

Chapter 2 Compound Interest

COMPOUND INTEREST.

EXERCISE - 2.1

Solution - 01.

Principal for the first year = ₹8,000.

$$\begin{aligned}\text{Interest for the first year} &= \frac{₹8,000 \times 5 \times 1}{100} \\ &= ₹400\end{aligned}$$

$$\begin{aligned}\text{Amount after one year} &= ₹8,000 + ₹400 \\ &= ₹8,400.\end{aligned}$$

$$\text{Interest for the second year} = \frac{₹8,400 \times 5 \times 1}{100}$$

$$\begin{aligned}\text{Amount after second year} &= ₹8,400 + ₹420 \\ &= ₹8,820.\end{aligned}$$

$$\begin{aligned}\text{Compound Interest after two years} &= \text{final amount} - \\ &\quad \text{Principal} \\ &= ₹8,820 - ₹8,000 \\ &= ₹820.\end{aligned}$$

Solution - 02.

Principal for the first year = ₹46,875.

Rate of interest = 4%.

$$\begin{aligned}\text{(i) Interest for the first year} &= \frac{₹46,875 \times 4 \times 1}{100} \\ &= ₹1,875\end{aligned}$$

$$\begin{aligned}\text{Amount after one year} &= ₹46,875 + ₹1,875 \\ &= ₹48,750.\end{aligned}$$

$$\begin{aligned} \text{(ii) interest for the second year} &= \frac{\text{₹} 48,750 \times 4 \times 1}{100} \\ &= \text{₹} 1,950 \end{aligned}$$

the amount standing to his credit at the end of
second year = ₹ 48,750 + ₹ 1,950
= ₹ 50,700.

$$\begin{aligned} \text{(iii) Interest for the third year} &= \frac{\text{₹} 50,700 \times 4 \times 1}{100} \\ &= \text{₹} 2,028 \end{aligned}$$

Solution-03.

Principal for the first year = ₹ 8,000

Rate of Interest = 10%

$$\begin{aligned} \text{Interest for the first year} &= \frac{\text{₹} 8,000 \times 10 \times 1}{100} \\ &= \text{₹} 800 \end{aligned}$$

$$\begin{aligned} \text{Amount after one year} &= \text{₹} 8,000 + \text{₹} 800 \\ &= \text{₹} 8,800 \end{aligned}$$

$$\begin{aligned} \text{Interest for the second year} &= \frac{\text{₹} 8,800 \times 10 \times 1}{100} \\ &= \text{₹} 880 \end{aligned}$$

$$\begin{aligned} \text{Amount after second year} &= \text{₹} 8,800 + \text{₹} 880 \\ &= \text{₹} 9,680 \end{aligned}$$

$$\begin{aligned} \text{Compound interest for the second year} &= \text{₹} 800 + \text{₹} 880 \\ &= \text{₹} 1,680 \end{aligned}$$

$$\text{Interest for the third year} = \frac{₹9,680 \times 10 \times 1}{100}$$
$$= ₹968.$$

$$\text{Sum due at the end of the third year} = ₹9,680 + ₹968$$
$$= ₹10,648.$$

Solution-04:

$$\text{Principal for the first year} = ₹12,800$$

$$\text{Rate of Interest} = 10\%$$

$$\text{Interest for the first year} = \frac{₹12,800 \times 10 \times 1}{100}$$
$$= ₹1,280.$$

(i) Amount at the end of first year = ₹12,800 + ₹1,280

$$= ₹14,080.$$

(ii) Interest for the second year = $\frac{₹14,080 \times 10 \times 1}{100}$

$$= ₹1,408.$$

$$\text{Amount at the end of second year} = ₹14,080 + ₹1,408$$
$$= ₹15,488.$$

$$\text{Interest for the third year} = \frac{₹15,488 \times 10 \times 1}{100}$$
$$= ₹1,548.8.$$

(iii) the total amount due to him at the end of three years = ₹15,488 + ₹1,548.8

$$= ₹17,036.8.$$

solution-05

Interest for 2 years = ₹1380

$$\Rightarrow \frac{P \times R \times T}{100} = ₹1380$$

$$\Rightarrow 24P = ₹138000$$

$$\Rightarrow \text{sum of money} = \frac{₹1,38,000}{24}$$
$$= ₹5,750.$$

Principal for the first half year = ₹5,750

$$\text{Interest for the first half year} = \frac{₹5,750 \times 6 \times 1}{100}$$
$$= ₹57.5 \times 6$$
$$= ₹345.$$

Amount after the first half year = ₹5,750 + ₹345

$$= ₹6,095$$

$$\text{Interest for the second half year} = \frac{₹6,095 \times 6 \times 1}{100}$$
$$= ₹60.95 \times 6$$
$$= ₹365.7.$$

∴ Compound Interest on this sum for one year payable half yearly at the same rate = ₹345 + ₹365.7

$$= ₹710.70$$

Solution-06:-

Principal for the first year = 10,000.

Amount after one year = ₹ 11,200

Interest for the first year = ₹ 11,200 - ₹ 10,000
= ₹ ~~1~~200

Rate of Interest for the first year = ?

$$\text{Interest for the first year} = \frac{10,000 \times r \times 1}{100}$$

$$\Rightarrow \frac{1200 \times 100}{10000} = r$$

$$\Rightarrow r = 12\%$$

Interest for the second year = $\frac{11,200 \times 12 \times 1}{100}$
= ₹ 112 × 12
= ₹ 1,344.

Amount at the end of second year = ₹ 11,200 + ₹ 1,344.
= ₹ 12,544.

Solution-07.

Principal for the first year = ₹ 5,000.

Amount after one year = ₹ 5,600

Interest for first year = ₹ 5,600 - ₹ 5,000

$$\Rightarrow \frac{5,000 \times r \times 1}{100} = ₹ 600$$

$$\Rightarrow ₹ 50 r = ₹ 600$$

① \Rightarrow Rate of Interest = 12%

$$(ii) \text{ Interest accrued in the second year} = \frac{₹5,600 \times 12 \times 1}{100}$$

$$= ₹672.$$

$$\text{Amount after second year} = ₹5,600 + ₹672$$

$$= ₹6,272$$

$$(iii) \text{ Interest for the third year} = \frac{₹6,272 \times 12 \times 1}{100}$$

$$= ₹62.72 \times 12$$

$$= ₹752.64$$

$$\text{Amount after third year} = ₹6,272 + ₹752.64$$

$$= ₹7,024.64$$

Solution -08:

$$\text{Principal for the first year} = ₹2,000.$$

$$\text{Interest for the first } \frac{\text{half}}{\text{year}} = \frac{₹2,000 \times 10 \times 1}{100}$$

$$= \frac{₹2,000 \times 2}{20}$$

$$= ₹200.$$

$$\text{Amount after first half year} = ₹2,000 + ₹200$$

$$= ₹2,200.$$

$$\text{Interest for the second half year} = \frac{₹2,200 \times 10 \times 1}{100}$$

$$= ₹220.$$

$$\text{Amount after second half year} = ₹2,200 + ₹220$$

$$= ₹2,420.$$

$$2420.$$

Interest for the second-half $2\frac{1}{2}$ year

$$= \frac{2420 \times 5 \times 1}{100}$$
$$= ₹ 121.$$

$$\therefore \text{compound interest after } 2\frac{1}{2} \text{ years} = ₹ 200 + ₹ 220$$
$$+ ₹ 121$$
$$= ₹ 541.$$

$$\text{Amount to be paid after } 2\frac{1}{2} \text{ years} = ₹ 2,000 + ₹ 541$$
$$= ₹ 2,541.$$

Solution-09.

