

### Answers with explanations

1.3; Let the principal = ₹  $x$

$$\therefore \text{Principal} + \text{S.I.} = ₹ \frac{7x}{4}$$

$$\therefore \text{S.I.} = \frac{7x}{4} - x = ₹ \frac{3x}{4}$$

$$\text{Rate} = \frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{3x \times 100}{4 \times x \times 4} = 18 \frac{3}{4}\% \text{ p.a.}$$

2.5; Let principal be P.

Clearly, S.I. = P

Time = 5 yrs.

Rate =  $R_1$

$$\therefore \text{S.I.} = \frac{P \times R \times T}{100} \Rightarrow \text{S.I.} = \frac{P \times R_1 \times 5}{100}$$

Thus,  $R_1 = 20\%$

When, S.I. = 2 P

T = 12 yrs.

Rate =  $R_2$

$$\text{Then, } 2P = \frac{P \times R_2 \times 12}{100}$$

$$\therefore R_2 = \frac{50}{3} = 16 \frac{2}{3}\%$$

$\therefore R_2 < R_1$

$\therefore$  The required rate of interest =  $16 \frac{2}{3}\%$

3.1; P = ₹ 72

A = ₹ 81

$\Rightarrow$  S.I. = A - P = ₹ 9

$$\text{Here, } 9 = 72 \times \frac{25}{4} \times \frac{t}{100}$$

$$\therefore t = \frac{9 \times 4 \times 4}{72} = 2 \text{ yrs.}$$

4. 2;  $t = \frac{1}{2} \text{ yr.}, r = 4\% \text{ pa}$

S.I. = ₹ 150

$$\text{Here, } 150 = \frac{P \times 4}{100} = \frac{1}{2}$$

$$\therefore P = 150 \times 25 \times 2 = 7500$$

5.3; Here, the principal and time are same but rates are different. Hence, we get difference in simple interest due to difference in the rates.

Diff. in 3 yrs. =  $\Rightarrow ₹ 13.50$

$$\text{Diff. in 1 yr.} = ₹ \frac{13.50}{3} = ₹ 4.50$$

$$\therefore \text{Diff. between rates} = \frac{₹ 4.50}{₹ 1500} \times 100$$

$$= \frac{3}{10} = 0.3\%$$

6.1; Let ₹  $x$  is lent at 8%

Then, ₹  $(10000 - x)$  is lent at for 10%  
Accordingly,

$$\frac{10000 \times 9.2 \times t}{100} = \frac{x \times 8 \times t}{100} + \frac{(10000 - x) \times 10 \times t}{100}$$

$$\Rightarrow \frac{92000t}{100} = \frac{8xt}{100} + \frac{(10000 - x)10t}{100}$$

$$\Rightarrow 92000t = 8xt + (10000 - x)10t$$

$$\Rightarrow 92000 = 8x + 100000 - 10x$$

$$\Rightarrow 2x = 8000$$

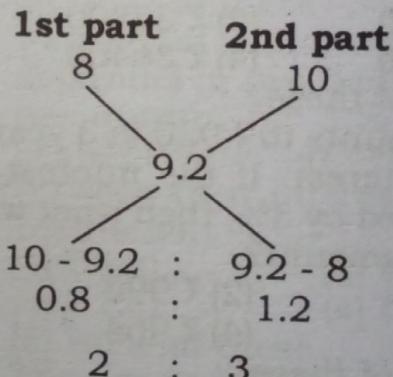
$$\Rightarrow x = 4000$$

$$\therefore x = 4000$$

∴ First part = ₹ 4000

Second part = ₹ 6000

6.1; **Paramount concept :-**



Hence, 1st part =  $\frac{2}{5} \times 10000 = ₹ 4000$

and

2nd Part =  $\frac{3}{5} \times 10000 = ₹ 6000$

7.3; Let the whole sum be = ₹ 100  
 Now, 40% of ₹ 100 = ₹ 40, R = 15%  
 $\therefore \text{S.I.} = \frac{40 \times 15 \times 1}{100} = ₹ 6$   
 Remaining amount = ₹ 100 - ₹ 40  
 $= ₹ 60$   
 50% of remaining amount = ₹ 30 at the rate of 10%pa  
 $\therefore \text{S.I.} = \frac{₹ 30 \times 10 \times 1}{100} = ₹ 3$   
 Now, remaining amount = ₹ 30 at the rate of 18% pa.  
 $\therefore \text{S.I.} = \frac{₹ 30 \times 18 \times 1}{100} = ₹ 5.40$   
 $\therefore \text{Total S.I.} = ₹ (6 + 3 + 5.40)$   
 $= ₹ 14.4$   
 $\therefore \text{Rate} = \frac{₹ 14.4}{100} \times 100 = 14.4\%$

8.5; P = ₹ 15600  
 R = 10%

$$\text{for 2 yrs, S.I.} = \frac{15600 \times 10 \times 2}{100}$$
 $= ₹ 3120$ 

After 2nd yr. P = ₹ (15600 + 3120)  
 $= ₹ 18720$

R = 10%

For 2 yr., S.I. =  $\frac{18720 \times 10 \times 2}{100} = ₹ 3744$

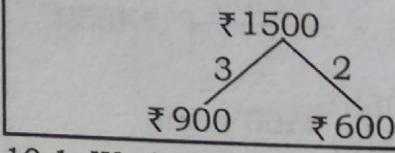
Required amount = ₹ (3120 + 3744)  
 $= ₹ 6864$

