

Chapter - 8

Simple Interest and Compound Interest

Compound Interest Quick Maths Formulas

- When Interest is compounded annually - Amount = $P [1 + (r/100)]^t$
 → When Interest is compounded half-yearly - Amount = $P [1 + (r/200)]^{2t}$
 → When Interest is compounded quarterly - Amount = $P [1 + (r/400)]^{4t}$
 → When rate of Interest is $r_1\%$, $r_2\%$ and $r_3\%$ then -
Amount = $P [1 + (r_1/100)] * [1 + (r_2/100)] * [1 + (r_3/100)]$

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Foundation

Solutions

1. (a); $SI = \frac{PRT}{100} = \frac{800 \times 5 \times 3}{100} = \text{Rs. } 120$
2. (c); $T = \frac{SI \times 100}{PR} = \frac{120 \times 100}{600 \times 10} = 2 \text{ years}$
3. (d); $R = \frac{SI \times 100}{PT} = \frac{4500 \times 100}{15000 \times 5} = 6\%$
4. (a); Total SI difference = $1400 - 1100 = \text{Rs. } 300$
 Total Time = $6 - 2 = 4 \text{ years}$
 $SI = \frac{300}{4} = \text{Rs. } 75$
 For 2 year SI = $75 \times 2 = \text{Rs. } 150$
 So, $P = 1100 - 150 = \text{Rs. } 950$
 $R = \frac{75}{950} \times 100 = 7 \frac{17}{19}\%$
5. (b); $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 $= 17500 \left[\left(1 + \frac{12}{100} \right)^2 - 1 \right] = \text{Rs. } 4452$
6. (c); $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 Here, $P = \text{Rs. } 12000$, $R = 9\% \text{ p.a.}$, $n = 3 \text{ years}$
 $= 12000 \left[\left(\frac{109}{100} \right)^3 - 1 \right] = \text{Rs. } 3540 \text{ (Appx.)}$
7. (d); $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 $= 4800 \left[\left(1 + \frac{5}{100} \right)^3 - 1 \right] = \text{Rs. } 756.6$
8. (a); $CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$
 $= 12500 \left[\left(1 + \frac{12}{100} \right)^2 - 1 \right] = \text{Rs. } 3180$



9. (a); Difference between CI and SI for 2 years = $\frac{PR^2}{100^2}$

$$64 = \frac{10000 \times R^2}{100 \times 100} \Rightarrow R^2 = 64 \Rightarrow R = 8\%$$

10. (a); Difference between CI and SI for 2 years = $\frac{PR^2}{100^2}$

$$\Rightarrow \frac{P \times 16}{100^2} = 1 \Rightarrow P = \text{Rs. } 625$$

11. (c); Because amount compound quarterly

$$\text{So, Year} = \text{year} \times 4, \text{ Rate} = \frac{\text{rate}}{4}$$

$$\therefore \text{year} = \frac{9}{12} \times 4 = 3 \text{ years, rate} = \frac{8}{4} = 2\%$$

$$\therefore \text{CI} = 12500 \left[\left(1 + \frac{2}{100} \right)^3 - 1 \right] = \text{Rs. } 765$$

12. (b); Because the amount is compounded half-yearly

$$\text{So, year} = \text{year} \times 2, \text{ rate} = \frac{\text{rate}}{2}$$

$$\therefore \text{year} = 2 \text{ years, rate} = 10\%$$

$$\begin{aligned} \Rightarrow \text{CI} &= P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right] \\ &= 32000 \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right] = \text{Rs. } 6720 \end{aligned}$$

13. (c); Difference between CI and SI for 2 years = $\frac{PR^2}{100^2}$

$$= \frac{700 \times 5 \times 5}{100 \times 100} = \text{Rs. } 1.75$$

14. (c); Difference between CI and SI for 2 years = $\frac{PR^2}{100^2}$

$$\text{Here, Difference} = \text{Rs. } 10, R = \frac{25}{4} \% \text{ per annum}$$

$$\Rightarrow 10 = P \times \left[\frac{25}{4 \times 100} \right]^2 \Rightarrow P = \text{Rs. } 2560$$

