gradeup

Sahi Prep Hai Toh Life Set Hai

Simple Interest 2 & Introduction of CI

Agenda

(2) * Remaining Questions
         of SI (Doubts) $\rightarrow$ (35-45) min

(1) * $\Big\{$ Introduct of Compound
              Interest $\rightarrow$ $\Big\}$ (45 ~ 50) min

1. The simple interest on Rs. 2555 from July 1, 2018 to September 3, 2018 at $3\frac{1}{7}$ % rate will be —

(a) 14.08

(b) 17

(c) 15

(d) 14.30

1.   (a)

2. What is the simple interest for 9 years on a sum of Rs. 80000 if the rate of interest for first 2 years is 6% per annum for next 3 years is 8% per annum and after period of 5 years is 12% per annum.

(a) 76800   (b) 67200

(c) 64200   (d) 50800

2.   (b)

3. A person lends 40% of his sum of money at 15% per annum, 50% of rest at 10% per annum and the rest at 18% per annum rate of interest, if the interest is calculated on the whole sum then what would be the annual rate of interest ?

(a) 13.4%

(b) 14.33%

(c) 14.4%

(d) 13.33%

3. (c)

400   650   5 year   R

1 year → 50 Rs

1 year → 60 Rs

8 year (480 Rs)
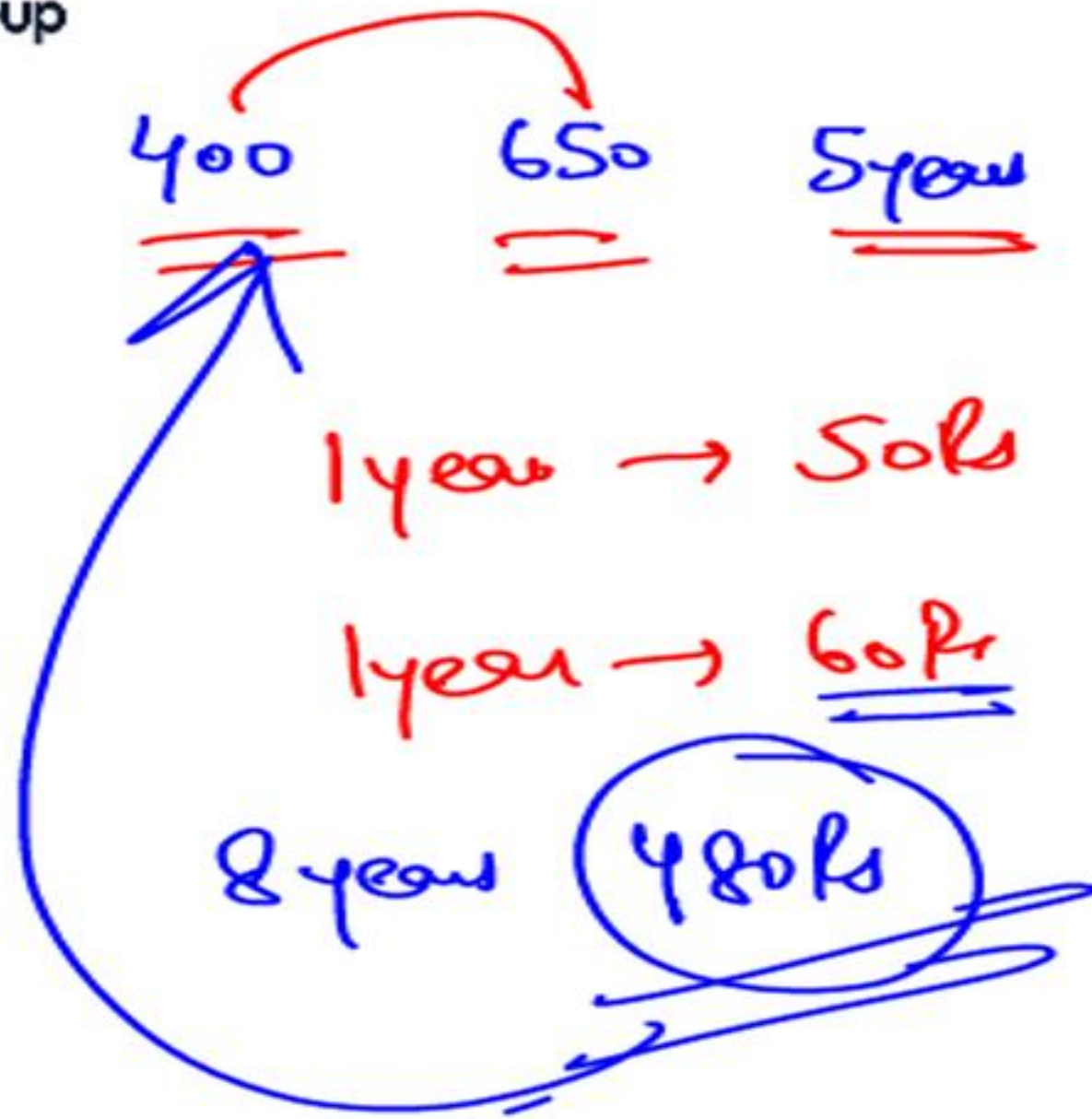
4. Rs. 400 becomes Rs. 650 at certain rate of simple interest in 5 years. If rate is increased by 2.5% per annum. What will be amount after 8 years.