9.1; Let ₹ x be lent at 10% per annum.  
 $\therefore ₹ (1500 - x)$  is lent at 7% per annum

$$\text{Now, } \frac{x \times 10 \times 3}{100} + \frac{(1500 - x) \times 7 \times 3}{100} = 396$$
 $\Rightarrow 30x + 31500 - 21x = 39600$ 
 $\Rightarrow 9x = 39600 - 31500$ 
 $\Rightarrow x = \frac{8100}{9} = ₹ 900$

9.1; **Paramount concept:-**  
 S.I. for 3 yrs. = ₹ 396  
 $1 \text{ yr.} \rightarrow \frac{₹ 396}{3} = ₹ 132$   
 $r = \frac{₹ 132}{1500} \times 100 = \frac{44}{5}\% = 8.8\%$   
 Now,

Thus,



10.1; We know

$$\text{Rate} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}}$$
 $= \frac{4200 \times 100}{29400 \times 6} = \frac{50}{21} = 2\frac{8}{21}\%$

11.3; A = 30, P + 2P  
 S.I. = A - P = 2P  
 $2P = \frac{P \times R \times 15}{100}$   
 $\Rightarrow R = \frac{200}{15} = \frac{40}{3}\%$   
 $A = 5P \Rightarrow S.I. = 4P$   
 $\therefore 4P = \frac{P}{100} \times \frac{40}{3} \times t$   
 $\Rightarrow t = 30 \text{ yrs.}$

11.3; **Paramount concept :-**

$$\frac{n_1 - 1}{n_2 - 1} = \frac{t_1}{t_2}$$

$$\frac{3 - 1}{5 - 1} = \frac{15}{t}$$
 $t = 30 \text{ yrs.}$

**11.3; Other method:-**

$$\text{Required time} = \frac{15 \times (5 - 1)}{(3 - 1)} = 30 \text{ yrs.}$$

$$12.1; \text{ Required Principal} = \frac{5520 \times 100}{12 \times 8} = ₹ 5750$$

$$13.1; \text{ Let the rate of interest be } R. \\ \text{Simple interest} = ₹ (77400 - 45000) \\ = ₹ 32400$$

$$\therefore R = \frac{32400 \times 100}{45000 \times 8} = 9\%$$

**13.1; Short cut:-**

$$\text{S.I. for 8 yrs.} = ₹ (77400 - 45000) \\ = ₹ 32400$$

$$\text{S.I. for 1 yr.} = \frac{₹ 32400}{8} = ₹ 4050$$

$$\therefore \text{Rate} = \frac{₹ 4050}{₹ 45000} \times 100 = 9\%$$

$$14.3; \text{Interest} = ₹ (31,000 - 25,000) = ₹ 6,000 \\ \text{Interest} \times 100$$

$$\text{Rate} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}} \\ = \frac{6,000 \times 100}{25,000 \times 2} = 12\%$$

**15.4; Required rate of interest**

$$= \frac{I \times 100}{P \times \text{Time}} = \frac{5400 \times 100}{15000 \times 3} = 12$$

$$16.3; \text{ Simple Interest} = \frac{P \times R \times T}{100} \\ = \frac{8930 \times 5 \times 8}{100} = ₹ 3572$$

$$17.4; \text{ Simple Interest} = \frac{P \times R \times T}{100} \\ = \frac{35800 \times 4 \times 15}{100} = ₹ 21480$$

$$\text{Now, total amount} = 35800 + 21480 \\ = ₹ 57280$$

$$18.5; \text{Principal} = \frac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}} = \frac{8490 \times 100}{5 \times 6} \\ = ₹ 28300$$

$$19.2; \text{Simple Interest} = \frac{8435 \times 12 \times 4}{100} \\ = ₹ 4048.80$$

$$20.4; \text{Rate of interest} = \frac{6318 \times 100}{5 \times 10530} = 12\%$$

$$21.2; \text{Simple Interest} = \frac{P \times R \times T}{100} \\ = \frac{6535 \times 6 \times 10}{100} = ₹ 3921$$

$$22.4; \text{Simple Interest} = \frac{7055 \times 15 \times 6}{100} \\ = ₹ 6349.5$$

$$23.2; \text{Principal} = \frac{\text{Intest} \times 100}{\text{Rate} \times \text{Time}} = \frac{708.75 \times 100}{12.5 \times 10} \\ = ₹ 567$$

24.1; Let the loan taken by Kirti be ₹  $x$ .  
According to the question,

$$3375 = \frac{x \times 6 \times 1}{100} + \frac{x \times 6.5 \times 1}{100} + \frac{x \times 7 \times 1}{100} + \frac{x \times 7.5 \times 1}{100}$$

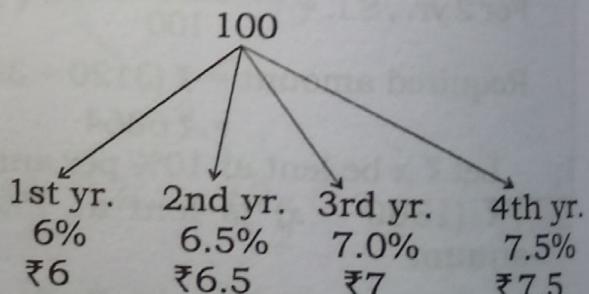
$$\Rightarrow 3375 = \frac{x}{100} (6 + 6.5 + 7 + 7.5)$$

$$\Rightarrow \frac{27x}{100} = 3375$$

$$\Rightarrow x = \frac{3375 \times 100}{27} = ₹ 12500$$

**24.1; Paramount concept:-**

Let the principal be = ₹ 100



$$\therefore \text{Total S.I.} = ₹ (6 + 6.5 + 7 + 7.5) \\ = ₹ 27 \text{ (derived)}$$

$$\downarrow \times 125$$

$$₹ 3375 \text{ (given)}$$

$$\therefore P = ₹ 100 \times 125 = ₹ 12500 \text{ (actual)}$$

25.1; Let the principal be ₹  $x$

$$\therefore \text{Amount} = ₹ 2x$$

$$\therefore \text{Interest} = ₹ x$$

Let the rate of interest be  $r\%$

$$\therefore \frac{x \times r \times 5}{100} \Rightarrow r = \frac{100}{5} = 20\%$$

