



SHIKSHA CLASSES

Sub. : Maths
Std. : VIIIth - S.B.

Answer Paper
14. Compound interest

Marks : 20

Q.1 : A) Select the most appropriate Alternative. 02

1) If interest is compounded then A = _____.

Ans : c) $P \left(1 + \frac{R}{100}\right)^N$

2) If compound interest = CI, Amount = A and principal = P, then true statement is.

Ans : b) $CI = A - P$

: B) Solve the following. 01

1) If $P = ₹ 1000$, $R = 10\%$ p.a. $T = 2$ years then find SI.

Ans : We know $SI = \frac{PRT}{100}$

$$\therefore SI = \frac{1000 \times 10 \times 2}{100} \\ = ₹ 200$$

Q.2 : A) Solve any one of the following. (Activity) 02

1) Activity : Fill in time blanks.

The amount of a certain principal is ₹ 6655 in 3 years, compounded annually at the rate of 10 p.c.p.a. Find the principal.

Ans : $A = ₹ 6655$; $R = 10$ p.c.p.a; $N = 3$ years

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

$$\therefore 6655 = P \times \left(1 + \frac{10}{100}\right)^3$$

$$= P \times \left(\frac{110}{100}\right)^3$$

$$\therefore P = \frac{6655 \times 10^3}{11 \times 11 \times 11} \quad P = \boxed{5} \times 10^3$$

$$= \boxed{5000}$$

\therefore the principal was ₹ 5000.

2) Activity : Fill in time blanks.

Here, principal (P) = ₹ 2000

Rate (R) = 5 p.c.p.a.

Duration (N) = 2 years

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

$$= 2000 \left(1 + \frac{5}{100}\right)^2$$

$$= 2000 \times \frac{105}{100} \times \frac{105}{100}$$

$$= \frac{\boxed{2} \times 105 \times 105}{10} = ₹ \boxed{2205}$$

Compound Interest = Amount - Principal

$$= \boxed{2205} - \boxed{2000} = ₹ \boxed{205}$$

\therefore Amount = ₹ 2205 and compound interest = ₹ 205.

: B) Solve any one of the following. 02

1) On the construction work of a flyover bridge there were 320 workers initially. The number of workers were increased by 25% every year. Find the number of workers after 2 years.

Ans : P = Number of workers initially = 320
R = Rate of increase in workers = 25% per year
N = 2 years
A = Number of workers after 2 years

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

$$= 320 \left(1 + \frac{25}{100} \right)^2$$

$$= 320 \times \frac{125}{100} \times \frac{125}{100}$$

$$= \frac{500000}{1000} = 500$$

∴ There will be 500 workers after 2 years.

2) A principal amounts to ₹13924 in 2 years by compound interest at 18 p.c.p.a. Find the principal.

Ans : Amount (A) = ₹ 13,924
Duration (N) = 2 years
Rate of interest (R) = 18 p.c.p.c.

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

$$\therefore 13924 = P \left(1 + \frac{18}{100} \right)^2$$

$$\therefore 13924 = P \left(\frac{118}{100} \right)^2$$

$$\therefore P = \frac{13924 \times 100 \times 100}{118 \times 118}$$

$$\therefore P = ₹ 10,000$$

∴ The required principal is ₹ 10,000.

Q.3 : A) Solve any one of the following. (Activity) 03

1) The population of a suburb is 16000. Find the rate of increase in the population if the population after two years is 17640.

Ans : P = Population of the suburb initially = 16,000
A = Population of the suburb after 2 years = 17,640
N = Duration = 2 years

Let R be the rate of increase in population per year.

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

$$\therefore 17640 = 16000 \left(1 + \frac{R}{100} \right)^2$$

$$\therefore \frac{17640}{16000} = \left(1 + \frac{R}{100} \right)^2$$

$$\therefore \left(\frac{42}{40} \right)^2 = \left(1 + \frac{R}{100} \right)^2$$

Taking square roots on both the sides, we get,

$$\frac{42}{40} = 1 + \frac{R}{100}$$

$$\therefore 1 + \frac{R}{100} = \frac{42}{40}$$

$$\therefore \frac{R}{100} = \frac{42}{40} - 1$$

$$\therefore \frac{R}{100} = \frac{42 - 40}{40}$$

$$\therefore R = \frac{2}{40} \times 100$$

$$\therefore R = 5\%$$

∴ The population of suburb increases 5% every year.

