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Sahi Prep Hai Toh Life Set Hai

# COMPOUND INTEREST

# Part-1

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# Agenda

9971658659

* Brief you about Previous session of CI
* Some varieties of Question
  6-7 varieties (15-18 Ques)

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* SI is same for all the years
** SI = CI for (1st year | 1st term)
*** CI/A increases by R% every year/term

$$A = P\left(1+\frac{R}{100}\right)^n \qquad \boxed{CI = A - P}$$

R = 20%/annum T = $1\frac{1}{2}$ years semi-annually

$\boxed{R \rightarrow 10}$ $\boxed{n = 3}$

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Q2. P = 80,000

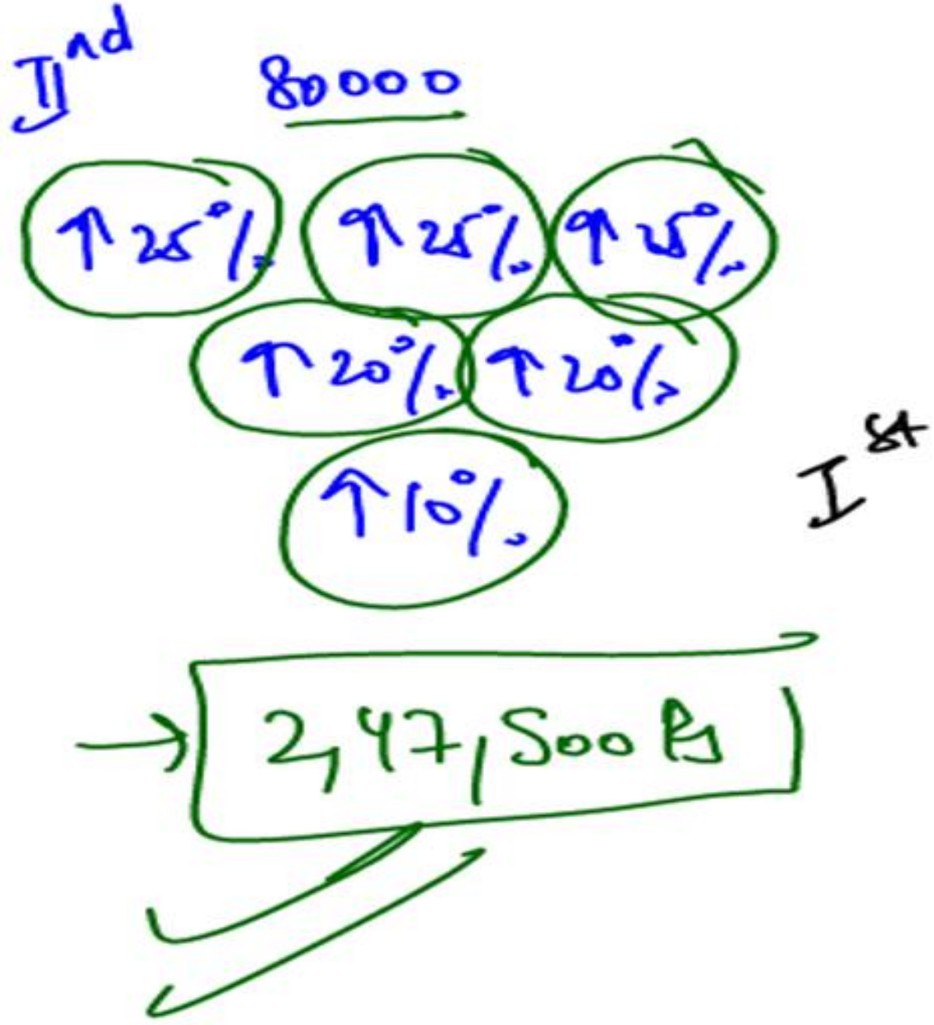
R = 25% for first 3 years

20% for next 2 years

10% for a period beyond 5 years

T = 6 Years

A = ??




$$A = P\left(1+\frac{R_1}{100}\right)^{n1}\left(1+\frac{R_2}{100}\right)^{n2}\left(1+\frac{R_3}{100}\right)^{n3}$$

$$= 80000\left(1+\frac{25}{100}\right)^{3}\left(1+\frac{20}{100}\right)^{2}\left(1+\frac{10}{100}\right)^{1}$$

$$= 80\overset{500}{000} \cdot \frac{5}{\cancel{4}} \cdot \frac{\cancel{5}}{\cancel{4}} \cdot \frac{\cancel{5}}{\cancel{5}} \cdot \frac{\cancel{5}^{3}}{\cancel{5}} \cdot \frac{\cancel{5}^{3}}{\cancel{5}} \cdot \frac{11}{\cancel{10}}$$

$$= 24750$$

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80000 ↑25% ↑25% ↑25% ↑20% ↑20% ↑10%