25.1; **Short cut :-**

$$r = \frac{(n-1) \times 100}{t}$$

$$r = \frac{(2-1) \times 100}{5} = 20\%$$

26.2; Let the money lent to Mohit be ₹  $x$

$$\therefore x \times \frac{16}{100} \times 3 - 6300 \times \frac{14}{100} \times 3 = 618$$

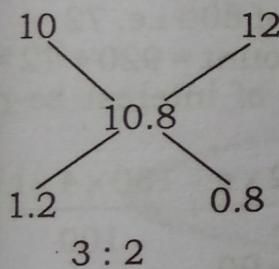
$$\Rightarrow \frac{x \times 48}{100} - 63 \times 14 \times 3 = 618$$

$$\Rightarrow \frac{48x}{100} = 618 + 2646$$

$$\Rightarrow \frac{48x}{100} = 3264$$

$$\therefore x = \frac{3264 \times 100}{48} = ₹ 6800$$

27.4; **Paramount concept:-**



$$5(3+2) = 30000$$

$$1 = 6000$$

$$3 = 18000$$

28.1; Let the sum be ₹ 100

After 10 years it becomes ₹ 200

$$\therefore \text{Interest} = 200 - 100 = 100$$

$$\text{Then, rate} = \frac{100 \times I}{P \times t} = \frac{100 \times 100}{100 \times 10} = 10\%$$

28.1; **Short cut :-**

$$\frac{(2-1) \times 100}{10} = 10\%$$

29.3; Using the formula,  
Time

$$= \frac{100 (\text{Multiple number of principal} - 1)}{\text{Rate}}$$

$$= \frac{100 (4-1)}{5} = 60 \text{ yrs}$$

29.3; **Short cut :-**

$$t = \frac{(n-1) \times 100}{r}$$

$$\frac{(4-1) \times 100}{5} = 60 \text{ yrs.}$$

30.1; P + S.I for 3.5 yrs = ₹ 873

P + S.I for 2 yrs = ₹ 756

On subtracting, S.I for 1.5 yrs = ₹ 117

Therefore, S.I. for 2 yrs

$$= ₹ \frac{117}{1.5} \times 2 = ₹ 156$$

$$\therefore P = 756 - 156 = ₹ 600$$

and Rate =  $\frac{100 \times 156}{600 \times 2} = 13\% \text{ per annum.}$

$$31.2; \text{Rate} = \frac{100(2-1)}{7} = \frac{100}{7}$$

$$\therefore \text{Time} = \frac{100(4-1)}{100} = \frac{100}{7} = 21 \text{ years}$$

32.1; Interest = ₹ 840 - ₹ 750 = ₹ 90

$$\therefore \text{Time} = \frac{90 \times 100}{750 \times 4} = 3 \text{ yrs}$$

Now, by the formula:

$$\text{Sum} = \frac{100 \times \text{Amount}}{100 + rt} = \frac{100 \times 575}{100 + 3 \times 5} = ₹ 500$$

33.2; **Direct Formula:**

$$\text{Sum} = \frac{100}{100 - (8 \times 4)} \times 340 = \frac{100 \times 340}{68} = ₹ 500$$

34.3; We may consider that ₹(1800 - 1650) gives interest of ₹ 30 at 4% per annum.

$$\therefore \text{Time} = \frac{30 \times 100}{150 \times 4} = 5 \text{ yrs}$$

35.1; Let the sum be ₹  $x$ , then

$$\frac{x \times 15 \times 5}{100} - \frac{x \times 15 \times 7}{200} = 144$$

$$\text{or}, 150x - 105x = 144 \times 200$$

$$\therefore x = \frac{144 \times 200}{45} = ₹ 640$$

35.1; **Other method:-**

$$\because 15 \times (5 - 3.5) \% \text{ of sum} = 144$$

$$\therefore 100\% \text{ of sum} = \frac{144 \times 100}{15 \times 1.5} = ₹ 640$$

$$36.2; \text{S.I.}_1 = \frac{P \times 4 \times 4}{100}$$

$$\text{S.I.}_2 = \frac{P \times 5 \times 3}{100}$$

$$\text{Clearly, S.I.}_1 - \text{S.I.}_2 = ₹ 80$$

$$\Rightarrow \frac{16P}{100} - \frac{15P}{100} = ₹ 80$$

$$\Rightarrow P = ₹ 80 \times 100 = ₹ 8000$$

36.2; **Other method:-**

$$\because (4 \times 4 - 3 \times 5) \% \text{ of sum} = 80$$

$$\therefore 100\% \text{ of sum} = \frac{80 \times 100}{(4 \times 4 - 3 \times 5)} = ₹ 8000$$

$$37.5; \text{Interest} = 18000 - 12000 = ₹ 6000$$

$$\therefore \text{Time} = \frac{6000 \times 100}{12000 \times 12} = \frac{25}{6} = 4 \frac{1}{6} \text{ years}$$