(a) 880
(b) 720
(c) 800
(d) 770

4.   (a)

5. The difference between the simple interest received from two different sources on Rs. 750 for 6 years is Rs. 22.5. The difference between their rate of interest is?

(a) 0.2%

(b) 0.5%

(c) 0.3%

(d) 0.7%

5.   (b)

6. A sum of money invested at simple interest 2.5 times of itself in 10 years. How many times will it become in 40 years time ?
(a) 3 times
(b) 5 times
(c) 7 times
(d) 4 times

6.	(c)

7. The simple interest on a sum of money is $\frac{9}{16}$ of the principal and the number of years is equal to the rate percent per annum. The rate per annum is –

(a) $6\frac{2}{6}\%$

(b) 10%

(c) $7\frac{1}{2}\%$

(d) $7\frac{1}{3}\%$

7. (c)

3 years ⟶ 950 Rs

5½ ⟶ 1325 Rs

$2\frac{1}{2}$ SI = 375 Rs

SI = 150 Rs

P = 500 Rs

8. A certain sum of money amounts to Rs. 950 in 3 years and to Rs. 1325 in 5½ years at a certain rate of simple interest. The rate of interest per annum is—

(a) 25%

(b) 20%

(c) 35%

(d) 30%

$$\frac{150 \cdot 100}{500} = 30\%$$

8. (d)

150 B

$$30\% \text{ of } x = 90\, Rs$$

$$x = \underline{300}$$

9. Gopal borrowed Rs. (1500) from Raman at 10% rate of interest for 2 years. he then added some money to the borrowed sum and lent it to Vinayak for the same time at 15% simple interest. If Gopal gains Rs. 240 in the whole transaction, then the sum lent by him to Vinayak is –

(a) 1600
(b) 1800
(c) 2000
(d) 2200

9. (b)

10. A certain interest is received on a sum of money at a certain rate of interest in a certain time. If principal amount is decreased by 20% and rate of interest becomes 3½ times then Rs. 560 will receive as a simple interest. The SI received on the original sum at the original rate of interest was ?

A. 180   B. 200

C. 220   D. 360

10. (b)

11. A certain sum of money amounts to Rs. 2500 in 2.5 years at 20% per annum. In how many year will it amount to Rs. 3000 at the same rate ?