$80000 + \frac{1}{4} \cdot 80000 = 1,00,000$

$1,00,000 + \frac{1}{5} 1,00,000 = 1,20,000$

$1,20,000 + \frac{1}{4} \cdot 1,20,000 = 1,50,000$

$1,50,000 + \frac{1}{5} \cdot 1,50,000 = 1,80,000$

$1,80,000 + \frac{1}{4} \cdot 1,80,000 = 2,25,000$

2,47,500

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**Q3. A certain sum becomes double in 5 years at compound interest. In how many years it will 8 times of itself?**

I^st Detailed

$$P\left(1+\frac{R}{100}\right)^5 = 2P$$

$$P\left(1+\frac{R}{100}\right)^n = 8P$$

(21) double → 5 years

$2^3$ & Times → ??

$$\left(1+\frac{R}{100}\right)^n = (2)^3$$

$$= \left[\left(1+\frac{R}{100}\right)^5\right]^3$$

$$\left(1+\frac{R}{100}\right)^n = \left(1+\frac{R}{100}\right)^{15}$$

$n = 15$

II^nd

5 × 3 = 15 years

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eg $3^1$ Triple → 10 years

$3^3$ 27 Times → ??

30 years

eg $5^1$ Times → 11 years

$5^4$ 625 Times → ??

44 years

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$3^1$ (i) Triple → 10 years

$3^4$ 81 times → ??

40 years

$4^1$ (ii) 4 times → 9 years

$4^3$ 64 times → ??

27 years

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$5^1$ (iii) 5 times → 7 years

$5^5$ 3125 times → ??

35 years

(iv) 81 times → 14 years

729 times → ??

21 years

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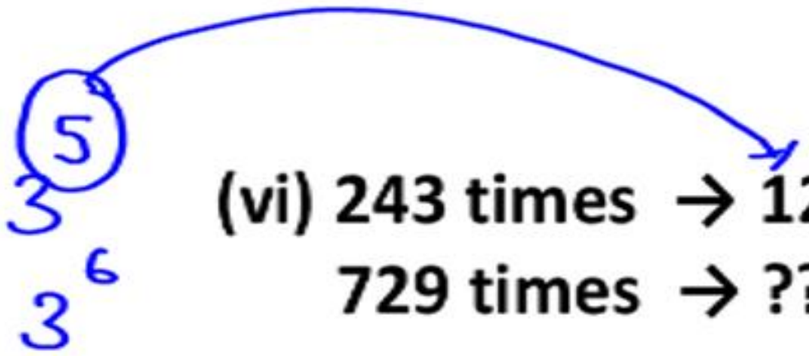
$5^3$ (v) 125 times → 18 years

$5^2$ 25 times → ??

12 years




(vi) 243 times → 12 years

729 times → ??

$$\frac{12}{5} \times 6 = \frac{72}{5}$$

$$= 14.4 \text{ years}$$

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(vii) 8 times → 12 years

27 times → ??