Principal for the first half year = ₹ 50,000

$$\text{Interest for the first half year} = \frac{₹ 50,000 \times 4 \times 1}{100}$$
$$= ₹ 2,000.$$

$$\text{Amount after the first half year} = ₹ 50,000 + ₹ 2,000$$
$$= ₹ 52,000.$$

Principal for the second half year = ₹ 52,000

$$\text{Interest for the second half year} = \frac{₹ 52,000 \times 4 \times 1}{100}$$
$$= ₹ 520 \times 4$$
$$= ₹ 2,080.$$

$$\text{Amount after the second half year} = ₹ 52,000 +$$
$$₹ 2,080$$
$$= ₹ 54,080.$$

Principal for third year = ₹ 54,080.

Solution-10.

Given that $A = 9261$, $n = 3$ & $r = 5$

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

$$9261 = P \left(1 + \frac{5}{100} \right)^3$$

$$9261 = P \left(1 + \frac{1}{20} \right)^3$$

$$9261 = P \left(\frac{21}{20} \right)^3$$

$$\frac{9261 \times 20 \times 20 \times 20}{21 \times 21 \times 21} = P$$

$$\therefore P = \frac{9261 \times 8000}{9261}$$

~~Principal = ₹ 8,000.~~

Solution-11:

Given that $A = 7,803$, $n = 2$, $r = 2$

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

$$7803 = P \left(1 + \frac{2}{100} \right)^2$$

$$7803 = P \left(1 + \frac{1}{50} \right)^2$$

$$7803 = \frac{P \times 51 \times 51}{50 \times 50}$$

$$P = \frac{19,507,500}{2500}$$

$$\therefore P = 7,500.$$

$$\begin{aligned} \text{Interest for the third half year} &= \frac{\text{₹}54080 \times 4 \times 1}{100} \\ &= \text{₹}540.8 \times 4 \\ &= \text{₹}2163.2 \end{aligned}$$

$$\begin{aligned} \text{Amount after third half year} &= \text{₹}54,080 + \text{₹}2,163.2 \\ &= \text{₹}56,243.20. \end{aligned}$$

$$\begin{aligned} \therefore \text{Compound Interest for } 1\frac{1}{2} \text{ years} &= \text{₹}56,243 - \text{₹}50,000 \\ &= \text{₹}6,243. \end{aligned}$$

Solution-10:

$$\text{Principal amount for the first year} = \text{₹}5,000.$$

$$\text{Interest for the first year} = \frac{\text{₹}5,000 \times 6 \times 1}{100}$$

$$= \text{₹}50 \times 6$$

$$= \text{₹}300.$$

$$\begin{aligned} \text{Amount after first year} &= \text{₹}5,000 + \text{₹}300 \\ &= \text{₹}5,300. \end{aligned}$$

$$\text{Interest for the second year} = \frac{\text{₹}5,300 \times 8 \times 1}{100}$$

$$= \text{₹}53 \times 8$$

$$= \text{₹}424.$$

$$\begin{aligned} \therefore \text{Amount after second year} &= \text{₹}5,300 + \text{₹}424 \\ &= \text{₹}5,724. \end{aligned}$$

$$\begin{aligned} \text{Compound Interest for 2 years} &= \text{₹}5,724 - \text{₹}5,000 \\ &= \text{₹}724. \end{aligned}$$

Solution- 11

Principal for the first half year = ₹17,000.

$$\begin{aligned}\text{Interest for the first year @ 10\%} &= \frac{₹17,000 \times 10 \times 1}{100} \\ &= ₹1,700.\end{aligned}$$

$$\begin{aligned}\text{Amount after first year} &= ₹17,000 + ₹1,700 \\ &= ₹18,700.\end{aligned}$$

$$\begin{aligned}\text{Interest for the second year @ 10\%} &= \frac{₹18,700 \times 10 \times 1}{100} \\ &= ₹1,870.\end{aligned}$$

$$\begin{aligned}\text{Amount after second year} &= ₹18,700 + ₹1,870 \\ &= ₹20,570.\end{aligned}$$

$$\begin{aligned}\text{Interest for the third year @ 14\%} &= \frac{₹20,570 \times 14 \times 1}{100} \\ &= ₹2,879.8.\end{aligned}$$

$$\begin{aligned}\text{Amount after third year} &= ₹20,570 + ₹2,879.8 \\ &= ₹23,449.8.\end{aligned}$$

$$\begin{aligned}\text{Compound Interest after three years} &= \frac{23,449.8}{23,449.8} - \frac{17,000}{17,000} \\ &= 6,449.80.\end{aligned}$$

Solution-12.

Principal for the first year = ₹9,600.

$$\begin{aligned}\text{Interest for the first year} &= \frac{\text{₹}9,600 \times 10 \times 1}{100} \\ &= \text{₹}960.\end{aligned}$$

$$\begin{aligned}\text{(i) sum due at the end of first year} &= \text{₹}9,600 + \text{₹}960 \\ &= \text{₹}10,560.\end{aligned}$$

$$\begin{aligned}\text{Interest for the second year} &= \frac{\text{₹}10,560 \times 10 \times 1}{100} \\ &= \text{₹}1,056.\end{aligned}$$

$$\begin{aligned}\text{(ii) sum due at the end of second year} &= \text{₹}10,560 \\ &\quad + \text{₹}1,056 \\ &= \text{₹}11,626.\end{aligned}$$

$$\begin{aligned}\text{(iii) Compound Interest earned in 2 years} &= \text{₹}11,626 - \text{₹}9,600 \\ &= \text{₹}2,026.\end{aligned}$$

$$\begin{aligned}\text{(iv) diff. of (ii) and (i)} &= 11,626 - 10,560 \\ &= \text{₹}1,056.\end{aligned}$$

$$\begin{aligned}\text{Interest for difference of amount for one} & \\ \text{year} &= \frac{\text{₹}1,056 \times 10 \times 1}{100} \\ &= \text{₹}105.60\text{Ps.}\end{aligned}$$

$$\begin{aligned}\text{Compound Interest for third year} &= ₹ 1056 + ₹ 105.6 \\ &= ₹ 1161.60.\end{aligned}$$

Solution-13:

Simple interest on certain money for 2 years

$$\text{@ } 10\% \text{ is } = 1,600$$

$$\Rightarrow \frac{x \times 10 \times 2}{100} = 1,600$$

$$\Rightarrow x = 8,000.$$

$$\text{Principal} = ₹ 8,000.$$

$$\begin{aligned}\text{Interest for the first year} &= \frac{₹ 8,000 \times 10 \times 1}{100} \\ &= ₹ 800.\end{aligned}$$

$$\begin{aligned}\text{Amount to be paid after one year} &= ₹ 8,000 + ₹ 800 \\ &= ₹ 8,800.\end{aligned}$$

$$\begin{aligned}\text{Interest for the second year} &= \frac{₹ 8,800 \times 10 \times 1}{100} \\ &= \frac{₹ 8800}{10} = ₹ 880\end{aligned}$$

$$\begin{aligned}\text{Amount after second year} &= ₹ 8800 + ₹ 880 \\ &= ₹ 9,680.\end{aligned}$$

$$\begin{aligned}\text{Interest for the third year} &= \frac{₹ 9,680 \times 10 \times 1}{100} \\ &= ₹ 968.\end{aligned}$$

$$\begin{aligned}\text{Amount after three year} &= 9,680 + ₹ 968 \\ &= ₹ 10,648.\end{aligned}$$

$$\begin{aligned}\text{Compound Interest for three year} &= ₹ 800 + ₹ 880 \\ &\quad + ₹ 968 \\ &= ₹ 2,648.\end{aligned}$$

Solution-14:

$$\text{Principal for the first year} = ₹ 6,000.$$

$$\begin{aligned}\text{Interest for the first year} &= \frac{₹ 6,000 \times 5 \times 1}{100} \\ &= ₹ 300.\end{aligned}$$

$$\text{Amount after first year} = ₹ 6,300$$

$$\text{Money repaid} = ₹ 1,200.$$

$$\begin{aligned}\text{Principal for the second year} &= ₹ 6,300 - 1,200 \\ &= ₹ 5,100.\end{aligned}$$

$$\begin{aligned}\text{Interest for the second year} &= \frac{₹ 5,100 \times 5 \times 1}{100} \\ &= ₹ 255.\end{aligned}$$

$$\begin{aligned}\text{Principal Amount after second year} &= ₹ 5,100 + ₹ 255 \\ &= ₹ 5,355\end{aligned}$$

$$\begin{aligned}\text{Amount outstanding at the beginning of third year} &= ₹ 5,355 - 1,200 \\ &= ₹ 4,155.\end{aligned}$$

Solution-15:

Principal for the first year = ₹1,00,000

$$\begin{aligned}\text{Interest for the first year} &= \frac{\text{₹1,00,000} \times 11 \times 1}{100} \\ &= \text{₹11,000}\end{aligned}$$

$$\begin{aligned}\text{Amount after one year} &= \text{₹1,00,000} + \text{₹11,000} \\ &= \text{₹1,11,000}\end{aligned}$$

Money repaid after one year = ₹41,000

$$\begin{aligned}\text{Principal for second year} &= \text{₹1,11,000} - \text{₹41,000} \\ &= \text{₹70,000}\end{aligned}$$

$$\begin{aligned}\text{Interest for the second year} &= \frac{\text{₹70,000} \times 11 \times 1}{100} \\ &= \text{₹7,700}\end{aligned}$$

$$\begin{aligned}\text{Amount after second year} &= \text{₹70,000} + \text{₹7,700} \\ &= \text{₹77,700}\end{aligned}$$

$$\begin{aligned}\text{Principal for third year} &= \text{₹77,700} - \text{₹47,700} \\ &= \text{₹30,000}\end{aligned}$$

Amount = ₹30,000

Solution - 16 :-

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

$$= \frac{₹20,000 \times 2.5 \times 10}{100}$$

$$= ₹200 \times 2.5$$

$$= ₹5,000.$$

Compounded for friend

$$\text{Interest for the first year} = \frac{₹20,000 \times 10 \times 10}{100}$$

$$= ₹2,000.$$

$$\text{Amount after one year} = ₹20,000 + ₹2,000$$
$$= ₹22,000.$$

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$$\text{Interest after the second year} = \frac{₹22,000 \times 10 \times 10}{100}$$

$$= ₹2,200.$$

$$\text{Amount after second year} = ₹22,000 + ₹2,200$$
$$= ₹24,200.$$

$$\text{Interest for second year 6 months} = \frac{₹24,200 \times 5 \times 10}{100}$$

$$= ₹1,210.$$

$$\therefore \text{Total amount} = 24,200 + 1,210$$
$$= 25,410.$$

$$\therefore \text{Gain} = 25,410 - 25,000 = ₹410$$

EXERCISE-2.2.

Solution-01:

Using the formula, we get

$$A = ₹ 5,000 \left(1 + \frac{6}{100} \right)^2$$

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

$$= ₹ 5,000 \times \left(\frac{106}{100} \right)^2$$

$$= ₹ 5,000 \times \frac{53 \times 53}{50 \times 50}$$

$$= ₹ 2 \times 53 \times 53$$

$$= ₹ 106 \times 53$$

$$= ₹ 5,618.$$

$$C.I = ₹ 5,618 - ₹ 5,000 = ₹ 618.$$

Solution-02:

Using formula, we get

$$A = ₹ 8,000 \left(1 + \frac{10}{100} \right)^4$$

$$= ₹ 8,000 \left(1 + \frac{1}{10} \right)^4$$

$$= ₹ 8,000 \left(\frac{10+1}{10} \right)^4$$

$$= ₹ 8,000 \left(\frac{11}{10} \right)^4$$

$$= ₹ 8,000 \times \frac{11 \times 11 \times 11 \times 11}{10 \times 10 \times 10 \times 10}$$

$$= \frac{58,564}{5}$$

$$= ₹ 11,712.8$$

$$C.I = ₹ 11,712.8 - ₹ 8,000 = ₹ 3,712.80$$

Solution-03:

Since, rate of interest per annum is 5%, therefore,

rate of interest per conversion (half yearly) = 2.5%

As the money compounded half yearly,

number of conversion periods = 2

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

$$= ₹7,400 \left(1 + \frac{2.5}{100} \right)^2$$

$$= ₹7,400 \left(1 + \frac{1}{40} \right)^2$$

$$= ₹7,400 \left(\frac{40+1}{40} \right)^2$$

$$= ₹7,400 \times \frac{41 \times 41}{40 \times 40}$$

$$= 7774.625$$

$$\therefore \text{Amount} = 7774.625$$

Solution-04.

Since, rate of interest per annum 10%, therefore rate of interest per conversion = 5%.