(a) 3 years
(b) 4 years
(c) 5 years
(d) 6 years

$150\% \text{ of } P = 2500 \quad -(1)$

$x\% \text{ of } P = 3000 \quad (2)$

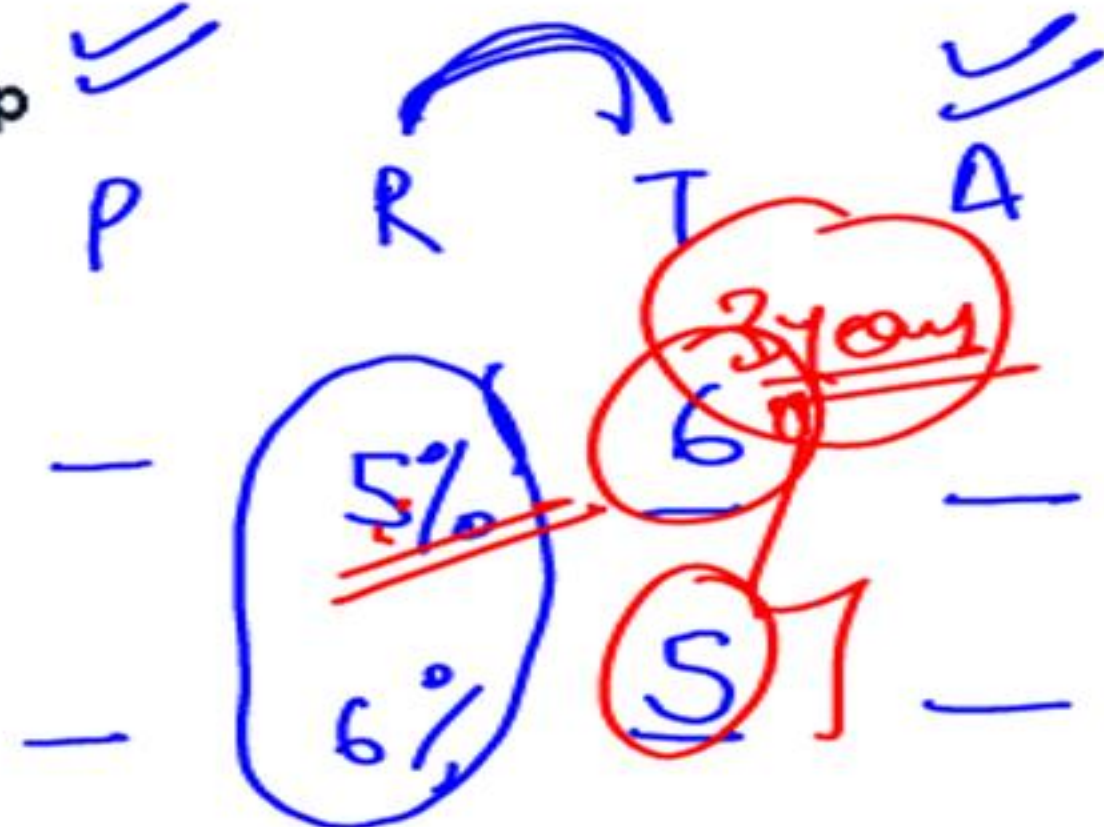$$\frac{150^{80}}{x} = \frac{2500}{3000}$$

$x = \boxed{180\%}$

11. (b)

12. A certain sum is invested for a certain time period. It amounts Rs. 1000 at 25% per annum. But when invested at 10% per annum, it amounts to Rs. 500. Find the time.

(a) 40 years
(b) 20 years
(c) 25 years
(d) 30 years

12. (b)

P   R   T   A

-3years-

5%   6

6%   S

lent at 6 months

$115\% \text{ of } P = 4600$

$P = 4000$

13. A man lent out certain sum of money to someone at 5% p.a. rate of interest and after 6 month he lent out the same sum of money at 6% p.a. rate of interest to another man. After a certain time he got amount of Rs. 4600 from each. What is the total sum of money he lent out to two men.

(a) 6800

(b) 7600

(c) 9000

(d) 8000

13. (d)

14. Dilip invested amounts in two different schemes A and B for five years in the ratio of 5 : 4 respectively. Scheme A offers 8% simple interest and bonus equal to 20% of the amount of interest earned in 5 years on maturity. Scheme B offers 9% simple interest. If the amount invested in scheme A was Rs. 20000. What was the total amount received on maturity from both the schemes ?

(a) Rs.50800
(b) Rs.51200
(c) Rs.52800
(d) Rs.58200

14. (c)