* This kind of Question doesn't come in SSC

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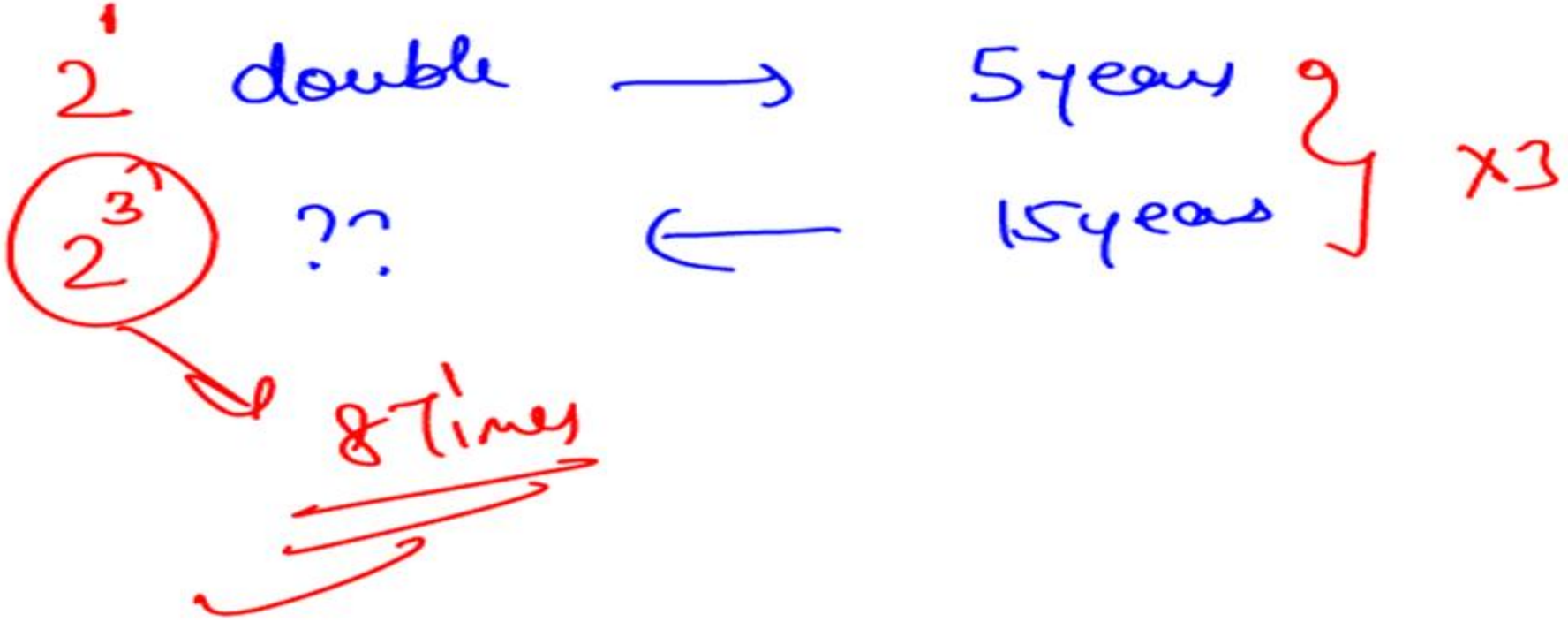
**Q4 (i). A certain sum at compound interest becomes double in 5 years. It becomes how many times in 15 years?**



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(ii) 2 years → Triple $3^1$

$\times 8$ 16 years → ?? $3^8$ → 6561 Times

(iii) 3 years → 7 times

$\times 2$ 6 years → ?? $7^2 = 49$ Times

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(iv) 11 years → 10 times

55 years → ??

$10^5 = 100000$ times

(v) 5 years → 12 times

15 years → ??

$12^3 = 1728$ times

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(vi) 2 8 years → 9 times

3 12 years → ??

2 Terms → 9 times

3 Terms → ??

$( )^{2} = 9$

$3^{3} = 27$ Time

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$2^1 - 2^{10}$

$3^1 - 3^5$

$4^1 - 4^5$

$5^1 - 5^5$

$6^1 - 6^4$

$7^1 - 7^4$

$8^1 - 8^4$

$9^1 - 9^4$

(vii) 3 ~~18~~ years → 64 times

5 ~~30~~ years → ??

3 Terms → 64 times $( )^3 = 64$

5 Terms $4^5 \Rightarrow$ 1024 times

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**Q5. A certain sum becomes Rs.1500 in 6 years and Rs.3000 in 12 years. Find the sum.**

Given

1500 ⟶ ~~6 years~~ 1 Sum = ??

3000 ⟶ ~~12 years~~ 2

Soln

$P(K)^1 = 1500$ — (1)

$P(K)^2 = 3000$ — (2)

(2) ÷ (1)

$K = 2$

$P = 750$

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Ans. Rs.750

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**Q5. (i) 7 years → 10,000**
**14 years → 40,000**
**Find the sum.**

7 years → 10000

14 years → 40000

$P \cdot K^1 = 10000$ — (1)

$P \cdot K^2 = 40000$ — (2)

(2) ÷ (1)

$K = 4$

$P = 2500$

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**Q5. (ii) 6 years → 20,000**
**18 years → 5,00,000**
**Find the sum.**

1 6 years → 20,000

3 18 years → 5,00,000.

