100} \right)^3 - 8000$$

following formulae.

There is no difference for one year.

For 2 years

$$\text{Difference} = \frac{P \times R^2}{100^2}$$

For 3 years

$$\text{Difference} = \frac{(300 + R) P \times R^2}{100^3}$$

If the rates of interest are 5% and 10%, the following formulae can be used



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Difference between Simple Interest and Compound Interest

Difference between Simple Interest and Compound Interest can be calculated by the

Exercise

1. What principal will amount to Rs.8550 at 4% per annum simple interest in $3\frac{1}{2}$ years?
1) Rs. 6800 2) Rs. 7500
3) Rs. 8100 4) Rs. 7300
5) None of these
2. What is the compound interest accrued on an amount of Rs. 18000, at the rate of 5% at the end of 3 years?
1) Rs. 20837.25 2) Rs. 21525
3) Rs. 2837.25 4) Rs. 19300.50
5) None of these
3. A sum of money invested at compound interest will become Rs.650 at the end of first year and Rs.676 at the end of second year. What is the sum?
1) Rs. 600 2) Rs. 625 3) Rs. 700
4) Rs. 675 5) None of these
4. A sum of Rs.1400 becomes Rs.1652 in three years at certain rate of simple interest. What will be the amount if the rate of interest is increased by 3%?
1) Rs.378 2) Rs.1748 3) Rs.1586
4) Rs.1778 5) None

Answers: 1-2; 2-3; 3-2; 4-4.

Explanations

$$1. \text{Amount} = P \left(1 + \frac{TR}{100} \right)$$

$$\Rightarrow P \left(1 + \frac{7 \times 4}{2 \times 100} \right) = 8550$$

$$\Rightarrow P \left(1 + \frac{8500 \times 2 \times 100}{228} \right) = \text{Rs.7500}$$

Shortcut: For one year, rate of interest is

$$4\% \text{ and for } 3\frac{1}{2} \text{ years it is } 4 \times 3\frac{1}{2} = 14\%$$

The amount will become 114%.

If 114% money = 8550, then 100% money

$$= \frac{100}{114} \times 8550 = \text{Rs. 7500}$$

$$2. \text{C.I} = P \left(1 + \frac{R}{100} \right)^T - P$$

$$\text{C.I} = 18000 \left(1 + \frac{5}{100} \right)^3 - 18000$$

$$\Rightarrow \left[18000 \times \frac{105}{100} \times \frac{105}{100} \times \frac{105}{100} \right] - 18000 = 2837.251$$

Shortcut: Amount = 105% of 105% of 105% of 18000

$$= 20837.25$$