P_1

13 years
$\underrightarrow{\quad}$
18 years

6 years
18 years

less than 6 years $\longrightarrow$ 8%
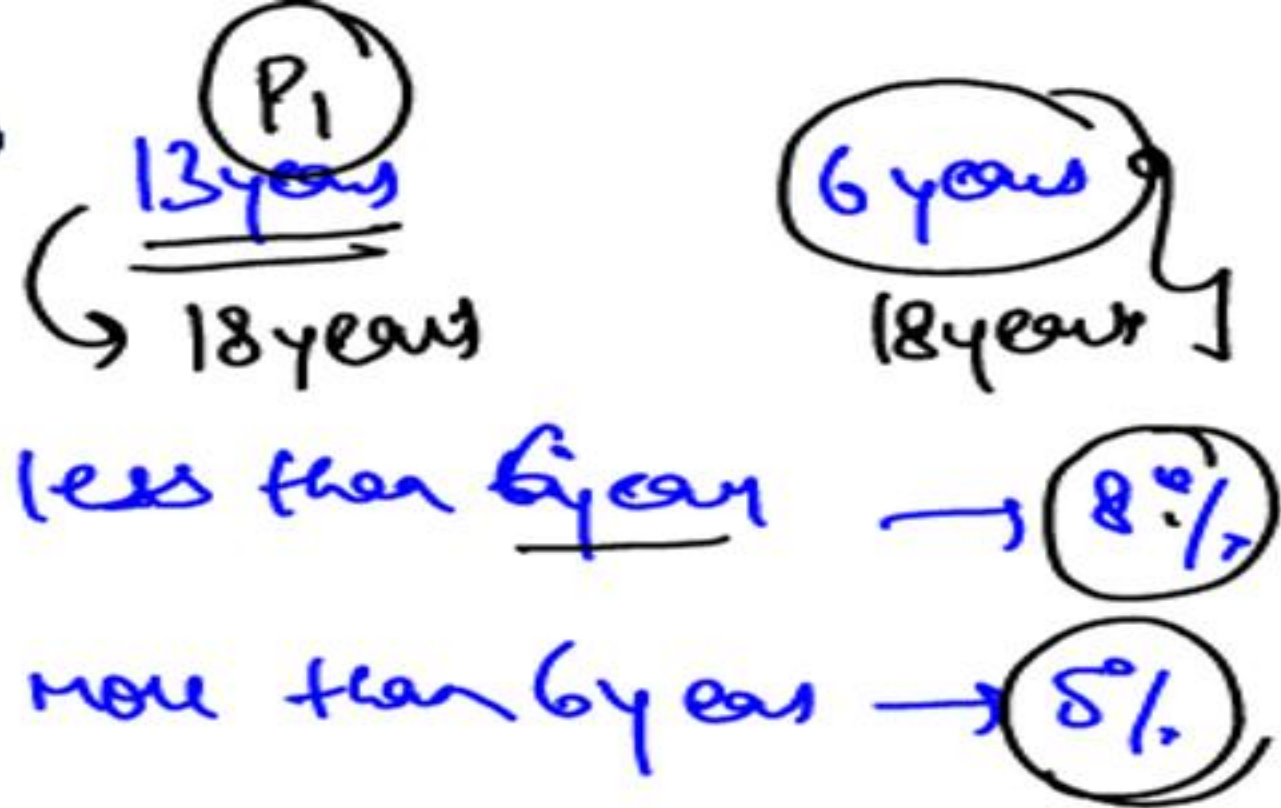
more than 6 years $\longrightarrow$ 5%

$140\% \text{ of } P_1 = 160\% \text{ of } P_2$

$$\frac{P_1}{P_2} = \frac{160}{140} \begin{Bmatrix} 8 \\ 7 \end{Bmatrix}$$

15. Ravi left Rs. 450,000 in his will for two sons who are 13 years and 6 years old. Simple interest offered by bank for less than 6 years is 8% p.a. and for more than 6 years is 5% p.a. Amount deposited in the bank such a way that when they attend 18 years they may receive equal amount. Find present value of the amount to be deposited for both the sons.
(a) 240000, 210000
(b) 220000, 230000
(c) 250000, 200000
(d) 2,10,000, 2,40000
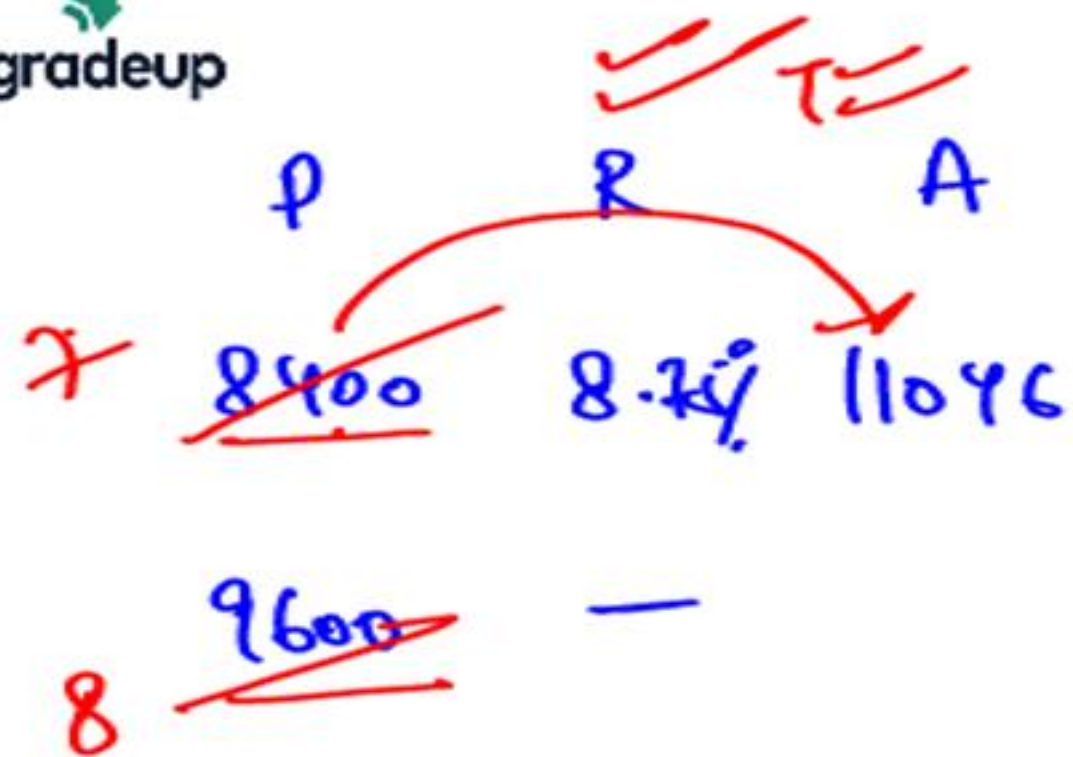
$$\frac{8}{15} \times 4,50,000 = 2,40,000$$