As the money compounded semi annually,

n (number of conversion periods) = 3

$$\begin{aligned} A &= P \left(1 + \frac{r}{100} \right)^n \\ &= 5,000 \left(1 + \frac{5}{100} \right)^3 \\ &= 5,000 \left(1 + \frac{1}{20} \right)^3 \\ &= 5,000 \left(\frac{21}{20} \right)^3 \\ &= \frac{5,000 \times 21 \times 21 \times 21}{20 \times 20 \times 20} = \frac{2.5 \times 21 \times 21 \times 21}{4} \\ &= 5,788.125 \end{aligned}$$

$$\begin{aligned} \text{Compound Interest} &= 5,788.125 - 5,000 \\ &= 788.125 \end{aligned}$$

Solution-05:

Since, the rate of interest per 12 months (annum), therefore rate of interest per conversion = $\frac{1}{4} \times 4\%$
= 1%.

As the money compounded quarterly

n (number of conversions) = $\frac{9}{3}$

= 3.

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

$$\begin{aligned}
 A &= 10,000 \left(1 + \frac{1}{100} \right)^3 \\
 &= 10000 \left(\frac{100+1}{100} \right)^3 \\
 &= \cancel{10,000} \times \frac{101 \times 101 \times 101}{\cancel{100} \times \cancel{100} \times 100} \\
 &= ₹ 103030.10.
 \end{aligned}$$

$$\begin{aligned}
 \text{Compound Interest} &= 103,030.10 - 1,00,000 \\
 &= ₹ 3,030.10.
 \end{aligned}$$

Solution-06:

$$\text{Principal} = 4,800, n = 2 \text{ \& } R = 5\%$$

$$\begin{aligned}
 \text{Simple Interest} &= \frac{P \times n \times R}{100} \\
 &= \frac{4800 \times 2 \times 5}{100} \\
 &= ₹ 480.
 \end{aligned}$$

$$\begin{aligned}
 A &= \left(1 + \frac{5}{100} \right)^n P \\
 &= 4,800 \left(1 + \frac{5}{100} \right)^2 \\
 &= 4,800 \left(1 + \frac{1}{20} \right)^2 \\
 &= 4,800 \left(\frac{20+1}{20} \right)^2 \\
 &= \frac{4800 \times 21 \times 21}{20 \times 20} \\
 &= ₹ 12 \times 21 \times 21 = 5,292.
 \end{aligned}$$

$$CI = 5,292 - 4,800 = 492.$$

$$\therefore \text{Difference} = ₹ 492 - ₹ 480 = ₹ 12 (CI - SI)$$

Solution-07:

Principal = ₹2,500, $n=2$ and $R=4\%$ per annum.

$$\begin{aligned}\text{Simple Interest} &= \frac{P \times N \times R}{100} \\ &= \frac{2,500 \times 2 \times 4}{100} \\ &= ₹200.\end{aligned}$$

Given that compound interest reckoned semi annually, therefore $n=4$ & $R = \frac{4}{2} = 2\%$.

$$\begin{aligned}A &= ₹2,500 \left(1 + \frac{2}{100}\right)^4 & \left| \begin{array}{l} A = P \left(1 + \frac{r}{100}\right)^n \\ A = 2,500 \left(1 + \frac{2}{100}\right)^4 \\ A = 2,500 \left(\frac{51}{50}\right)^4 \\ A = \frac{2,500 \times 51 \times 51 \times 51 \times 51}{50 \times 50 \times 50 \times 50} \\ A = \frac{6,765,201}{2500} \\ A = ₹2,706.80 \end{array} \right.\end{aligned}$$

$$\begin{aligned}\text{Compound Interest} &= 2,706.80 - 2,500 \\ &= ₹206.80.\end{aligned}$$

∴ Difference between simple interest & compound interest is

$$\begin{aligned}CI - SI &= 206.80 - 200 \\ &= ₹6.80\end{aligned}$$

Solution-08:-

Given that.

Principal for the first year = ₹2,000.

$$\begin{aligned}\text{Interest for the first year} &= \frac{2,000 \times 1 \times 4}{100} \\ &= ₹80.\end{aligned}$$

Principal for the second year = ₹2,080.

$$\begin{aligned}\text{Interest for the second year} &= \frac{2,080 \times 1 \times 3}{100} \\ &= 62.40.\end{aligned}$$

$$\begin{aligned}\text{Compound Interest} &= ₹80 + ₹62.40 \\ &= ₹142.40.\end{aligned}$$

Solution-09

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$$\begin{aligned}A &= P \left(1 + \frac{r_1}{100}\right) \left(1 + \frac{r_2}{100}\right) \left(1 + \frac{r_3}{100}\right) \\ &= 3,125 \left(1 + \frac{4}{100}\right) \left(1 + \frac{5}{100}\right) \left(1 + \frac{6}{100}\right) \\ &= 3,125 \left(1 + \frac{1}{25}\right) \left(1 + \frac{1}{20}\right) \left(1 + \frac{3}{50}\right) \\ &= \frac{3,125 \times 26 \times 21 \times 53}{4 \times 3} \\ &= \frac{14,469}{4} \\ &= 3,617.25.\end{aligned}$$

$$\therefore \text{Compound Interest} = 3,617.25 - 3,125 = ₹492.25$$

Solution-12:

Given that $A = 132651$, $n = 3$, $r = 2$

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

$$132651 = P \left(1 + \frac{2}{100} \right)^3$$

$$\Rightarrow P \left(1 + \frac{2}{100} \right)^3 = 132651$$

$$\Rightarrow \frac{P \times 51 \times 51 \times 51}{50 \times 50 \times 50} = 132651$$

$$\Rightarrow P = \frac{132651 \times 50 \times 50 \times 50}{51 \times 51 \times 51}$$

$$\Rightarrow P = \frac{132651 \times 125000}{132651}$$

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 $\Rightarrow P = 1,25,000.$

Solution-13:

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

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

$$= P \left(1 + \frac{1}{25} \right)^2$$

$$= \frac{P \times 26 \times 26}{25 \times 25}$$

$$CI = \frac{26 \times 26}{25 \times 25} (P) - P = \frac{676P - 625P}{625}$$

$$\Rightarrow CI = \frac{51P}{625}$$

$$\Rightarrow 5,712 = \frac{51P}{625}$$

$$\Rightarrow \frac{5,712 \times 625}{51} = P$$

$$\Rightarrow P = 70,000.$$

Solution-14:

$$A = 1275, P = 1200, n = 1 \text{ \& } R = ?$$

$$1275 = 1200 \left(1 + \frac{R}{100}\right)^n$$

$$\frac{1275}{1200} = \frac{100 + R}{100}$$

$$\Rightarrow R = \frac{1275}{12} - 100$$

$$\Rightarrow R = \frac{75}{12}$$

$$\Rightarrow R = 6.25\%$$

$$\text{CI for second year} = \frac{1275 \times 1 \times 6.25}{100}$$

$$= \frac{7968.75}{100}$$

$$= 79.68$$

Compound interest for second year

$$= ₹80.$$

Solution-15

Given that $A=2500$, $P=2304$, $n=2$ & $R=?$.