15. (b); Here, amount = 2P (Where P = Principal)

$$\text{Hence, SI} = P, \text{ Rate} = \frac{100 \times \text{SI}}{P \times T} = \frac{P \times 100}{P \times 8} = 12.5\%$$

16. (b); Amount = $P + \frac{P \times R \times T}{100}$

$$450 = P + \frac{P \times 2 \times 10}{100} \Rightarrow P = \text{Rs. } 375$$

17. (b); Amount = $P + \frac{P \times R \times T}{100}$

$$= 22400 + \frac{22400 \times 12 \times 7}{100} = \text{Rs. } 41216$$

18. (b); Amount = $P + \frac{P \times R \times T}{100}$

$$10500 = 7000 + \frac{7000 \times 5 \times T}{100} \Rightarrow T = 10 \text{ years}$$

19. (d); SI = $\frac{PRT}{100} \Rightarrow 4016.25 = \frac{P \times 9 \times 5}{100} \Rightarrow P = \text{Rs. } 8925$

20. (c); Year = 2 years,

$$R = \frac{10}{2} = 5\% \quad [\because \text{CI is compounded half-yearly}]$$

$$\text{Difference between CI and SI for 2 years} = \frac{PR^2}{100^2}$$

$$25 = \frac{P \times 25}{100 \times 100}; P = \text{Rs. } 10000$$

21. (b); Difference between CI and SI for 2 years = $\frac{PR^2}{100^2}$

$$12.8 = \frac{2000 \times R^2}{(100)^2} \Rightarrow R = 8\% \text{ per annum}$$

22. (c); Here, Amount = Principal + SI

Now, since amount is given as 2P, hence SI must be equal to P

$$\Rightarrow P = \frac{P \times R \times 6}{100} \quad [\text{Using SI formula}]$$

$$\Rightarrow R = \frac{50}{3} \% \text{ per annum}$$

Now, Amount = 4P (Need to find)

Hence, SI = 3P

$$3P = \frac{P \times \frac{50}{3} \times T}{100} \Rightarrow 300 = \frac{50}{3} \times T \text{ or } T = 18 \text{ years}$$

23. (d); Let the sum of money be Rs. 100

$$\text{Rs. } 100 \xrightarrow{3 \text{ years}} \text{Rs. } 200 \xrightarrow{3 \text{ years}} \text{Rs. } 400$$

Here, Rs. 100 becomes 4 times i.e. Rs. 400 in total 6 years



24. (d); Let amount be 100

$$\text{Then } 100 \times \frac{25}{4} = \text{Rs. } 625 \quad (\text{Final amount})$$

$$\text{So, } 625 = 100 \left[\left(1 + \frac{r}{100} \right)^2 \right]$$

$$\Rightarrow \frac{25}{10} = \left(\frac{100+r}{100} \right) \Rightarrow \frac{5}{2} = \frac{100+r}{100} \Rightarrow r = 150\%$$

25. (d); Here, Amount = $P \left[\left(1 + \frac{R}{100} \right)^2 \right]$

$$= 25000 \left[\left(1 + \frac{8}{100} \right)^2 \right]$$

$$= 25000 \left[\left(\frac{27}{25} \right)^2 \right] = \text{Rs. } 29160$$

26. (b); Here, $\frac{SI}{CI} = \frac{\frac{P \times R \times T}{100}}{P \left[\left(1 + \frac{R}{100} \right)^2 - 1 \right]}$

$$= \frac{\frac{100 \times 5 \times 2}{100}}{100 \left[\left(1 + \frac{5}{100} \right)^2 - 1 \right]} = \frac{\frac{10}{41}}{\frac{400}{400}} = 40 : 41$$

27. (c); CI becomes Rs. 800 in 3 years and becomes Rs. 840 in 4 years

\Rightarrow Hence, CI of 1 year = Rs. (840 - 800) = Rs. 40

$$\Rightarrow \text{Rate} = \frac{40 \times 100}{800 \times 1} \quad [\text{Here, } P = \text{Rs. } 800]$$