15.   (a)

16. Two equal sums are lent at 10% and 8% simple interest p.a. respectively, at the same time. The first sum is received 2 years earlier than the second one and the amount received in each case was Rs. 36,900. Each sum was :

(a) Rs.20,500

(b) Rs.20,200

(c) Rs.18,100

(d) Rs.21,500

16. (a)

P   R   A   SI

7   8400   8.75% 11046   2646

8   9600   —   ??

17. A sum of Rs.8,400 amounts to Rs. 11,046 at 8.75% p.a. simple interest in certain time. What is the simple interest on the sum of Rs.9,600 at the same rate for the same time?

(a) Rs.2,990
(b) Rs.3,012
(c) Rs.2,686
(d) Rs.3,024

$7 \rightarrow 2646$

$1 \rightarrow \dfrac{378}{\cancel{2646}}{7}$

378×8

17. (d)

P	R	T	A	SI
—	9.25	5.4	14395.2	
—	8.6	4.5		

18. A sum amounts to Rs. 14,395.20 at 9.25% p.a. simple interest in 5.4 years. What will be the simple interest on the same sum at 8.6% p.a. in 4.5 years.

?? (a) Rs.3,715.20

(b) Rs.3,627

(c) Rs.3,797.76

(d) Rs.3,672

Interest → 9.25×5.4

→ $\left(10 - \dfrac{3}{4}\right) \times 5.4$

= $54 - 4.05$

≈ $\boxed{50\%}$

$\dfrac{8}{2}P = \underset{4800}{\cancel{14400}}$

$P = \boxed{9600}$

8.6×4.5

$8.6 (5 - 0.5)$

$43 - 4.3 = 38.7$

18. (a)

$$38 \cdot 7\% \text{ of } 9600$$

$$38 \cdot 7\% \text{ of } (10000 - 400)$$

$$3870 - 154 \cdot 8$$

$$= 3715 \cdot 2$$

19. A sum of Rs.12,800 is invested partly at 15% p.a. and the remaining at 12% p.a. simple interest. If the total interest at the end of 3 years is Rs.5,085, then how much money was invested at 15% p.a.?

(a) Rs.5,300
(b) Rs.7,500
(c) Rs.5,200
(d) Rs.5,800

19. (a)

20. A sum of Rs.10,500 amounts of Rs.13,825 in $3\frac{4}{5}$ years at a certain rate % p.a. simple interest. What will be the simple interest on the same sum for 5 years at double the earlier rate?