$$2500 = 2304 \left(1 + \frac{r}{100}\right)^2$$

$$\frac{2500}{2304} = \left(1 + \frac{r}{100}\right)^2$$

$$\Rightarrow \frac{100+r}{100} = \sqrt{\frac{2500}{2304}}$$

$$\Rightarrow \frac{100+r}{100} = \sqrt{\left(\frac{50}{48}\right)^2}$$

$$\Rightarrow 100+r = \frac{100 \times 50}{48}$$

$$\Rightarrow r = \frac{5000}{48} - 100$$

$$\Rightarrow r = \frac{5000 - 4800}{4800}$$

$$\Rightarrow r = \frac{200}{4800}$$

$$\Rightarrow r = \frac{1}{24}\%$$

$$\Rightarrow r = 4.16\%$$

$$\Rightarrow r = 4\frac{1}{6}\%$$

Solution-16:

Given that

$$A = \frac{25}{16} P, \quad n = 2 \text{ \& } r = 9.$$

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

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

$$\Rightarrow \frac{100+r}{100} = \sqrt{\frac{25}{16}}$$

$$\Rightarrow \frac{100+r}{100} = \frac{5}{4}$$

$$\Rightarrow r = 125 - 100$$

$$\Rightarrow r = 25\%$$

Solution-17:

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

$$\Rightarrow 2315.25 = 2,000 \left(1 + \frac{r}{100} \right)^3$$

$$\Rightarrow \frac{2315.25}{2000} = \left(\frac{100+r}{100} \right)^3$$

$$\Rightarrow \sqrt[3]{\frac{2.31525}{2.000}} = \frac{100+r}{100} \Rightarrow 2315.25 \times 100 \times 5 = (100+r)^3$$

$$\Rightarrow \sqrt[3]{2315.25 \times 500} = 100+r$$

$$\Rightarrow \sqrt[3]{1157625} = 100+r$$

$$\Rightarrow \sqrt[3]{105^3} = 100+r$$

$$\Rightarrow r = 105 - 100 = 5\%$$

Solution-18:

$$A = 48620.25, P = 40,000, r = \frac{R}{2}, n = 2 \times 2 = 4$$

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

$$\Rightarrow 48,620.25 = 40,000 \left(1 + \frac{R}{200}\right)^4$$

$$\Rightarrow \left(\frac{100+R}{200}\right)^4 = \frac{48,620.25}{40,000}$$

$$\Rightarrow [(200+R)^2]^2 = \frac{48,620.25 \times 200 \times 200 \times 200 \times 200}{40,000}$$

$$\Rightarrow (200+R)^2 = \sqrt[4]{(220.5)^2 (200)^2}$$

$$\Rightarrow 200+R = \sqrt[2]{200 \times 220.5}$$

$$\Rightarrow R = 20 - 0.00$$

$$\Rightarrow R = 10\%$$

Solution-19:

$$G/T \quad A = \frac{216}{125} P, n = 3.$$

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

$$\Rightarrow \frac{216}{125} P = P \left(1 + \frac{Rr}{100}\right)^3$$

$$\Rightarrow \frac{100+r}{100} = \sqrt[3]{\frac{216}{125}}$$

$$\Rightarrow 100+r = \frac{6 \times 100}{5}$$

$$\Rightarrow r = 120 - 100 = 20\%$$

$$\therefore \text{Rate of interest} = 20 \times 2\% \\ = 40\%$$

Solution-20:

Given that $A = 88200$, $P = 80000$, $n = 2$

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

$$\Rightarrow \frac{88200}{80000} = \left(\frac{100+r}{100} \right)^2$$

$$\Rightarrow \sqrt{\frac{21 \times 21 \times 2}{20 \times 20 \times 2}} = \frac{100+r}{100}$$

$$\Rightarrow \frac{21 \times 10^5}{20} = 100+r$$

$$\Rightarrow r = 105 - 100$$

$$\Rightarrow r = 5\%$$

Principal = 88,200

$$C I = \frac{88,200 \times 5 \times 5}{100}$$

$$= 882 \times 5$$

$$= 4,410$$

\therefore Amount to be paid after 3 years = $P + CI$

$$= 88,200 + 4,410$$

$$= 92,610$$

$$\therefore A = ₹ 92,610.$$

Solution-21.

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

The amount after 3 years will be the principal for the third year

$$\Rightarrow 5556.50 = 5292 \left(1 + \frac{r}{100}\right)$$

$$\Rightarrow 1 + \frac{r}{100} = \frac{5556.60}{5292}$$

$$\Rightarrow \frac{r}{100} = \frac{5556.60 - 5292}{5292}$$

$$\begin{array}{r} 5556 \\ 5292 \\ \hline 264 \end{array}$$

$$\Rightarrow r = \frac{26460}{5292}$$

$$\Rightarrow r = 5\%$$

\therefore The rate of compound interest = 5% per annum

Let the original sum be P .

$$\text{₹ } 5292 = P \left(1 + \frac{5}{100}\right)^2$$

$$\Rightarrow P \times \frac{21 \times 21}{20 \times 20} = 5292$$

$$\Rightarrow P = \frac{5292 \times 400}{441}$$

$$\Rightarrow P = 12 \times 400$$

$$\Rightarrow P = \text{₹ } 4800$$

\therefore original sum is ₹ 4,800.

Solution - 22:-

Let the rate of compound Interest be $r\%$ per annum
The amount after 3 years will be the principal for
the 4th year

$$\Rightarrow 878.46 = 798.60 \left(1 + \frac{r}{100}\right)$$

$$\Rightarrow \frac{878.46}{798.60} = \frac{100+r}{100}$$

$$\Rightarrow \frac{r}{100} = \frac{878.46 - 798.60}{798.60}$$

$$\begin{array}{r} 878.46 \\ 798.60 \\ \hline 79.86 \end{array}$$

$$\Rightarrow r = \frac{7986}{798.60}$$

$$\Rightarrow r = 10\%$$

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\therefore The rate of compound interest = 10% per annum

Let the original sum be P .

$$\text{₹ } 798.6 = P \left(1 + \frac{10}{100}\right)^3$$

$$\Rightarrow 798.6 = P \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$\Rightarrow \frac{798.6 \times 1000}{121 \times 11} = P$$

$$\Rightarrow P = \frac{798600}{121 \times 11}$$

$$\Rightarrow P = 600.$$

\therefore original amount = ₹600.

Solution-23.

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

$$\Rightarrow 17576 = 15625 \left(1 + \frac{4}{100}\right)^n$$

$$\Rightarrow \frac{17576}{15625} = \left(\frac{26}{25}\right)^n$$

$$\Rightarrow \left(\frac{26}{25}\right)^3 = \left(\frac{26}{25}\right)^n$$

Bases are equal then powers should be equal $n=3$.