$$38.4; \text{We know, S.I.} = \left[ \frac{\text{prt}}{100} \right]$$

From Problem (S.I.)<sub>1</sub> = (S.I.)<sub>2</sub> = (S.I.)<sub>3</sub>

$$\Rightarrow \left[ \frac{p_1 r_1 t_1}{100} = \frac{p_2 r_2 t_2}{100} = \frac{p_3 r_3 t_3}{100} \right]$$

$$\Rightarrow [p_1 r_1 t_1 = p_2 r_2 t_2 = p_3 r_3 t_3]$$

$$\Rightarrow [p_1 \times 10 \times 5 = p_2 \times 12 \times 10 = p_3 \times 15 \times 12]$$

$$\Rightarrow p_1 = 2p_2 = 3p_3$$

$$\Rightarrow [p_1 : p_2 : p_3 = 6 : 3 : 2]$$

$$39.3; \text{Rate of interest} = \frac{19.20 \times 100}{64 \times 2} = 15\%$$

$$\text{Interest on ₹ 86} = \frac{86 \times 15 \times 4}{100} = ₹ 51.6$$

$$\therefore \text{Amount} = 86 + 51.6 = ₹ 137.6$$

$$40.1; \text{Difference in rates} = 13\% - 12\frac{1}{2}\% = \frac{1}{2}\%$$

$$\text{S.I.} = ₹ 104 = \frac{P}{100} \times \frac{1}{2} \times 1$$

$$\Rightarrow P = ₹ 104 \times 2 \times 100 = ₹ 20800$$

$$41.2; \text{Rate of interest} = \frac{120 \times 100}{800 \times 3} = 5\%$$

Now, the new rate becomes 8%. Then interest

$$= \frac{800 \times 8 \times 3}{100} = ₹ 192$$

$$\therefore \text{Amount} = 800 + 192 = ₹ 992$$

41.2; **Other method:-**

Note that increase in the amount will be

$$(3 \times 3) = 9\% \text{ of } 800 \text{ i.e. } 72$$

$$\therefore \text{Required amount} = 920 + 72 = ₹ 992$$

42.3; Let the rate of interest be  $r\%$  per annum.

$$\text{Then } \frac{600 \times 2 \times r}{100} + \frac{150 \times 4 \times r}{100} = 90$$

$$\text{or, } 12r + 6r = 90$$

$$\therefore r = 5\%$$

43.3; Use the formula

$$\text{Sum} = \frac{\text{Difference in Interests} \times 100}{\text{Times} \times \text{Difference in rates}}$$

$$\text{or, } 500 = \frac{2.5 \times 100}{2 \times x}$$

$$\therefore \frac{2.5 \times 100}{2 \times 500} = 0.25\%$$

44.1; S.I. at the rate of 4% for 2 yr.

$$= \frac{P \times 4 \times 2}{100} = \frac{8P}{100} \quad \text{(i)}$$

S.I. at the rate of 6% for next 4 yr.

$$= \frac{P \times 6 \times 4}{100} = \frac{24P}{100} \quad \text{(ii)}$$

For next 3 yr.

$$\text{S.I.} = \frac{P \times 8 \times 3}{100} = \frac{24P}{100} \quad \text{(iii)}$$

$$\begin{aligned} \text{Total S.I.} &= \frac{8P}{100} + \frac{24P}{100} + \frac{24P}{100} = \frac{56P}{100} \\ &= ₹ 1120 \end{aligned}$$

$$\Rightarrow P = \frac{₹ 1120 \times 100}{56} = ₹ 2000$$

45.1; A = P + S.I.

$$= P + \frac{P \times 5 \times 6}{100} = \frac{130}{100} P = ₹ 2613$$

$$\Rightarrow P = \frac{₹ 2613 \times 100}{130} = ₹ 2010$$

$$\begin{aligned} \text{Now, S.I.} &= A - P = ₹ (3015 - 2010) \\ &= ₹ 1005 \end{aligned}$$

$$\Rightarrow 1005 = \frac{2010 \times 5 \times t}{100}$$

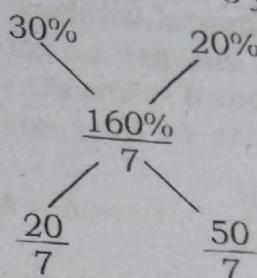
$\therefore t = 10 \text{ yrs.}$

45.1; Other method:-

$$\begin{aligned} \text{Required sum} &= \frac{1120 \times 100}{(2 \times 4 + 4 \times 6 + 3 \times 8)} \\ &= ₹ 2000 \end{aligned}$$

$$46.2; r = \frac{1600}{7000} \times 100 = \frac{160}{7} \%$$

6%  $\times$  5 yrs.      4%  $\times$  5 yrs.



2 : 5

Thus, required amount = ₹ 2000

47.4; According to the given information,  
interest of 3 yrs. for the given sum  
 $= 2250 - 2100 = 150$

Therefore, the interest of 1 year for

$$\text{the same sum} = \frac{150}{3} = ₹ 50$$

$$\begin{aligned} \text{Hence, the required sum} \\ &= 2100 - 50 \times 2 = 2000 \end{aligned}$$

Whereas, rate of interest

$$= \frac{50 \times 100}{2000 \times 1} = 2.5\%$$

**Paramount**

**जहाँ जीत एक जिद है**

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# COMPOUND INTEREST

**Compound Interest is different from simple interest in the way that in C.I., interest is charged on interest. Let us see the difference between simple interest and compound interest.**

Till date we have solved the questions of compound interest by using formula

$$A = P \left(1 + \frac{R}{100}\right)^t \text{ where } A = \text{Amount, } P = \text{Principal, } R = \text{Rate of interest and } T = \text{Time}$$

or we simply calculate the simple interest for the 1st year and then add it to the principal to get the amount which becomes the principal for the 2nd year and this process goes on for the number of years given in the question but sometimes the calculation becomes very lengthy and this is the limitation as far as this method is concerned. In competitive exams, time is very precious, So we will use different methods. The question given in the exercise have been solved by traditional as well as the short tricks.