= 5% per annum

28. (c); Here, difference between SI and CI for 2 years

$$= \frac{PR^2}{(100)^2} = \frac{12000 \times (5)^2}{(100)^2} = \text{Rs. } 30$$

29. (a); Difference between CI and SI for 3 years

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

$$= \frac{(15000)(3)^2(303)}{(100)^3} = \text{Rs. } 40.91 \quad (\text{appx.})$$

30. (a); The difference between CI and SI for 3 years

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

$$= \frac{13000 \times (4)^2(304)}{(100)^3} = \text{Rs. } 63.23 \quad (\text{appx.})$$

31. (d); Principal = $\frac{SI \times 100}{\text{Rate} \times \text{Time}}$

$$= \frac{500 \times 100}{5 \times 1} = \text{Rs. } 10000$$

\Rightarrow Now CI at 5% rate

$$= 10000 \left[\left(1 + \frac{5}{100} \right)^2 - 1 \right] = \text{Rs. } 1025$$

32. (c); Difference between CI and SI for 2 years = $\frac{PR^2}{100^2}$

$$\Rightarrow 35 = \frac{P(5)^2}{(100)^2} \Rightarrow P = \text{Rs. } 14000$$

33. (c); Rate = $\frac{20}{2} = 10\%$, Time = $\frac{3}{2} \times 2 = 3$ years

[\therefore CI is calculated half yearly]

$$CI = 10000 \left[\left(1 + \frac{10}{100} \right)^3 - 1 \right]$$

$$= 10000 \left[\left(\frac{11}{10} \right)^3 - 1 \right] = \text{Rs. } 3310$$

34. (d); $P = \frac{SI \times 100}{R \times T} = \frac{7200 \times 100}{12 \times 6} = \text{Rs. } 10000$

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

$$= 10000 \left[\left(1 + \frac{5}{100} \right)^2 - 1 \right] = \text{Rs. } 1025$$

35. (c); Difference between CI and SI for 2 years = $\frac{PR^2}{(100)^2}$

$$\Rightarrow 25 = \frac{(10000)R^2}{(100)^2} \Rightarrow R = 5\% \text{ per annum}$$



$$36. (c); \text{ Here, CI} = P \left[\left(1 + \frac{R}{100} \right)^2 - 1 \right]$$

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

$$\Rightarrow \text{SI} = \frac{P \times 2 \times R}{100} \Rightarrow \frac{\text{CI}}{\text{SI}} = 1.2 = \frac{\frac{PR}{100} \left[\frac{R}{100} + 2 \right]}{\frac{2PR}{100}}$$

$$\Rightarrow \frac{\text{CI}}{\text{SI}} = \frac{200+R}{200}, \quad 1.2 = \frac{200+R}{200}, \quad R = 40\%$$

$$37. (b); \text{ CI} = 7500 \left[\left(1 + \frac{10}{100} \right)^2 \times \left(1 + \frac{20}{100} \right)^2 - 1 \right]$$

[Here, R = 10% per annum for first 2 years and R = 20% per annum for next 2 years]

$$= 7500 \left[\left(\frac{11}{10} \right)^2 \times \left(\frac{12}{10} \right)^2 - 1 \right] = 5568$$

38. (c); Here, the amount is compounded half-yearly

$$\text{Hence, Rate} = \frac{R}{2}\% = 10\% \text{ per annum}$$

$$\text{Time} = 2T = 2 \times 2 = 4 \text{ years}$$

$$\Rightarrow \text{CI} = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$$

$$= 10000 \left[\left(1 + \frac{10}{100} \right)^4 - 1 \right] = \text{Rs. } 4641$$

$$39. (c); \text{ Difference between SI and CI for 2 years} = \frac{PR^2}{(100)^2}$$

$$\Rightarrow \text{Difference} = \frac{(10000)(12)^2}{(100)^2} = \text{Rs. } 144$$

$$40. (d); \text{ Difference between SI and CI for 2 years} = \frac{Pr^2}{100^2}$$

$$\text{Difference} = \frac{10000 \times 14^2}{10000} = \text{Rs. } 196$$

Moderate

1. (c); Let the original amount be Rs. P.
T = 12, R₁ = 8%, R₂ = 12%, Profit = 320

$$\frac{P \times T \times R_2}{100} - \frac{P \times T \times R_1}{100} = 320$$

$$\frac{P \times 12 \times 12}{100} - \frac{P \times 8 \times 12}{100} = 320 \Rightarrow P = \frac{2000}{3}$$

$$P = \text{Rs. } 666.67$$

2. (d); Let each instalment be Rs. A

$$A = \frac{100P}{100T + \frac{RT(T-1)}{2}} = \frac{100 \times 1092}{100 \times 3 + 36} = \text{Rs. } 325$$