$P \cdot R^1 = 20000$ — (1)

$P \cdot R^3 = 5,00,000$ — (2)

(2) ÷ (1)

$R^2 = 25$

$R = 5$

$P = 4000$

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**Q5. (iii) 10 years → 30,000**
**15 years → 90,000**
**Find the sum.**

2 Terms → 30000

3 Terms → 90000

$P \cdot K^2 = 30000$ — (1)

$P \cdot K^3 = 90000$ — (2)

(2) ÷ (1)

$K = 3$

$P \cdot 9 = 30000$

$P = \frac{30000}{9} = 3333.33$

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**Q5. (iv) 12 years → 90,000**
**18 years → 2,70,000**
**Find the sum.**

2 Terms → 90000

3 Terms → 270,000

$P \cdot K^2 = 90000$ — (1)

$P \cdot K^3 = 270000$ — (2)

(2) ÷ (1)

$K = 3$

$P = 10,000$

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**Q5. (v) 14 years → 3,60,000**
**35 years → 12,15,000**
**Find the sum.**

Sol$^{n}$

2 Terms → 3,60,000

5 Terms → 12,15,000

$P K^2 = 3,60,000$ — (1)

$P K^5 = 12,15,000$ — (2)

(2) ÷ (1)

$K^3 = \frac{12,15,000}{3,60,000} = \frac{243}{72} = \frac{27}{8}$

$K = 3/2$

$P \cdot \frac{9}{4} = 3,60,000$ (4000)

$P = 1,60,000$

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Q5. (vi) 2 ~~10~~ years → 18,000

5 ~~25~~ years → 4,86,000

6 ~~30~~ years → ??

5 years ⟶ 1 Term

$P \cdot K^2 = 18000$ — (1)

$P \cdot K^5 = 4,86,000$ — (2)

(2) ÷ (1)

$K = 3$

4,86,000 × 3

= 14,58,000

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$S_1$ (A) $P_1$ 11 years

$S_2$ (B) $P_2$ 14 years

18 years $R = 20\%$ per annum

$$P_1\left(1+\frac{20}{100}\right)^7 = P_2\left(1+\frac{20}{100}\right)^4$$

$$P_1\left(\frac{6}{5}\right)^3 = P_2$$

$$\frac{P_1}{P_2} = \frac{125}{216}$$

**Q6. A father deposited Rs. 10,23,000 in the account of his two sons A and B. At the time of deposition, the age of two sons were 11 years, and 14 years respectively. He put a condition to the bank official that his both children must get equal amount when they will be 18 years old. If the rate of compound interest be 20% per annum. Find the amount deposited in each account.**

$$\frac{125}{341} \times 10,23,000$$

$$= 3,75,000$$

$$\frac{216}{341} \times 10,23,000 = 6,48,000$$

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## Shortcut

10,23,000

11 years  14 years

R = 20% / annum

$\left(1+\frac{20}{100}\right)^3 =$ 216 → 14 years

125 → 11 years

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eg R = 25% / annum

A (15 years)  B (13 years)

Amount → 1,64,000

A → ??

$\left(1+\frac{25}{100}\right)^2 \Rightarrow \frac{25}{16}$

$\frac{25}{41} \times 1,64,000^{4000}$

A → 1,09,000

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Ans. Rs.3,75,000 & Rs.6,48,000

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**Q7. A merchant bought a house and a car for Rs. 6,00,000 and Rs. 8,00,000 respectively. If the value of house increases by 10% per annum and the value of car depreciates by 20% per annum, then what will be his profit or loss after three years.**

House

$\rightarrow 6{,}00{,}000\left(1+\frac{10}{100}\right)^3$

$6{,}00{,}000 \cdot \frac{11}{10} \cdot \frac{11}{10} \cdot \frac{11}{10}$

$\Rightarrow 600 \times 1331$

$= 7{,}98{,}600$

$8{,}00{,}000\left(1-\frac{20}{100}\right)^3$

$8{,}00{,}000 \times \frac{8}{10} \cdot \frac{8}{10} \cdot \frac{8}{10}$

$= 4{,}09{,}600$

$12{,}08{,}200$

Loss $\rightarrow 1{,}91{,}800$

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**Loss – Rs.1,91,800**

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# SIMPLE AND COMPOUND INTEREST

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1. SI is same for all the years
2. SI = CI (For 1st term)
3. CI/A increases by R% every term