To start we need to learn the percentage fraction table to reduce the time taken by us in solving each question.

We know  $5\% = \frac{5}{100} = \frac{1}{20}$ . Hence we must have  $5\% = \frac{1}{20}$  on our finger's tips.

Now see the table.

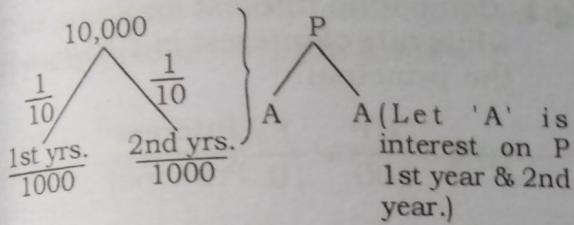
### PERCENTAGE - FRACTION CHART

$\frac{1}{2} = 50\%$	$\frac{1}{7} = 14\frac{2}{7}\%$	$\frac{1}{12} = 8\frac{1}{3}\%$	$\frac{3}{5} = 60\%$	$\frac{5}{11} = 45\frac{5}{11}\%$
$\frac{1}{3} = 33\frac{1}{3}\%$	$\frac{1}{8} = 12\frac{1}{2}\%$	$\frac{1}{15} = 6\frac{2}{3}\%$	$\frac{4}{5} = 80\%$	$\frac{3}{8} = 37\frac{1}{2}\%$
$\frac{1}{4} = 25\%$	$\frac{1}{9} = 11\frac{1}{9}\%$	$\frac{1}{20} = 5\%$	$\frac{4}{7} = 57\frac{1}{7}\%$	$\frac{5}{8} = 62\frac{1}{2}\%$
$\frac{1}{5} = 20\%$	$\frac{1}{10} = 10\%$	$\frac{1}{25} = 4\%$	$\frac{2}{11} = 18\frac{2}{11}\%$	$\frac{7}{8} = 87\frac{1}{2}\%$
$\frac{1}{6} = 16\frac{2}{3}\%$	$\frac{1}{11} = 9\frac{1}{11}\%$	$\frac{2}{5} = 40\%$		

### Type 1

Eg. (i) What is the simple interest accrued on ₹ 10000 in two years at 10% p.a.?  
(ii) What is the compound interest accrued on ₹ 10000 in two years at 10% p.a.?  
P = 10000

$$R\% 10\% = \frac{1}{10}$$



Hence S.I. = 1000 + 1000 = 2000/-  
Here we simply deduce 10% into

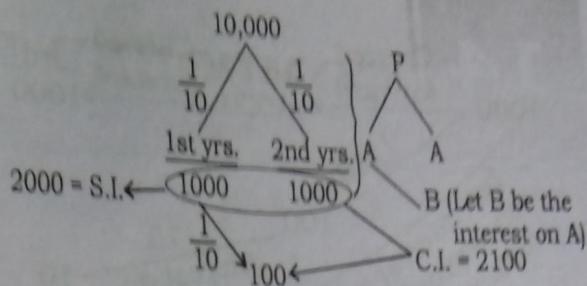
fraction i.e.  $\frac{1}{10}$  and then calculate

$\frac{1}{10}$  of 10,000 for the 1st and 2nd year

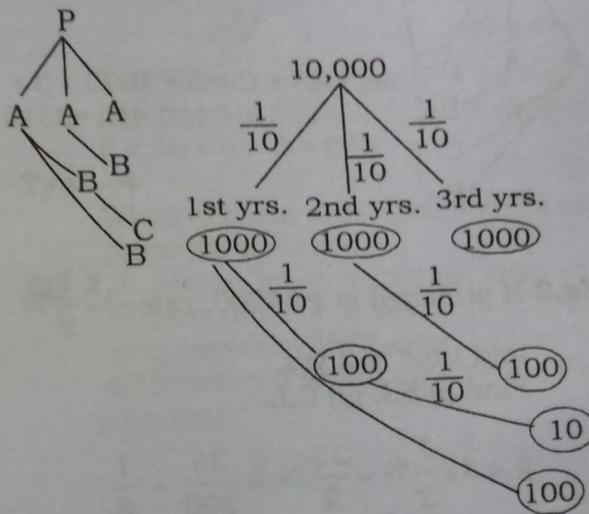
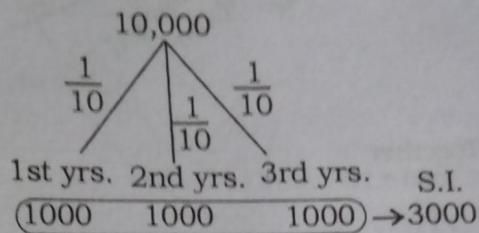
#### But

In case of compound interest, it is different because the lender will charge 10% for both years + since the 1000/- that has accrued as interest on 10,000 remains unpaid, so the lender will charge 10% interest on this 1000/- (interest for 1st year) also. Hence at the end of 2 years the borrower will pay 1000 (1<sup>st</sup> year interest hereby referred as 'A') + 1000 (2<sup>nd</sup> year interest hereby referred as 'A') + 10% of 1000 (Interest on 1<sup>st</sup> yr. interest hereby referred as 'B').