3. (c); Let the sums be A and B

$$R_1 = 6, R_2 = 7, T = 2$$

$$\frac{P_1 \times R_1 \times T}{100} + \frac{P_2 \times R_2 \times T}{100} = 354$$

$$\Rightarrow \frac{A \times 6 \times 2}{100} + \frac{B \times 7 \times 2}{100} = 354 \Rightarrow 6A + 7B = 17700$$

also one fourth of the first sum is equal to one fifth of the second sum

$$\frac{A}{4} = \frac{B}{5} = 5A - 4B = 0$$

By solving the equations we get,

$$A = 1200, B = 1500$$

$$\text{Total sum} = \text{Rs. } (1200 + 1500) = \text{Rs. } 2700$$

4. (a); Let 14% amount = Rs. x

$$11\% \text{ amount} = \text{Rs. } (13900 - x)$$

$$\frac{x \times 2 \times 14}{100} + \frac{(13900 - x) \times 11 \times 2}{100} = 3508$$

$$6x = 350800 - 13900 \times 22 \Rightarrow x = 7500$$

$$\text{Scheme B} = 13900 - 7500 = \text{Rs. } 6400$$

5. (b); Let the sum be Rs. 100 and interest is calculated half-yearly.

$$\Rightarrow \text{Then, Rate} = \frac{10}{2} = 5\%, \quad \text{Time} = 2 \text{ years}$$

$$\text{Effective rate of interest} = 5 + 5 + \frac{5 \times 5}{100} = 10.25\%$$

6. (c); Let the original rate = R%

$$\text{New rate} = (2R)\%$$

$$\frac{725 \times R \times 1}{100} + \frac{362.50 \times 2R \times 1}{3 \times 100} = 33.50$$

$$\Rightarrow (2175 + 725) R = 33.50 \times 100 \times 3$$

$$\Rightarrow (2900) R = 10050 \Rightarrow R = 3.46\%$$

7. (c); CI for first 2 years

$$= 50000 \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right] = \text{Rs. } 10500$$



Amount = P + CI = 50000 + 10500 = Rs. 60500

$$SI = \frac{P \times R \times T}{100} = \frac{60500 \times 12 \times 3}{100} = \text{Rs. } 21780$$

Total amount = Rs. 82280

8. (c); Let P = 100, $A = 100 \times \frac{60}{100} + 100 = \text{Rs. } 160$

$$I = 160 - 100 = \text{Rs. } 60, R = \frac{60 \times 100}{100 \times 6} = 10\%$$

$$CI = \frac{331}{1000} \times 12000 = \text{Rs. } 3972$$

9. (b); Here, CI is calculated on half-yearly basis
Hence, Amount would be defined as:

$$A = \left[1600 \left(1 + \frac{5}{2 \times 100} \right)^2 + 1600 \left(1 + \frac{5}{2 \times 100} \right) \right]$$

$$\left(\text{Where Rate} = \frac{\text{Rate}}{2} = \frac{5}{2}\% \right)$$

$$A = \text{Rs. } \left[1600 \times \frac{41}{40} \left(\frac{41}{40} + 1 \right) \right] = \text{Rs. } 3321$$

$$CI = A - P = \text{Rs. } (3321 - 3200) = \text{Rs. } 121$$

10. (b); Let the money in first installment = Rs. x
Second installment = Rs. (35000 - x)
The principal is defined as:

$$\Rightarrow P = \frac{3600 \times 100}{12 \times 2} = \text{Rs. } 15000$$

(Using SI in scheme A)