Solution-24.

$$P = ₹12,500 \quad CI = ₹3246.40 \quad \text{rate} = 8\%$$

$$A = ₹12,500 + 3246.40$$

$$= ₹15746.40$$

$$\text{Using } 15746.40 = 12500 \left(1 + \frac{8}{100}\right)^n$$

$$\Rightarrow \frac{15746.40}{12500} = \left(\frac{27}{25}\right)^n$$

$$= \left(\frac{27}{25}\right)^3 = \left(\frac{27}{25}\right)^n$$

\therefore Bases are equal then powers should be equal

\therefore number of years = 3.

$$n = 3.$$

Solution-25:

Here, $P = ₹16,000$, $A = ₹18,522$.

As the interest is compounded semi annually,

$$r \text{ (rate of interest per conversion period)} = \frac{1}{2} \text{ of } 10\% \\ = 5\%$$

Let the number of conversion periods be n , then

$$₹18,522 = ₹16,000 \left(1 + \frac{5}{100}\right)^n$$

$$\Rightarrow \frac{₹18,522}{₹16,000} = \left(\frac{21}{20}\right)^n$$

$$\Rightarrow \left(\frac{21}{20}\right)^4 = \left(\frac{21}{20}\right)^n$$

\therefore Bases are equal then powers should be equal

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Solution-26:

Given that $A = 2782.50$, $R_1 = 5$, $r_2 = 6$.

$$2782.50 = P \left(1 + \frac{5}{100}\right) \left(1 + \frac{6}{100}\right)$$

$$\Rightarrow 2782.50 = P \left(\frac{21}{20}\right) \left(\frac{53}{50}\right)$$

$$\Rightarrow P = \frac{2782.50 \times 20 \times 50}{21 \times 53}$$

$$\Rightarrow P = 10,000.$$

\therefore Sum = 10,000.

Solution -27.

$$CI_1 = \frac{P_1 \times 1 \times r}{100}$$

$$\Rightarrow P_1 r = 225 \times 100$$

$$\Rightarrow P_1 r = 22,500$$

$$P_1 = \frac{22,500}{r}$$

$$CI_2 = \frac{P_2 \times 1 \times r}{100}$$

$$240 = \frac{22,500}{r} \times 1 \times r + r$$

$$[\because P_2 = \frac{22,500}{r} + 2]$$

$$r = \frac{240}{225}$$

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Solution - 27.

GIF

Compound Interest for the first year $CI_1 = 225$

Compound Interest for the second year $CI_2 = 240$.

$$CI_1 = \frac{P_1 \times N \times R}{100}$$

$$\Rightarrow 225 = \frac{P_1 \times 1 \times R}{100}$$

$$\Rightarrow P_1 R = 22,500.$$

$$\begin{aligned} \therefore \text{Principal for the second year} &= \frac{22,500}{R} + CI_1 \\ &= \frac{22,500}{R} + 225 \end{aligned}$$

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$$\Rightarrow 24 \times 1000 = P_2 \times 1 \times R$$

$$\Rightarrow 24,000 = \frac{22,500}{R} \times R + 225(R)$$

$$\Rightarrow 225R = 24,000 - 22,500$$

$$\Rightarrow R = \frac{1500}{225} = 6\frac{2}{3}\%$$

$$\Rightarrow \text{(i) Rate of interest} = 6\frac{2}{3}\%$$

(ii) Original Sum.

$$CI_1 = \frac{P_1 \times N \times R}{100}$$

$$\Rightarrow P_1 = \frac{225 \times 100 \times 3}{225 \times 6} = 225 \times 15$$

$$\therefore \text{Original sum} = ₹ 3,375$$

(iii) Compound Interest for the third year CI_3 .

$$\begin{aligned} \text{Principal} &= ₹ 3375 + 295 + 240 \\ &= ₹ 3840. \end{aligned}$$

$$CI_3 = \frac{₹ 3840 \times 20 \times 1}{3 \times 100}$$

$$\text{Compound Interest for the third year} = ₹ 256$$

Solution-28:

$$\begin{aligned} \text{Simple Interest} &= \frac{P \times N \times R}{100} \\ &= \frac{P \times 2 \times 5}{100} \\ &= \frac{P}{10}. \end{aligned}$$

$$\begin{aligned} \text{Compound Interest} &= P \left[\left(1 + \frac{5}{100} \right)^2 - 1 \right] \\ &= P \left[\left(\frac{21}{20} \right)^2 - 1 \right] \\ &= P \left[\frac{441 - 400}{400} \right] \\ &= \frac{41P}{400}. \end{aligned}$$

Given that

$$\frac{41P}{400} - \frac{P}{10} = 25$$

$$\Rightarrow \frac{41P - 40P}{400} = 25$$

$$\Rightarrow 81P = 2500 \times 4$$

$$\Rightarrow P = \frac{2500 \times 4}{81}$$

$$\Rightarrow \text{Principal} = 10,000$$

Solution-29:

$$\text{Simple Interest} = \frac{P \times 10}{100}$$

$$= \frac{P}{10}$$

$$\text{Compound Interest} = P \left[\left(1 + \frac{5}{100} \right)^2 - 1 \right]$$

$$= P \left[\left(1 + \frac{1}{20} \right)^2 - 1 \right]$$

$$= P \left[\left(\frac{21}{20} \right)^2 - 1 \right]$$

$$= P \left[\frac{441 - 400}{400} \right]$$

$$= \frac{41P}{400}$$

$$\frac{41P}{400} - \frac{P}{10} = 15$$

$$41P - 40P = 400 \times 15$$

$$\Rightarrow P = 6,000$$

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Solution-30:

Given that.

$$\text{Compound Interest for the first year} = P \left[\left(1 + \frac{r}{100} \right)^1 - 1 \right]$$

$$\Rightarrow 1250 = P [100 + r - 100]$$

$$\Rightarrow 1250 = Pr$$

$$\Rightarrow P = \frac{1250}{r}$$

$$\text{Compound Interest for the second year} = P \left[\left(1 + \frac{r}{100} \right)^2 - 1 \right]$$

$$1375 = P \left[\left(1 + \frac{1250}{P \times 100} \right)^2 - 1 \right]$$

$$1375 = P \left[\frac{(P + 12.50)^2}{P^2} - 1 \right]$$

$$\Rightarrow 1375 = P \left[\frac{P^2 + 25P + 156.25 - P^2}{P^2} \right]$$

Solution-30:

Compound Interest of 2nd conversion period -

Compound Interest of 1st conversion = S.I on the Interest of 1st conversion Period.

∴ $1375 - 1250 = \text{S.I on Interest on the Interest of 1st conversion period}$

$$125 = \frac{1250 \times 1 \times R}{100}$$

∴ Rate of interest = 10%.