We will hence forth write this as follows.



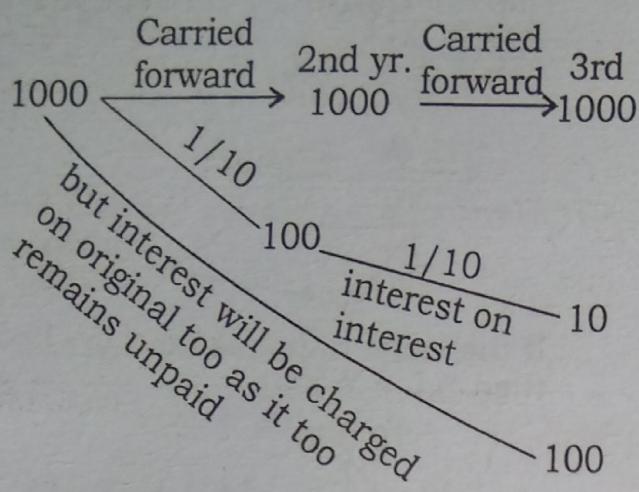
If the same happens for 3 yrs., then S.I. = ?



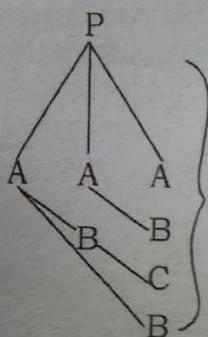
$$\text{C.I.} = \text{all circled numbers } 1000 + 1000 + 100 + 100 + 10 + 100 = 3310$$

Let us understand this step wise:

1. 1000 charged for 3rd. i.e. last yr.
2. 2nd yr. interest is 1000. Now 10% of 1000 will also be charged i.e. 100/-
3. Now coming to 1st yr.



Together



$$3A + 3B + C = 3 \times 1000 + 3 \times 100 + 10 = 3310$$

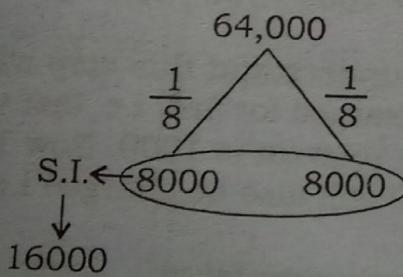
**Eg.2**-If principal is ₹ 64000, rate=  $12\frac{1}{2}\%$

and time is 2 yrs.

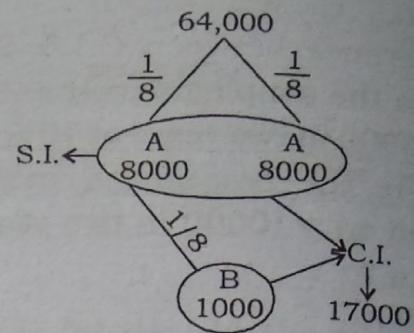
Find (i) S.I. (2) C.I.

$$R = 12\frac{1}{2}\% = \frac{25}{2}\% = \frac{25}{200} = \frac{1}{8}$$

(i) **S.I.**



(i) **C.I.**



### Type -2

How to find the principal if C.I. is given.

**Eg.1**- Compound interest for 2 yrs. is 210 while rate of interest is 10% p.a. find the principal.

$$10\% = \frac{10}{100} = \frac{1}{10} \frac{\text{Interest}}{\text{Principal}}$$

$$2 \text{ yrs. } \left\{ \begin{array}{ll} \frac{P}{10} & \frac{A(P+I)}{11} \\ \frac{10}{100} & \frac{11}{121} \end{array} \right.$$

If interest = 21/- then P = 100/-

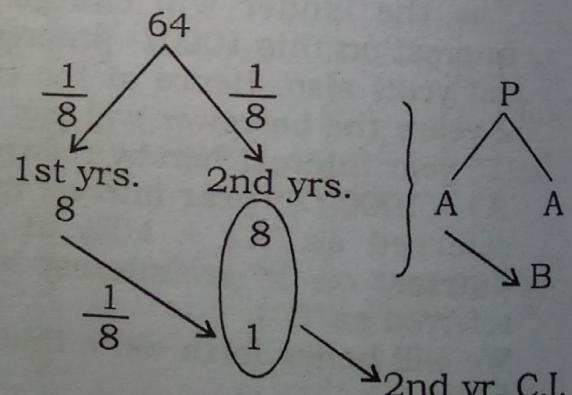
If interest = 210/- then P = 1000/-

**Eg.2** Compound interest for second year

is 72 while rate of interest is  $12\frac{1}{2}\%$

p.a. Find the principal.

$$12\frac{1}{2}\% = \frac{25}{200} = \frac{1}{8}$$



$$C.I. = 9 \text{ then } P = 64$$

$$C.I. = 72 \text{ which is } (9 \times 8) \text{ then } P = 64 \times 8 = ₹ 512/-$$

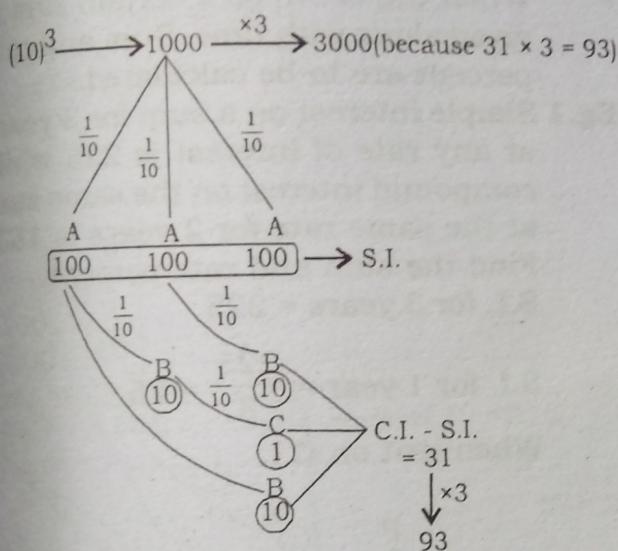
**Type - 3**

If difference between C.I. & S.I. is given.