The money in first installment = Rs. x = Rs. 15000

Scheme B = Rs. (35000 - 15000) = Rs. 20000

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

$$= 20000 \left[\left(1 + \frac{10}{100} \right)^2 - 1 \right] = \text{Rs. } 4200$$

11. (a); Let population P be 100

$$100 \xrightarrow{+10\% \uparrow} 110 \xrightarrow{+10\% \uparrow} 121 \xrightarrow{+10\% \uparrow} 133.1$$

For P = 100, increase in 3 years = 133.1

For P = 125000, increase in 3 years

$$= \frac{133.1}{100} \times 125000 = 166375$$

12. (d); Here, difference = SI = 3000 - 1500 = Rs. 1500

$$\Rightarrow \text{Rate} = \frac{1500 \times 100}{1500 \times 5} = 20\%, (P = \text{Rs. } 1500)$$

\(\Rightarrow\) Now, Rate of interest = (20 + 1)% = 21%

$$\Rightarrow \text{Hence, new SI} = \frac{1500 \times 5 \times 21}{100} = \text{Rs. } 1575$$

$$\Rightarrow \text{Amount} = \text{Principal} + \text{SI} = \text{Rs. } [1500 + 1575] = \text{Rs. } 3075$$

13. (d); Principal = $\frac{3800 \times 100}{8 \times 5} = \text{Rs. } 9500$

$$\Rightarrow CI = P \left[\left(1 + \frac{R}{100} \right)^n - 1 \right]$$

$$= 9500 \left[\left(1 + \frac{8}{100} \right)^2 - 1 \right] = \text{Rs. } 1580.8$$

14. (b); Total SI = Rs. 19550

$$19550 = \frac{P \times R_1 \times T_1}{100} + \frac{P \times R_2 \times T_2}{100} + \frac{P \times R_3 \times T_3}{100}$$

$$19550 = P \left[\frac{4 \times 3}{100} + \frac{8 \times 2}{100} + \frac{9 \times 2}{100} \right]$$

$$19550 = P \left[\frac{12}{100} + \frac{16}{100} + \frac{18}{100} \right] \Rightarrow P = \text{Rs. } 42500$$

15. (b); Let his money be 100 Rs.

After eight year it becomes 300

\(\therefore\) interest = 200

$$\text{So, Rate} = \frac{200 \times 100}{100 \times 8} = 25\%$$

$$\text{In 20 year, SI} = \frac{100 \times 25 \times 20}{100} = 500$$

So, amount = 500 + 100 = Rs. 600

Hence, from Rs. 100 to Rs. 600, it becomes 6 times

16. (b); Let amount be a, b, c respectively then,

$$\frac{a \times 4 \times 1}{100} = \frac{b \times 4 \times 2}{100} = \frac{c \times 4 \times 3}{100}$$

$$\Rightarrow a = 2b = 3c = 6K (\text{let})$$

$$\therefore a = 6K, b = 3K, c = 2K$$

so the part are in ratio 6:3:2

$$\therefore \text{Smallest part} = \frac{2189}{11} \times 2 = 199 \times 2 = \text{Rs. } 398$$

17. (c); Suppose amount invested in scheme A = x

Suppose amount invested in scheme B = y

Suppose amount invested in scheme C = z

$$\therefore x + y + z = 65000 \quad \dots(i)$$



From question

$$x = 72\% \text{ of } z = \frac{18}{25}z \quad \dots(\text{ii})$$

$$\text{So, } 12x + 16y + 18z = 1018000 \quad \dots(\text{iii})$$

$$\Rightarrow 6x + 8y + 9z = 509000$$

From (i), (ii) and (iii) get

$$\frac{43}{25}z + y = 65000 \quad \dots(\text{iv})$$

$$\frac{108}{25}z + 8y + 9z = 509000$$

$$\Rightarrow \frac{333}{25}z + 8y = 509000 \quad \dots(\text{v})$$

$$\text{From (iv) we have } \frac{344}{25}z + 8y = 520000 \quad \dots(\text{vi})$$

$$\therefore (\text{vi}) - (\text{v}) \Rightarrow \frac{11}{25}z = 11000$$

$$\therefore 11z = \text{Rs. } 275000, z = \text{Rs. } 25000$$

$$\therefore y = \text{Rs. } 22000$$

18. (a); Here, Population P = 100000

$$100000 \xrightarrow{5\% \uparrow} 105000 \xrightarrow{5\% \uparrow} 110250 \xrightarrow{5\% \uparrow} 115762.5$$