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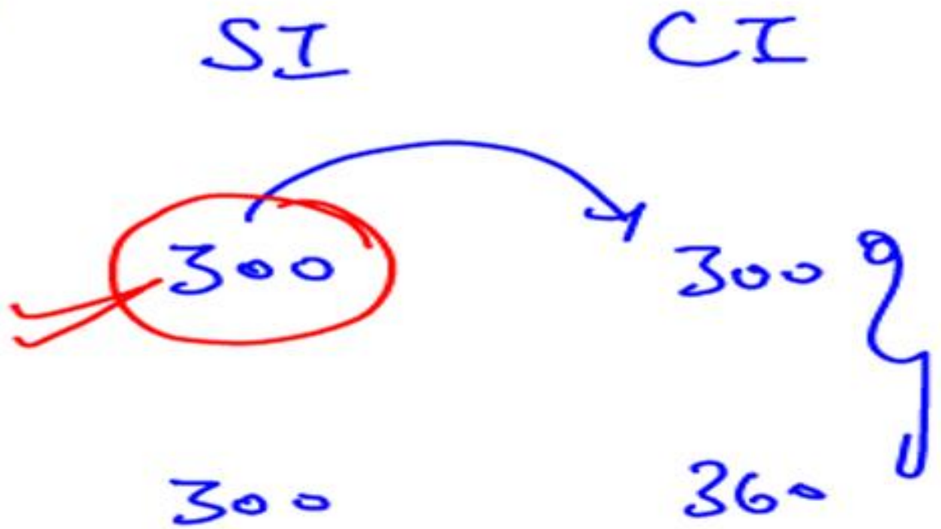


**Eg1. If simple interest earned in 2 years is Rs.600 and compound interest earned in 2 years is Rs.660. Find the P and R?**

$$R = \frac{60}{300} \times 100$$

$$= 20\%$$

$$20\% \text{ of } P = 300$$

$$P = 1500$$

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Ans. R = 20%

P = Rs. 1500

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**Eg. If simple interest earned in 2 years is Rs.900 and compound interest earned in 2 years is Rs.954. Find the P and R?**

| SI | CI |
|---|---|
| 450 | 450 |
| 450 | 504 |

₹ 54 . 10p

₹ 45p

2

R = 12%

12% of P = 450

P = 3750

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Ans. R = 12%

P = Rs. 3750

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$$(CI)_2 - (SI)_2 = \frac{PR^2}{100^2}$$

**Eg2. If the difference between SI and CI earned in 2 years is Rs.90 and rate of interest is 6% per annum. Find P.**

$$\frac{P \cdot 6 \cdot 6}{100 \cdot 100} = 90 \times 5$$

$$50$$

$$P = 25000$$

gradeup **Ans.** **P = Rs. 25000**

eg The difference b/w CI earned in 1 year when it is compounded annually & compounded semi-annually if P = 50000 & R = 20%/annum

Soln

CI .. - CI

semi-annually annually

R = 10% 2 terms SI 2 terms

500 p.a. 10% R = 500

100 10% R = 500

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For 2 years / terms

$$SI = \frac{P \cdot R \cdot 2}{100} \qquad CI = P\left[\left(1+\frac{R}{100}\right)^2 - 1\right]$$

(i) $(CI)_2 - (SI)_2 = \frac{PR^2}{100^2}$

(ii) $\frac{(SI)_2}{(CI)_2} = \frac{200}{200+R}$

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For 3 years | term

$$(CI)_3 - (SI)_3 = \frac{PR^2}{100^2}\left[\frac{R}{100} + 3\right]$$

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$$(CI)_2 - (SI)_2 = \frac{PR^2}{100^2}$$

$$\frac{(SI)_2}{(CI)_2} = \frac{200}{200 + R}$$

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$$(CI)_3 - (SI)_3 = \frac{PR^2}{100^2}\left[\frac{R}{100} + 3\right]$$

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**Eg3. If the rate of interest is 15% per annum. Find the ratio of simple interest earned in 2 years and compound interest earned in 2 years.**

$R = 15\%$

$$\frac{(SI)_2}{(CI)_2} = \frac{200}{200+R}$$

$$= \frac{200}{215} \quad 40$$

$$43$$

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Ans. 40 : 43

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**Eg4. If the difference between simple interest and compound interest earned in 3 years is Rs.15.25 and rate of interest is 5% per annum. Find P.**

$$(CI)_3 - (SI)_3 = 15.25$$

$$\frac{P \cdot 5 \cdot 5}{20 \cdot 100 \cdot 100} \left[\frac{5}{100} + 3\right] = \frac{1525}{100}$$

$$\frac{P}{20 \cdot 20} \left[\frac{305}{100}\right] = \frac{1525}{100}$$

$$P = 2000 \text{ Rs}$$

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**Ans.** **Rs. 2000**