

General instructions for students: whatever be the notes provided, everything must be copied in the Maths copy and then do the HOME WORK in the same copy.

CHAPTER 2. COMPOUND INTEREST (continued)

GROWTH

Rate of growth - The growth per year (or unit of time) is called the rate of growth.

* *If the rate of growth is constant, then*

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

Where,

$r\%$ = rate of growth per year, n = no. of years

V_0 = present measure of the quantity, V = measure of the quantity after n years.

For Example:

- *The present population of a town is 15625. If the population increases at the rate of 4 % every year. What will be the increase in the population in next 3 years.*

Here, present population of a town (V_0) = 15625, rate of growth (r) = 4 % every year

no. of years (n) = 3 years

(Population of a town after 3 years) $V = V_0 \left(1 + \frac{r}{100}\right)^n$

Or
$$V = 15625 \left(1 + \frac{4}{100}\right)^3$$

Or
$$V = 15625 \left(\frac{26}{25}\right)^3$$

Or
$$V = 17576$$

Increase in the population in next 3 years = $V - V_0$

$$= 17576 - 15625$$

$$= 1951 \text{ Ans.}$$

- *The value of a property is increasing at the rate of 25 % every year. By what percent will the value of the property increase after 3 years?*

Let the present value of a property be Rs. V_0

$$\begin{aligned}\text{Value of a property after 3 years} &= V_0 \left(1 + \frac{25}{100}\right)^3 \\ &= V_0 \left(\frac{5}{4}\right)^3 = \frac{125}{64} V_0\end{aligned}$$

$$\begin{aligned}\text{Increase in the value of a property} &= \frac{125}{64} V_0 - V_0 = \left(\frac{125}{64} - 1\right) V_0 \\ &= \text{Rs. } \frac{61}{64} V_0\end{aligned}$$

$$\begin{aligned}\text{Increase percentage} &= \left(\frac{\text{increase}}{\text{present value}} \times 100\right) \% = \left(\frac{\frac{61}{64} V_0}{V_0} \times 100\right) \% \\ &= \left(\frac{61}{64} \times 100\right) \% \\ &= 95 \frac{5}{16} \% \text{ Ans.}\end{aligned}$$

If V_0 is the measure of the quantity n years ago and V is the present measure of the quantity, then

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

For Example:

- A farmer increases his output of wheat in his farm every year by 8%. This year he produced 2187 quintals of wheat. What was the yearly produce of wheat 2 years ago?

Here, present weight (V) = 2187 quintals, rate of growth (r) = 8% every year

$$\text{no. of years}(n) = 2 \text{ years}$$

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

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

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

$$\text{Or } V_0 = \frac{2187 \times 25 \times 25}{27 \times 27}$$

$$\text{Or } V_0 = 1857 \text{ quintals Ans.}$$

If the rate of growth is $r_1\%$ during the first year and $r_2\%$ during the second year, then

$$V = V_0 \left(1 + \frac{r_1}{100}\right) \left(1 + \frac{r_2}{100}\right)$$

This formula can be extended for more than two years

For Example:

- The present population of a town is 200000. Its population increases by 10% in the first year and 15% in the second year. Find the population of the town at the end of 2 years.

Here, present population of a town (V_0) = 200000, rate of growth for first year (r_1) = 10%

rate of growth for second year (r_2) = 15% no. of years (n) = 2 years

Or $V = V_0 \left(1 + \frac{r_1}{100}\right) \left(1 + \frac{r_2}{100}\right)$

Or $V = 200000 \left(1 + \frac{10}{100}\right) \left(1 + \frac{15}{100}\right)$

Or $V = 200000 \times \frac{11}{10} \times \frac{23}{20}$

Or $V = 253000$ **Ans.**

HOME WORK

EXERCISE - 2.3

QUESTION NUMBERS: 3, 9 and 12

CHAPTER TEST: 1, 3, 6 and 8