(2004) (2005) (2006) (2007)

Hence Population after 3 years is almost 115760

19. (c); This question can be solved either using statement (1) or (2)

In statement (1), it is simple formula of difference

$$= \frac{PR^2}{(100)^2}$$

In statement (2), it is simple formula of SI

20. (c); This question can be solved either using statement (1) or (2)

In statement (1), we can apply formula of SI in statement (2), we need to determine difference

$$\text{formula of } = \frac{PR^2}{(100)^2}$$

21. (c); We can solve this question using both information together.

Because, in statement I, we can find rate of interest and in statement II, we know the Principal.

22. (d); Given, $T_1 = 5 \text{ yr}$, $R_1 = 10\%$ and $T_2 = 10 \text{ yr}$ and $R_2 = 8\%$

Let the first part = x

Then, second part = (1521 - x)

Now, according to the question,

$$\frac{x \times 5 \times 10}{100} = \frac{(1521 - x) \times 10 \times 8}{100}$$

$$\Rightarrow 5x = 12168 - 8x \Rightarrow 13x = 12168, x = \text{Rs. } 936$$

and second part = $1521 - 936 = \text{Rs. } 585$

23. (d); Given, $T_1 = 2 \text{ years}$ and $T_2 = 4 \text{ years}$, $P_1 = \text{Rs. } 600$, $P_2 = \text{Rs. } 150$ and $SI_1 + SI_2 = \text{Rs. } 80$

According to the question,

$$\frac{600 \times R \times 2}{100} + \frac{150 \times R \times 4}{100} = 80$$

$$\Rightarrow 120R + 60R = 800 \Rightarrow 180R = 800$$

$$\therefore R = \frac{800}{180} = \frac{80}{18} = \frac{40}{9} = 4\frac{4}{9}\%$$

24. (c); Given, time = 42 months

$$\Rightarrow \frac{42}{12} \text{ years} = 3\frac{1}{2} \text{ years}$$

$$\Rightarrow \frac{7}{2} \times 2 = 7 \text{ half-yr, rate} = \frac{13}{2}\% \text{ half-yearly}$$

$$SI = \frac{20000 \times 13 \times 7}{100 \times 2} = \text{Rs. } 9100$$

$$\therefore \text{Amount (A)} = 20000 + 9100 = \text{Rs. } 29100$$

25. (d); Given, $R_1 = 6\%$, $R_2 = 10\%$

According to the question,

$$800 + \frac{800 \times 6 \times T}{100} = 600 + \frac{600 \times 10 \times T}{100}$$

$$800 + 48T = 600 + 60T \Rightarrow 12T = 200 \Rightarrow 3T = 50$$

$$\therefore T = \frac{50}{3} = 16\frac{2}{3} \text{ years}$$

26. (c); According to the formula,

$$\text{Annual payment} = \frac{100P}{100T + \frac{RT(T-1)}{2}}$$

$$= \frac{1092 \times 100}{100 \times 2 + \frac{24(2-1)}{2}} = \frac{1092 \times 100}{212}$$

$$= \text{Rs. } 515.09 \approx \text{Rs. } 515$$

27. (b); Given, annual payment = Rs. 160

$R = 5\%$, $T = 5 \text{ years}$, debt (P) = ?