**E.g.-1** Difference between C.I. and S.I. for 3 years is 93/- If rate of interest p.a. is 10%, find principal.

$$10\% = \frac{10}{100} = \frac{1}{100} = \frac{1}{10}$$

The denominator of  $\frac{1}{10}$  to the power time will be assumed as 'P' so that calculation becomes easy.



$$(10)^3 = 1000 \xrightarrow{\times 3} 3000/-$$

If difference = 31 then P = 1000/-

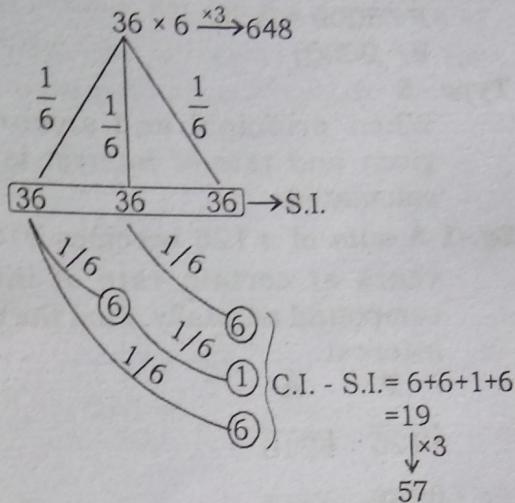
If difference = 93 then P = 3000/-

**Eg.2** Difference between compound interest and simple interest for 3 years is 57 while rate of interest per annum is  $16\frac{2}{3}\%$ . Find the principal.

$$\text{Here, } R = \frac{50}{3}\%$$

$$\frac{50}{300} = \frac{1}{(6)^t}$$

↓ taken as P  
 $(6)^3$



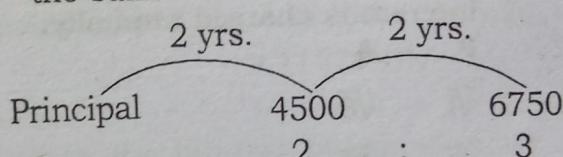
If difference = 19 then P =  $36 \times 6$

If difference 57 (which is  $19 \times 3$ ) then P =  $36 \times 6 \times 3 = 648$

**Type - 4**

When amount of two years given and principal is asked.

**Eg. 1** A person lends a certain sum at a certain rate for 2 years at C.I. The sum becomes 4500 after 2 years but 6750 when it is lent for 4 years. Find the sum.



∴ P : 2nd year amount must also be in the ratio of 2 : 3.

$$\frac{P}{4500} = \frac{2}{3}$$

$$P = 4500 \times \frac{2}{3} = 3000$$

**Eg.2** A money lender lends a sum at certain rate of C.I. for 3 years that becomes 3000 after 2 years but 4500 after 6 years. Find the sum.

$$\begin{array}{ccccc}
 & 3 \text{ yrs.} & & 3 \text{ yrs.} & \\
 P & & 3000 & & 4500 \\
 & 2 & : & 3 & \\
 2 & : & 3 & & \\
 P : 3000 = 2 : 3 & & & & \\
 P = 2000/- & & & &
 \end{array}$$

#### Type - 5

When principal and amount are given and rate of interest is to be calculated.

**Eg.-1** A sum of ₹ 125 becomes 216 in 3 years at certain rate of interest compound annually. Find the rate of interest.

**P      A**

$$\sqrt[3]{125} \quad \sqrt[3]{216}$$

$$\sqrt[3]{125} \quad \sqrt[3]{216}$$

$$5 : 6$$

$$R = \frac{\text{Increase}}{\text{Original}} \times 100$$

$$\frac{1}{5} \times 100 = 20\%$$

**Eg.- 2** A sum of money becomes 8 times in 3 years. Find the rate at which the money is lent if compound interest is charged annually.

**P      A**

$$\sqrt[3]{1} \quad \sqrt[3]{8}$$

$$\sqrt[3]{1} \quad \sqrt[3]{8}$$

$$1 : 2$$

$$\text{Rate} = \frac{\text{Diff.}}{\text{Original}} \times 100$$

$$\frac{1}{1} \times 100 = 100\%$$

**Eg.-3** If sum of 3000 lent on compound interest becomes 3993 in 3 years. Find the rate percent.

$$\begin{array}{ccc}
 3000 & : & 3993 \\
 3 + \downarrow & & \downarrow \div 3 \\
 1000 & & 1331 \\
 \text{Now } \sqrt[3]{1000} & : & \sqrt[3]{1331} \\
 \sqrt[3]{1000} & : & \sqrt[3]{1331} \\
 10 & : & 11
 \end{array}$$