(a) Rs.8,470
(b) Rs.8,750
(c) Rs.8,670
(d) Rs.8,560

20. (b)

COMPOUND INTEREST (BASIC)

Compound Interest is just an application of Percentage, so here in many questions we will use the concepts discussed in Percentage Class.

$$\uparrow 20\% = \times \frac{120}{100} = \frac{6}{5}$$

$$\uparrow 30\% = \times \frac{130}{100} = \frac{13}{10}$$

$$\downarrow 20\% = \times \frac{80}{100} = \frac{4}{5}$$

$$\downarrow 30\% = \times \frac{70}{100} = \frac{7}{10}$$

Successive % Change

Successive % Change of X% & Y%

$$X + Y + \frac{XY}{100}$$

Eg. ↑ **20%** ↑**30%**

$$\rightarrow \quad 20 + 30 + \frac{20 \cdot 30}{100}$$

$$\Rightarrow 56\% \uparrow$$

$$\times\frac{6}{5}\times\frac{6}{5}\times\frac{6}{5}$$ ↑ **20% (after 3 Years)** $= K\times\dfrac{6}{5}\times\dfrac{6}{5}\times\dfrac{6}{5}$

$$\times\frac{4}{5}\times\frac{4}{5}\times\frac{4}{5}$$ ↓ **20% (after 3 Years)** $= K\times\dfrac{4}{5}\times\dfrac{4}{5}\times\dfrac{4}{5}$

$$\frac{5}{6}\times\frac{5}{6}\times\frac{5}{6}$$ ↑ **20% (3 Years ago)** $= K\times\dfrac{5}{6}\times\dfrac{5}{6}\times\dfrac{5}{6}$

$$\frac{5}{4}\times\frac{5}{4}\times\frac{5}{4}$$ ↓ **20% (3 Years ago)** $= K\times\dfrac{5}{4}\times\dfrac{5}{4}\times\dfrac{5}{4}$

Eg. The present population of a town is 50,000. If it increases by 20% every year, what will be its population after 4 years?

$$50000 \cdot \frac{\overset{80}{6}}{5} \cdot \frac{6}{5} \cdot \frac{6}{5} \cdot \frac{6}{5}$$

$$80 \times 1296$$

$$103680$$

$$\downarrow 25\% \rightarrow \frac{3}{4}$$

$$\downarrow 25\% = 75\% = \boxed{\frac{3}{4}}$$

Eg. The present worth of a car is 13,50,000. If its value depreciates by 25% every year. What was its value 3 years ago?

$$\overset{50000}{\cancel{13,50,000}} \times \frac{4}{\cancel{3}} \times \frac{4}{\cancel{3}} \times \frac{4}{\cancel{3}}$$

$$\Rightarrow \underline{\underline{32,00,000}}$$

DIFFERENCE BETWEEN SI AND CI CONCEPT

P = 20000

R = 10%/annum

T = 3 years

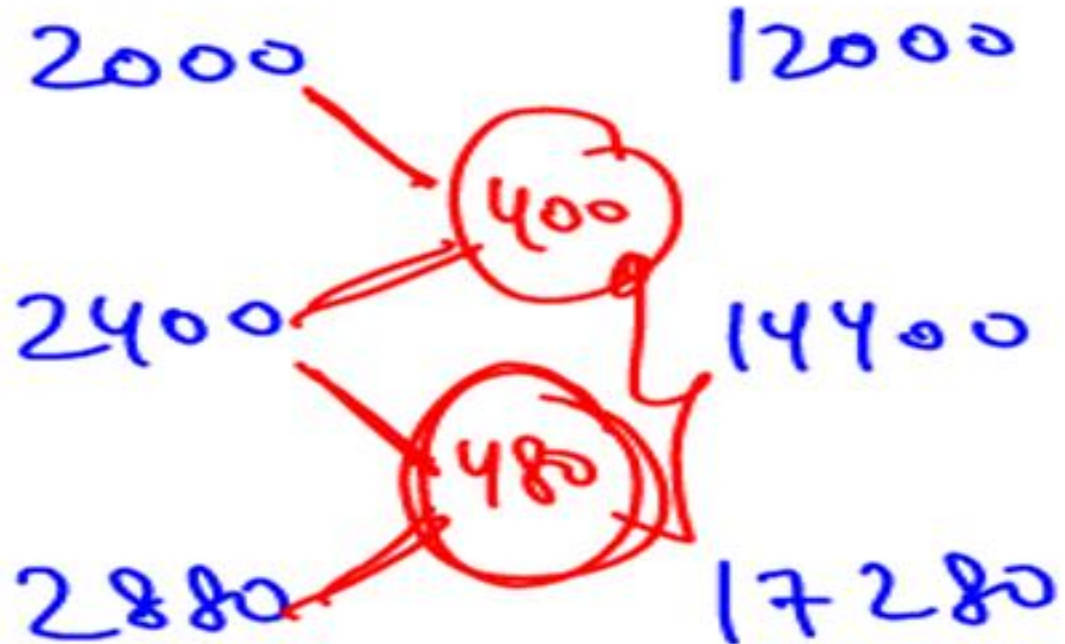|	SI	CI	A
1st	2000	2000	22000
2nd	2000	2200	24200
3rd	2000	2420	26620

IMPORTANT POINTS TO BE USED WHILE SOLVING QUESTIONS

(i) • SI is same for all the years.