According to the formula,

$$\text{Annual payment} = \frac{100P}{100T + \frac{RT(T-1)}{2}}$$

$$\Rightarrow 160 = \frac{100P}{5 \times 100 + \frac{5 \times 4 \times 5}{2}} \Rightarrow 160 = \frac{100P}{550}$$

$$\therefore P = \frac{550 \times 160}{100} = 55 \times 16 = \text{Rs. } 880$$



28. (b); Given that, $P = 370440$, $R = 5\%$ and $n = 3$ years
According to the formula,

$$\text{Population } n \text{ years ago} = \frac{P}{\left(1 + \frac{R}{100}\right)^n}$$

$$\text{Population 3 years ago} = \frac{370440}{\left(1 + \frac{5}{100}\right)^3} = \frac{370440}{\left(\frac{21}{20}\right)^3}$$

$$= \frac{370440 \times 20 \times 20 \times 20}{21 \times 21 \times 21} = \frac{370440 \times 8000}{9261}$$

$$= 40 \times 8000 = 320000$$

29. (c); Population of particular area P of a city = 5000

In 1st year population got increased by 10%

$$\therefore \text{Population } P_1 = 5000 + 10\% \text{ of } 5000 = 5500$$

In 2nd year population decreased by 20%

$$\therefore \text{Population } P_2 = 5500 - 20\% \text{ of } 5500$$

$$= 5500 - \frac{20}{100} \times 5500 = 4400$$

In 3rd year population increased by 30%

$$\text{Population } P_3 = 4400 + 30\% \text{ of } 4400$$

$$= 4400 + \frac{30}{100} \times 4400 = 5720$$

30. (c); Given that cost of a car, $P = \text{Rs. } 400000$
 \Rightarrow Decreasing rate = 10%, year = 3 years

$$\Rightarrow \text{Price of car after 3 years} = P \left(1 - \frac{R}{100}\right)^3$$

$$= 400000 \left(1 - \frac{10}{100}\right)^3 = 400000 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10}$$

$$= \text{Rs. } 291600$$

31. (b); Let the sum borrowed be Rs. P

Rate of interest = $R\%$

CI = Rs. 110, SI = Rs. 100, Time (t) = 2 years

$$\text{CI} - \text{SI} = 110 - 100 = 10$$

$$\Rightarrow \text{Difference} = \frac{PR^2}{(100)^2} \Rightarrow 10 = \frac{PR^2}{(100)^2} \dots(i)$$

$$\Rightarrow \text{Difference} = \frac{\text{SI} \times R}{200}$$

$$10 = \frac{100 \times R}{200}; R = 20\% \dots(ii)$$

Put value (ii) in (i)

$$\Rightarrow 10 = \frac{P(20)^2}{(100)^2}; P = \text{Rs. } 250$$

32. (b); Let the sum be Rs. P

According to given question:

$$\Rightarrow P \left(1 + \frac{R}{100}\right)^n > 2P \Rightarrow P \left(1 + \frac{20}{100}\right)^n > 2P$$

$$\Rightarrow \left(\frac{6}{5}\right)^n > 2 \text{ By hit and trial method, } n > 4 \text{ years}$$

33. (c); Given, $P = 10$ crore
and population after 3 years = 13.31 crore
According to the formula,

$$\text{Population after } n \text{ year} = P \left(1 + \frac{R}{100}\right)^n$$

$$\Rightarrow 13.31 = 10 \left(1 + \frac{R}{100}\right)^3 \Rightarrow \frac{1331}{1000} = \left(1 + \frac{R}{100}\right)^3$$

$$\Rightarrow \left(\frac{11}{10}\right)^3 = \left(1 + \frac{R}{100}\right)^3 \Rightarrow 1 + \frac{R}{100} = \frac{11}{10}$$

$$\Rightarrow \frac{R}{100} = \frac{11}{10} - 1 = \frac{1}{10} \therefore R = 10\%$$

34. (a); Initial income of Hemant, $P = \text{Rs. } 4000$

Let r_1 (rate of decrease) = 10%,

r_2 (rate of decrease) = 5%, r_3 (rate of growth) = 15%

So, Net final

$$\text{Income} = P \left(1 - \frac{r_1}{100}\right) \left(1 - \frac{r_2}{100}\right) \left(1 + \frac{r_3}{100}\right)$$

$$= 4000 \left(1 - \frac{10}{100}\right) \left(1 - \frac{5}{100}\right) \left(1 + \frac{15}{100}\right)$$

$$= 4000 \times \frac{9}{10} \times \frac{19}{20} \times \frac{23}{20} = \text{Rs. } 3933$$