Solution-31:

Simple Interest for three years = ₹ 225.

$$\Rightarrow \frac{x \times r \times 3}{100} = 225$$

$$\Rightarrow x \times r = \frac{22,500}{3} \quad [\because x = \text{Principal} \ \& \ r = \text{rate of Interest}]$$

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Compound Interest for two years = ₹ 153

$$\Rightarrow P \left[\left(1 + \frac{r}{100} \right)^2 - 1 \right] = ₹ 153$$

$$\Rightarrow x \left[\frac{(100+r)^2 - (100)^2}{(100)^2} \right] = ₹ 153.$$

$$\Rightarrow x [100^2 + r^2 + 200r - 100^2] = ₹ 153 \times 10,000$$

$$\Rightarrow (200r + 200^2r) = 15,30,000$$

$$\Rightarrow \frac{22500}{3} [r + 200] = 153000$$

$$\Rightarrow r = 68 \times 3 - 200$$

$$\Rightarrow r = 204 - 200$$

∴ Rate of interest = 4%.

∴ Simple Interest on three years = ₹225

$$\Rightarrow \frac{P \times 25 \times 3}{100} = 225$$

$$\Rightarrow P = 25 \times 75$$

$$\Rightarrow P = ₹1875$$

∴ Principal = ₹1875.

Solution -32:-

Compounded annually:-

First, we find the amount after one year

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

$$= P \left(1 + \frac{10}{100}\right)^1$$

$$= 8,000 \left(\frac{110}{100}\right)$$

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$$= 8,800.$$

Principal for the second half year = 8,800.

$$\text{Interest for the next half year} = \frac{8,800 \times 10 \times 1}{2}$$

$$= ₹440.$$

compounded Annually Interest = ₹9240.

As the money invested for $1\frac{1}{2}$ years, therefore.

n = number of conversion periods = 3.

$$A = P \left(1 + \frac{r}{100}\right)^n = ₹8,000 \left(1 + \frac{5}{100}\right)^3$$

$$= ₹8,000 \left(\frac{21}{20}\right)^3 = ₹8,000 (1.05)^3$$

$$= ₹9,261.$$

Interest for $1\frac{1}{2}$ year compounded semi annually = ₹9,261.

difference b/w compounded semi annually and annually

$$= ₹9,261 - ₹9,240$$

$$= ₹21.$$

Solution -33 :-

Compounded Annually,

$$\text{Compound Interest for two years} = P \left[\left(1 + \frac{r}{100} \right)^n - 1 \right]$$

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

$$= P \left[\left(1 + \frac{1}{5} \right)^2 - 1 \right]$$

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$$= P \left[\left(\frac{6}{5} \right)^2 - 1 \right]$$

$$= P \left[\frac{36 - 25}{25} \right]$$

$$= \frac{11P}{25} = 0.44P$$

Compounded half yearly,

$$\text{Compound Interest for two years} = P \left[\left(1 + \frac{r}{100} \right)^n - 1 \right]$$

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

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

$$= P \left[(1.1)^4 - 1 \right]$$

$$= P [1.4641 - 1]$$

$$= 0.464P.$$

$$\therefore \text{Given that } 0.464P - 0.44P = ₹482$$

$$0.024P = 482$$

$$\Rightarrow P = \frac{482}{0.0241}$$

$$\Rightarrow P = 20,000.$$

\therefore Sum of money Lent out = 20,000.

Solution-34:-

$$\text{Amount after one year} = P \left(1 + \frac{r}{100}\right)^1$$

$$13,230 = P \left(1 + \frac{r/2}{100}\right)^2$$

$$\text{Amount after } 1\frac{1}{2} \text{ year} = P \left(1 + \frac{r}{100}\right)^n$$

$$13,891.50 = P \left(1 + \frac{r/2}{100}\right)^3$$

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$$13,891.50 = \frac{13,230}{\left(1 + \frac{r/2}{100}\right)^2} \cdot \left(1 + \frac{r/2}{100}\right)^3$$

$$\Rightarrow \frac{13,891.50}{13,230} = 1 + \frac{r}{200}$$

$$\Rightarrow \frac{13,891.50}{13,230} = \frac{200+r}{200}$$

$$\Rightarrow 10.5 \times 20 = 200+r$$

$$\Rightarrow 210 = 200+r$$

$$\Rightarrow r = 10$$

\therefore Rate of Interest = 10%.

$$\text{Sum} = \frac{13,230}{1.1025} = ₹12,000$$

$$\therefore P = \frac{13,230}{\left(1 + \frac{r/2}{100}\right)^2}$$

$$P = \frac{13,230}{\left(1 + \frac{5}{100}\right)^2}$$

$$= \frac{13,230 \times 20 \times 20}{21 \times 21}$$

$$= \frac{13,230}{1.1025}$$

\therefore Sum = ₹12,000.

Solution-03.

present population = 6,76,000

$$\begin{aligned} \text{(i) its population 2 years hence} &= 676000 \left(1 + \frac{4}{100}\right)^2 \\ &= 676000 \left(1 + \frac{1}{25}\right)^2 \\ &= 676000 \left(\frac{26}{25}\right)^2 \\ &= \frac{676000 \times 26 \times 26}{25 \times 25} \\ &= 676000 \times 1.04 \times 1.04 \\ &= 676000 \times 1.0816 \\ &= 731616 \end{aligned}$$

$$\begin{aligned} \text{(ii) its population 2 years ago} &= 676000 \left(1 - \frac{4}{100}\right)^2 \\ &= 676000 \left(1 - \frac{1}{25}\right)^2 \\ &= 676000 \left(\frac{24}{25}\right)^2 \\ &= 676000 \times 0.96 \times 0.96 \\ &= 676000 \times 0.9216 \\ &= 6225000 \\ &= 62,50,000 \end{aligned}$$

Solution-04:

$$\begin{aligned} \text{Refrigerator value after two years} &= ₹ 9,000 \left(1 - \frac{4}{100}\right)^2 = ₹ 9,000 \left(\frac{19}{20}\right)^2 \\ &= ₹ \frac{9,000 \times 19 \times 19}{20 \times 20} \\ &= ₹ \frac{16,254}{2} = 8,122.5 \end{aligned}$$

$$\therefore \text{total depreciation} = 9000 - 8,122.5 = 887.5$$

Solution-05:-

Purchased cost of scooter = ₹24,000.

Rate of depreciation = 5%

Scooter Value after 3 years = $24,000 \left(1 - \frac{5}{100}\right)^3$

$$= 24,000 \left(1 - \frac{1}{20}\right)^3$$

$$= 24,000 \left(\frac{20-1}{20}\right)^3$$

$$= 24,000 \left(\frac{19}{20}\right)^3$$

$$= \frac{24,000^3 \times 19 \times 19 \times 19}{20 \times 20 \times 20}$$

$$= 3 \times 361 \times 19$$

$$= 57 \times 361$$

$$= 20,577.$$

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Solution-06:-

Present production = 2187 quintals

Wheat production 2 years ago = $2187 \left(1 - \frac{8}{100}\right)^2$

$$= 2187 \left(\frac{12.5-1}{12.5}\right)^2$$

$$= 2187 \left(\frac{11.5}{12.5}\right)^2$$

$$= 2187 (0.92)^2$$

$$= 2187 \times 0.8464$$

$$= 1851.$$

∴ wheat production two years ago

$$= 1851$$

Exercise -2.3.