(ii) • SI = CI (for 1st year/term)

(iii) • CI/Amount increases by R% every year

$P = 10000$

$R = 20\%$

CI   A

2000   12000

400

2400   14400

480

2880   17280

This diff also increases
by $R\%$ every year

Eg. Compound interest earned in 4th year is Rs.8 more than the compound interest earned in 3rd year whereas the compound interest earned in 5th year is Rs.17 more than the compound interest earned in 3rd year. Find the rate of interest per annum.

$(CI)_3 \rightarrow X$

$(CI)_4 \rightarrow X+8$

⑧

⑨

$(CI)_5 \rightarrow X+17$

$\dfrac{1}{8} \times 100$

$= \quad 12.5\%$

Eg.   CI – 5th year → 5,000 $\Big\}$

   CI – 6th year → 5,600

   Find R = ?

$$\frac{600}{5000} \times 100$$

$$R = 12\%$$

Eg. CI – 8th year → 4,500

CI – 9th year → ? ?

R = 8% p.a.

$$4500 + \frac{8}{100} \cdot 4500$$

$$4500 + 360$$

$$= \quad 4860\,Rs$$

Eg. CI – 11th year → 16,000

CI – 14th year → ? ?

R = 30% p.a.

$$16000 - \frac{13}{10} \cdot \frac{13}{10} \cdot \frac{13}{10}$$

$$= 35152 \text{ Rs}$$

Eg. CI – 7th year → 24,000

CI – 6th year → ? ?

R = 20% p.a.

CI increases by

R% every year

$\uparrow 20\%$ → $\boxed{\times \dfrac{6}{5}}$

$24000 \times \dfrac{5}{6}$

= 20000 /-

Eg.　CI – 5th year → 2,500

CI – 7th year → 4,900

Find R = ??

$$2500 \left(K \right)^2 = 4900$$

$$K^2 = \frac{49}{25}$$

$$K = \sqrt{\frac{49}{25}} \boxed{\frac{7}{5}}$$

$$K^2 = \frac{49}{25}$$

$$K = 7/5 \longrightarrow 14\%$$

$$R = 40\%$$

Eg.   CI – 7th year → 6,400

CI – 10th year → 12,500

Find R = ??

$$6400 \cdot (K)^3 = 12500$$

$$K = \frac{5}{4} \Rightarrow 125\%$$

$$R = 25\%$$

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

A = Amount
P = Principal
R = Rate of Interest
n = No. of terms

CI = A − P

Eg   P = 10000

A = ??

Term → 1year

R = 40%/annum

T = 2years

$$A = 10000\left(1+\frac{40}{100}\right)^2$$

$$= 10000 \cdot \frac{14}{10} \cdot \frac{14}{10}$$

$$= 19600$$

Eg   P = 10000

semi-annually

R = 40%/annum

$T = 1\frac{1}{2}$ years

$$A = 10000\left(1+\frac{20}{100}\right)^3$$

$$= 10000 \cdot \frac{12}{10} \cdot \frac{12}{10} \cdot \frac{12}{10}$$

$$A = 17280 \ Rs$$

Q1. (i) P = 20,000

R = 15%/annum

T = 2 Years

A = ??

• **If nothing is given in the question by default, it is compounded annually and rate is per annum.**

$$A = 20000\left(1 + \frac{15}{100}\right)^2$$

$$= 20000 \cdot \frac{23}{20} \cdot \frac{23}{20}$$

$$= \boxed{26450 \text{ Rs}}$$

Q1. (ii) P = 40,000

R = <u>20%</u> /annum

T = <u>2 Years</u>

A = ??