35. (a); Let the installment in each part be Rs. P

According to question:

$$\Rightarrow \frac{P}{\left(1 + \frac{R}{100}\right)} + \frac{P}{\left(1 + \frac{R}{100}\right)^2} = \text{Rs. } 5100$$

$$\Rightarrow \frac{P}{\left(1 + \frac{4}{100}\right)} + \frac{P}{\left(1 + \frac{4}{100}\right)^2} = 5100$$

$$\frac{25P}{26} + \frac{625}{676} P = 5100 \Rightarrow 1275P = 5100 \times 676$$

$$P = \frac{5100 \times 676}{1275} = \text{Rs. } 2704$$



36. (a); Let the first part be Rs. a
Second part Rs. (2602 - a)
According to question:
Amount after 7 years = Amount after 9 years

$$\Rightarrow a\left(1 + \frac{r}{100}\right)^7 = (2602 - a)\left(1 + \frac{r}{100}\right)^9$$

$$\Rightarrow \frac{a}{(2602 - a)} = \left(1 + \frac{4}{100}\right)^2$$

$$\Rightarrow \frac{a}{(2602 - a)} = \frac{26}{25} \times \frac{26}{25} = \frac{676}{625}$$

$$\Rightarrow 625a = 676(2602 - a)$$

$$\Rightarrow a = \frac{676 \times 2602}{1301} = \text{Rs. } 1352$$

Second part = Rs. (2602 - a) = Rs. 1250

37. (b); Let rate = R% and time = n year

$$\text{Then, } 4320 = 3000\left(1 + \frac{R}{100}\right)^n$$

$$\Rightarrow \left(1 + \frac{R}{100}\right)^n = \frac{4320}{3000} = 1.44$$

$$\therefore \left(1 + \frac{R}{100}\right)^{\frac{n}{2}} = \sqrt{1.44} = 1.2$$

\(\therefore\) Required amount for $\frac{n}{2}$ year

$$= 3000\left(1 + \frac{R}{100}\right)^{\frac{n}{2}} = 3000 \times 1.2 = \text{Rs. } 3600$$

38. (a); Let the principal be Rs. P
If CI is compounded half-yearly,

$$\Rightarrow CI = P\left[\left(1 + \frac{10}{100}\right)^4 - 1\right]$$

(where $R = \frac{R}{2}\%$ p.a. and $T = 2T$ years)

$$\Rightarrow CI = P\left[\left(\frac{11}{10}\right)^4 - 1\right] = \frac{4641P}{10000}$$

If CI is compounded annually,

$$\Rightarrow CI = P\left[\left(1 + \frac{20}{100}\right)^2 - 1\right] = \frac{11P}{25}$$

According to question:

$$\Rightarrow \frac{4641P}{10000} - \frac{11P}{25} = 964$$

$$\Rightarrow P = \frac{964 \times 10000}{241} = \text{Rs. } 40000$$

39. (c); Let shares of X and Y be Rs. x and Rs. (8448 - x), respectively.

Amount got by X after 3 years = Amount got by Y after 2 years

$$x\left(1 + \frac{6.25}{100}\right)^3 = (8448 - x)\left(1 + \frac{6.25}{100}\right)^2$$

$$\Rightarrow 1 + \frac{6.25}{100} = \frac{8448 - x}{x} \Rightarrow 1 + \frac{1}{16} = \frac{8448 - x}{x}$$

$$\Rightarrow \frac{17}{16} = \frac{8448 - x}{x} \Rightarrow 17x = 135168 - 16x \Rightarrow$$

$$x = \text{Rs. } 4096$$

40. (b); Let the population at beginning of first year be 'a'
So, according to question:

$$\Rightarrow a\left[1 + \frac{5}{100}\right] \times \left[1 - \frac{5}{100}\right] = 47880$$

$$\Rightarrow a \times \left[\frac{21}{20}\right] \times \left[\frac{19}{20}\right] = 47880$$

$$\Rightarrow a = \frac{47880 \times 20 \times 20}{21 \times 19} = \text{Rs. } 48000$$