Solution-01

Present population = 2,00,000.

$$\begin{aligned}\text{Population after one year} &= \text{Present Population} \left(1 + \frac{10}{100}\right) \\ &= 2,00,000 \times 1.1 \\ &= 2,20,000\end{aligned}$$

$$\begin{aligned}\text{Population after second year} &= 2,20,000 \times \left(1 + \frac{15}{100}\right) \\ &= 2,20,000 (1 + 0.15) \\ &= 2,20,000 (1.15) \\ &= 2,53,000.\end{aligned}$$

∴ Population of the town at the end of the two years = 2,53,000.

Solution-02:-

Present Population = 15,625.

$$\begin{aligned}\text{Population after 3 years} &= \text{Present Population} \times \left(1 + \frac{4}{100}\right)^3 \\ &= 15,625 \left(1 + \frac{4}{100}\right)^3 \\ &= 15,625 \left(\frac{25+4}{25}\right)^3 \\ &= 15,625 \left(\frac{26}{25}\right)^3 \\ &= 15,625 \times \frac{26 \times 26 \times 26}{25 \times 25 \times 25} \\ &= 26 \times 26 \times 26 \\ &= 17,576.\end{aligned}$$

∴ Increase in population = 17,576 - 15,625
= 1951.

Solution-03

Present population = 6,760,000.

$$\begin{aligned} \text{(i) its population 2 years hence} &= 6760000 \left(1 + \frac{4}{100}\right)^2 \\ &= 6760000 \left(1 + \frac{1}{25}\right)^2 \\ &= 6760000 \left(\frac{26}{25}\right)^2 \\ &= \frac{6760000 \times 26 \times 26}{25 \times 25} \\ &= 6760000 \times 1.04 \times 1.04 \\ &= 7311616. \end{aligned}$$

(ii) its population 2 years Ago = V_0

$$6,76,000 = V_0 \left(1 - \frac{4}{100}\right)^2$$

$$6,76,000 = V_0 \left(1 - \frac{4}{100}\right)^2$$

$$6,76,000 = V_0 \left(1 - \frac{1}{25}\right)^2$$

$$6,76,000 = V_0 \left(\frac{24}{25}\right)^2$$

$$\frac{6,76,000}{0.96 \times 0.96} = V_0$$

$$\Rightarrow V_0 = 62,50,000.$$

Solution-04:

$$\begin{aligned} \text{Refrigerator value after two years} &= ₹9,000 \left(1 - \frac{5}{100}\right)^2 \\ &= ₹9,000 \times \frac{29 \times 29}{20 \times 20} \\ &= 16,254/2 = ₹8,122.50 \end{aligned}$$

$$\begin{aligned} \therefore \text{Total depreciation} &= 9,000 - 8,122.5 \\ &= 887.5. \end{aligned}$$

Solution-05:-

Purchased cost of scooter = ₹24,000.

Rate of depreciation = 5%.

$$\text{Scooter value after 3 years} = 24,000 \left(1 - \frac{5}{100}\right)^3$$

$$= 24,000 \left(1 - \frac{1}{20}\right)^3$$

$$= 24,000 \left(\frac{19}{20}\right)^3$$

$$= 3 \times 19 \times 361$$

$$= 51 \times 361$$

$$= ₹20,577.$$

∴ Scooter value after three years = ₹20,577.

Solution-06:-

Present production = 2187 quintal

Wheat production 2 years ago = V_0

$$2187 = V_0 \left(1 + \frac{8}{100}\right)^2$$

$$\Rightarrow 2187 = V_0 \left(1 + \frac{2}{25}\right)^2$$

$$\Rightarrow 2187 = V_0 \left(\frac{25+2}{25}\right)^2$$

$$\Rightarrow 2187 = V_0 \left(\frac{27}{25}\right)^2$$

$$\Rightarrow \frac{2187 \times 25 \times 25}{27 \times 27} = V_0$$

$$\Rightarrow \frac{2187 \times 25 \times 25}{27 \times 27} = V_0$$

$$\Rightarrow \frac{1366875}{729} = V_0$$

$$\Rightarrow V_0 = 1,875.$$

Solution-07:-

Rate of depreciation = 5%.

Present value of Property = 411540.

Property Value 3 years ago = V_0

$$\Rightarrow 411540 = V_0 \left(1 - \frac{5}{100}\right)^3$$

$$\Rightarrow 411540 = V_0 \left(1 - \frac{1}{20}\right)^3$$

$$\Rightarrow \frac{411540 \times 8000}{19 \times 361} = V_0$$

$$\Rightarrow \frac{4,11,540 \times 8000}{6,859} = V_0$$

$$\Rightarrow V_0 = 4,80,000.$$

\therefore Property Value 3 years ago = 4,80,000.

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Solution-08:-

Present purchased cost = 16,000

Rate of scooter After 2 years = 14,400.

$$\Rightarrow 16,000 = 14,400 \left(1 + \frac{r}{100}\right)^2$$

$$\Rightarrow \frac{\frac{16,000}{9}}{14,400} = \left(1 + \frac{r}{100}\right)^2$$

$$\Rightarrow \sqrt{\frac{10}{9}} = \frac{100+r}{100}$$

$$\Rightarrow \frac{\sqrt{10}}{3} = \frac{100+r}{100}$$

$$\Rightarrow 300 - 3r = 315 \quad \Rightarrow 3r = 15$$

$$\Rightarrow r = 5.$$

Solution-09:-

Here, production of cars 2011-2012 - 80,000
2014-2015 - 92,160

$$V = V_0 \left(1 + \frac{r}{100}\right)^n$$

$$\Rightarrow 92,160 = 80,000 \left(1 + \frac{r}{100}\right)^3$$

$$\Rightarrow \frac{92,160}{80,000} = \left(1 + \frac{r}{100}\right)^3$$

$$\Rightarrow \left(\frac{21}{20}\right)^3 = \left(1 + \frac{r}{100}\right)^3$$

$$\Rightarrow \frac{21}{20} = 1 + \frac{r}{100}$$

$$\Rightarrow 100 + r = 105$$

$$\Rightarrow r = 5\% \text{ P.A.}$$

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Solution-10:-

Here, present value of machine = 5,00,000

n years ago machine cost = 3,64,500.
after

$$\Rightarrow 5,00,000 = 3,64,500 \left(1 - \frac{10}{100}\right)^n$$
$$\Rightarrow \frac{5,000}{3645} = (0.9)^n$$

$$3,64,500 = 5,00,000 (1 - 0.1)^n$$

$$\Rightarrow \frac{364500}{500000} = (0.9)^n$$

$$\Rightarrow 0.729 = (0.9)^n$$

$$\Rightarrow (0.9)^3 = (0.9)^n$$

\therefore number of years = 3.