$$R = \frac{\text{Increase}}{\text{Original}} \times 100$$

$$= \frac{1}{10} \times 100 = 10\%$$

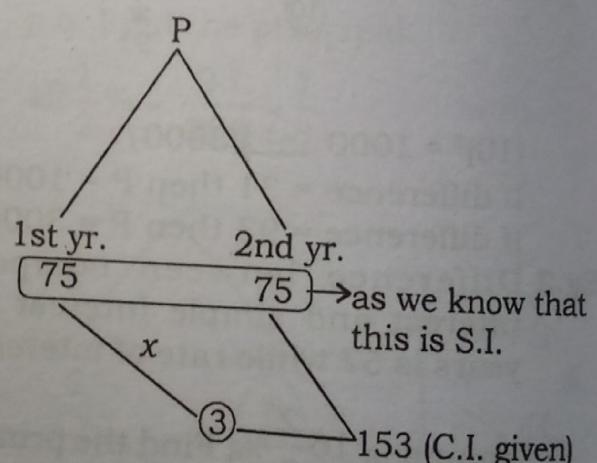
#### Type - 6

- When C.I. & S.I. on a certain sum is given alone with time. Sum and rate percent are to be calculated.

**Eg.1** Simple interest on a sum for 3 years at any rate of interest is 225 while compound interest on the same sum at the same rate for 2 years is 153. Find the sum and rate percent.  
S.I. for 3 years = 225

$$\text{S.I. for 1 year} = \frac{225}{3} = 75$$

When lent on C.I.



$$75 \times x = 3$$

$$x = \frac{3}{75} = \frac{1}{25}$$

$$R = \frac{1}{25} = \frac{1}{25} \times 100 = 4\%$$

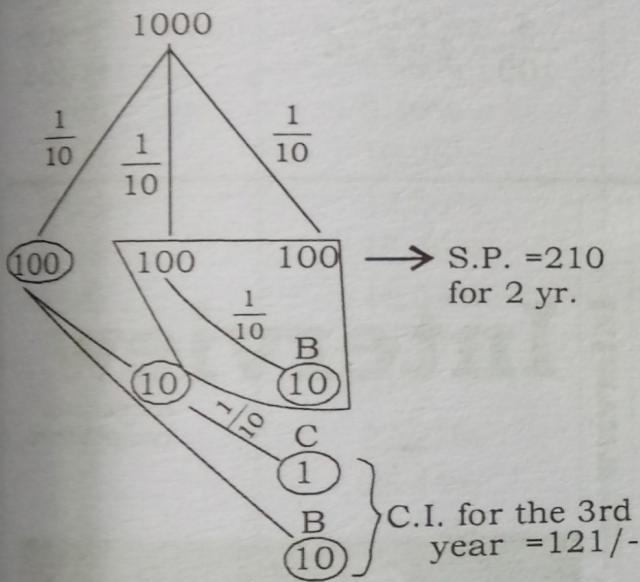
$$P \times \frac{1}{25} = 75 \therefore P = 25 \times 75 = 1875$$

**Type - 7**  
When time is given in days not years.

**E.g. 1** what C.I. accrues upon a sum of ₹ 1000 if it is lent at 10% for a period of 2 years and 73 days.

$$\text{Time} = 2 \text{ yrs. } 73 \text{ days} = 2 + \frac{73}{365}$$

$$\text{yrs. } 2\frac{1}{5} \text{ yrs.}$$



But this 121/- is C.I. for 365 days

Hence for 73 days C.I. must be  $\frac{73}{365}$

$$\text{i.e. } \frac{1}{5} \text{ of } 121 = 24.20/-$$

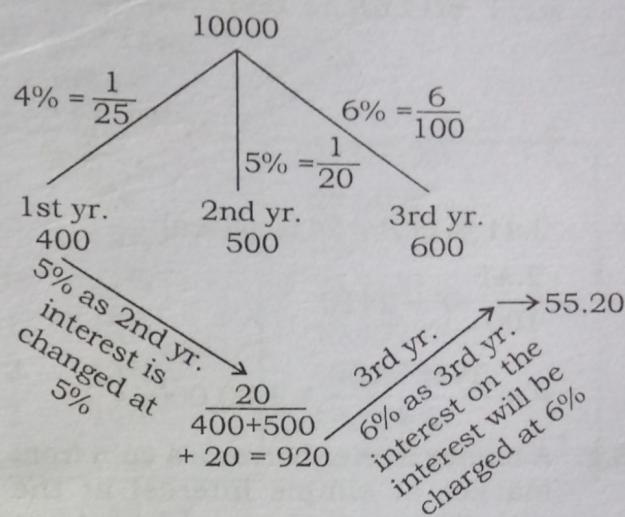
Hence total C.I. = 210

$$\begin{aligned} &+ \underline{24.20} \\ &= 234.20/- \end{aligned}$$

### Type - 8

- When the rate of interest is different for different years.

**Eg. 1** A person borrows 10,000 at 4% for the 1<sup>st</sup> year, 5% for the 2<sup>nd</sup> year and 6% for the 3<sup>rd</sup> year. What is the amount paid after 3<sup>rd</sup> year?



$$\therefore \text{C.I.} = 920 + 600 + 55.20 \\ = 1575.20/-$$

$$\begin{aligned} \text{Amount after 3 yrs.} &= 10000 + 1575.20 \\ &= 11575.20/- \end{aligned}$$

### Type - 9

- When the interest is compounded half-yearly.

**Eg. 1** A sum is lent out for 2 years at the rate of 20% p.a. compounded annually. If the sum was let out on C.I. compound half yearly, then interest earned is 2410 more. Find the principal.