(compounded semi-annually)

$$A = 40000 \left(1 + \frac{10}{100} \right)^4$$

$$= 40000 \cdot \frac{11}{10} \cdot \frac{11}{10} \cdot \frac{11}{10} \cdot \frac{11}{10}$$

$$= 4 \times 14641$$

$$= 58564 \text{ Rs}$$

Q1. (iii) P = 1,00,000

R = 12% / annum

T = 2 Years

C.I. = ??

$$A = 1,00,000 \left(1 + \frac{12}{100}\right)^2$$

$$= 1,00,000 \times \frac{112}{100} \times \frac{112}{100}$$

$$= 10 \times 12544 = 125440$$

$$CI = 125440 - 1,00,000$$

$$= 25,440 ₹$$

Q1. (iv) P = 37,500

R = 40% /annum

T = 1½ Years

A = ??

(compounded semi-annually)

$$A = 37500 \left(1 + \frac{20}{100}\right)^3$$

$$= \overset{300}{\cancel{37500}} \times \frac{\cancel{6}}{\cancel{5}} \times \frac{6}{\cancel{5}} \times \frac{6}{\cancel{5}}$$

$$= 64800$$

Q1. (v) P = 5,000

R = 20% /annum

T = ??

C.I. = Rs. 1,655

(compounded semi-annually)

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

$$6655 = 5000 \left(1 + \frac{10}{100} \right)^n$$

$$\overset{1331}{\underset{1000}{\frac{\cancel{6655}}{\cancel{5000}}}} = \left(\frac{11}{10} \right)^n$$

$$n = 3$$

3 Terms of 6 month

Time = $1\frac{1}{2}$ years

$\boxed{1 \text{ quarter} = 3 \text{ months}}$

Q1. (vi) P = ??

R = 32%/ annum

T = 9 months

A = Rs.6,29,856

Compounded quarterly

$32\% \rightarrow 12 \text{ month}$

$16\% \rightarrow 6 \text{ mont}$

$8\% \rightarrow 3 \text{ month}$

$629856 = P\left(1 + \dfrac{\overset{2}{\cancel{8}}}{\underset{25}{\cancel{100}}}\right)^3$

32

$\cancel{629856}^{\overset{864}{23328}} = P \cdot \dfrac{\cancel{27}}{25} \cdot \dfrac{\cancel{27}}{25} \cdot \dfrac{\cancel{27}}{25}$

$P = 5,00,000$

* If nothing is given By default it is Compounded **annually**

Q1. (vii) P = 30,000

R = 20%/ annum

T = 27 months → 2years 3months

C.I. = ??

Step1

$$A = 30000 \left(1 + \frac{20}{100}\right)^2$$

$$= \boxed{43200}$$

a/p step2 →

$$\frac{43200 \cdot 20}{100} \cdot \frac{\cancel{3}}{\cancel{12}^1} \quad \boxed{= 2160}$$

Amount = 45360

CI = 15360

$$40000\left(1+\frac{30}{100}\right)^2$$

$$= \underline{67600 \text{ Rs}}$$

Q1. (viii) P $= 40,000$

R $= 30\% /$ annum

T $= 32$ months $\rightarrow$ 2 years 8 months

A $= ??$

$$\frac{67600 \times \overset{10}{30}}{100} \times \frac{\overset{2}{8}}{\underset{3}{12}}$$

$$= \underline{13520}$$

$$A = \underline{81120 \text{ Rs}}$$

Q1. (ix) P = 50,000

R = 40% / annum

T = 10 months

A = ??

3 Terms + 1 month extra

1 Term

$R = \boxed{10\%}$

(compounded quarterly)

Term = $\boxed{3 \text{ months}}$

$$A = 50000 \left(1 + \frac{10}{100}\right)^3$$

$$= 50000 \cdot \frac{11}{10} \cdot \frac{11}{10} \cdot \frac{11}{10}$$

$$= 50 \times 1331 = 66550 \, ₹$$

$$\frac{66550 \cdot 40 \cdot 1}{100 \cdot 12 = 3} = 2218 \cdot 33$$

$$\boxed{68768 \cdot 33}$$

gradeup

$24\% \rightarrow 12$ month

$\boxed{10\%} \leftarrow$ 5 month

Q1. (x) P = 60,000
R = 24% /annum
T = 17 months
A = ??

3 Tecram + 2 month

Teem → 5 month

(compounded every five months)

(a) Rs. 81456   (b) Rs. 81840
(c) Rs. 76884.8   (d) Rs. 83054.4

$$60000\left(1+\frac{10}{100}\right)^3 = \boxed{79860}$$

$$\frac{79860 \cdot 24\% \cdot 2}{100 \quad 12} \Rightarrow \frac{31924}{10}$$

$$= \boxed{3192.4}$$