

*General instructions for students: Whatever be the notes provided, everything must be copied in the Maths copy and then do the HOMEWORK in the same copy.*

## CHAPTER 2. COMPOUND INTEREST (continued)

### DEPRECIATION

**Rate of depreciation** - The decrease of the value per year (or unit of time) is called rate of depreciation.

If the rate of depreciation is constant, then

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

Where,

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

$V_0$  = present value,       $V$  = value after  $n$  years.

**For Example:**

- Dinesh purchased a scooter for Rs. 24000. The value of the scooter depreciating at rate of 5 % per annum. Calculate its value after 3 years.

Here, present value of a scooter ( $V_0$ ) = Rs. 24000, rate of depreciation ( $r$ ) = 5 % p. a.

no. of years ( $n$ ) = 3 years

(Value of a scooter after 3 years)       $V = V_0 \left(1 - \frac{r}{100}\right)^n$

Or       $V = 24000 \left(1 - \frac{5}{100}\right)^3$

Or       $V = 24000 \left(\frac{19}{20}\right)^3$

Or       $V = \text{Rs. } 20577$  **Ans.**

- The value of a car depreciates by 12.5 % every year. By what percent will the value of the car decrease after 3 years?

Let the present value of the car be Rs.  $V_0$

Value of the car after 3 years =  $V_0 \left(1 - \frac{12.5}{100}\right)^3$

=  $V_0 \left(\frac{7}{8}\right)^3$

Decrease in the value of car =  $V_0 - V_0 \left(\frac{7}{8}\right)^3$

$$= V_0 \left[ 1 - \left( \frac{7}{8} \right)^3 \right]$$

$$= \text{Rs. } \frac{169}{512} V_0$$

$$\text{Decrease percentage} = \left( \frac{\text{decrease}}{\text{present value}} \times 100 \right) \% = \left( \frac{\frac{169}{512} V_0}{V_0} \times 100 \right) \%$$

$$= \left( \frac{169}{512} \times 100 \right) \%$$

$$= 33 \frac{1}{128} \% \text{ Ans.}$$

If  $V_0$  is the value **n years ago** and  $V$  is the present value, then

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

**For Example:**

- The value of a machine, purchased 2 years ago, depreciates at the annual rate of 10 %. If its present value is Rs. 97200, find its value when it was purchased.

Here, present value of a machine ( $V$ ) = Rs. 97200, rate of depreciation ( $r$ ) = 10 % p. a.

no. of years ( $n$ ) = 2 years

(Value of a machine 2 years ago)

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

$$\text{Or } 97200 = V_0 \left( 1 - \frac{10}{100} \right)^2$$

$$\text{Or } 97200 = V_0 \left( \frac{9}{10} \right)^2$$

$$\text{Or } V_0 = \frac{97200 \times 10 \times 10}{9 \times 9}$$

$$\text{Or } V_0 = \text{Rs. } 120000 \text{ Ans.}$$

#### **ASSIGNMENT - IV**

#### **EXERCISE - 2.3**

QUESTION NUMBERS: 4, 7, 8, 10 and 14

CHAPTER TEST: 10, 11 and 12

### 3. EXPANSIONS

please memorize all algebraic identities

1.  $(a + b)^2 = a^2 + 2ab + b^2$
2.  $(a - b)^2 = a^2 - 2ab + b^2$
3.  $(a + b)(a - b) = a^2 - b^2$
4.  $(x + a)(x + b) = x^2 + (a + b)x + ab$
5.  $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
6.  $(a + b)^3 = a^3 + b^3 + 3ab(a + b) = a^3 + b^3 + 3a^2b + 3ab^2$
7.  $(a - b)^3 = a^3 - b^3 - 3ab(a - b) = a^3 - b^3 - 3a^2b + 3ab^2$
8.  $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
9.  $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
10.  $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$
11.  $(x + a)(x + b)(x + c) = x^3 + (a + b + c)x^2 + (ab + bc + ca)x + abc$
12. If  $a + b + c = 0$ , then  $a^3 + b^3 + c^3 = 3abc$

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