2) The population of a city increases at compounding rate of 8% per year. Find the population in the year 2012 if population in the year 2010 was 2,50,000.

Ans : P = Population in the year 2010 = 2,50,000

A = Population in the year 2012;

R = Rate of increase of population per year = 8%

N = 2 years

A = Population in the year 2012, that is population after 2 years

$$A = P \left(1 + \frac{R}{100} \right)^N = 250000 \times \left(1 + \frac{8}{100} \right)^2$$

$$= 250000 \times \left(\frac{108}{100} \right)^2$$

$$= 250000 \times \left(\frac{108}{100} \right) \times \left(\frac{108}{100} \right)$$

$$= 2,91,600.$$

∴ In the year 2012, population of the city was 2,91,600.

: **B) Solve any one of the following.** 03

1) The cost price of a machine is 2,50,000. If the rate of depreciation is 10% per year find the depreciation in price of the machine after two years.

Ans : P = Cost price of a machine initially = ₹ 2,50,000

R = Rate of depreciation = 10% per year

N = 2 years

A = Cost price of machine after 2 years

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

$$= 250000 \left(1 + \frac{(-10)}{100} \right)^2$$

$$= 250000 \times \frac{90}{100} \times \frac{90}{100}$$

$$= ₹ 2,02,500.$$

Depreciation in the price after 2 years

$$= 250000 - 202500$$

$$= ₹ 47,500$$

The depreciation in the price of machine after 2 years is ₹ 47,500.

2) To start a business Shalaka has taken

a loan of ₹ 8000 at a rate of $10\frac{1}{2}$ p.c.p.a. After two years how much compound interest will she have to pay?

Ans : Here, Principal (P) = ₹ 8000

Rate (R) = $10\frac{1}{2}$ p.c.p.a. = 10.5 p.c.p.a.

Duration (N) = 2 years

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

$$= 8000 \left(1 + \frac{10.5}{100} \right)^2$$

$$= 8000 \times \frac{110.5}{100} \times \frac{110.5}{100}$$

$$= \frac{8 \times 110.5 \times 110.5}{10}$$

$$= ₹ 9768.20$$

Compound Interest = Amount - Principal

$$= ₹ 9768.20 - 8000$$

$$= ₹ 1768.20$$

∴ Shalaka will have to pay compound interest ₹ 1768.20 after two years.

Q.4 : **Solve any one of the following.** 04

1) The difference between the compound interest and simple interest on a certain sum of money at 10% per annum for 2 years is ₹ 500. Find the sum when the interest is compounded annually ?

Ans : Let the sum be ₹ 100

Computation of Compound interest:

We have, P (Principal) = ₹ 100

R = 10% p.a.

N = 2 years

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

$$= 100 \times \left(1 + \frac{10}{100} \right)^2$$

$$= 100 \times \left(\frac{11}{10} \right)^2$$

$$= 100 \times \frac{11}{10} \times \frac{11}{10}$$

$$= ₹ 121$$

$$\therefore \text{CI} = A - P = 121 - 100$$

$$= ₹ 21$$

Computation of simple interest :

We have, P = ₹ 100, R = 10%, N = 2 years

$$\therefore \text{SI} = \frac{PRT}{100}$$

$$= \frac{100 \times 10 \times 2}{100} = ₹ 20$$

Thus, difference in CI and SI

$$= ₹ (21 - 20) = ₹ 1$$

Now ,

If difference between CI and SI is ₹ 1, Sum = ₹ 100

If difference between CI and S.I is ₹ 500, Sum = ₹ (100 × 500)

$$= ₹ 50,000.$$

2) Find the difference between simple interest and compound interest on ₹ 20000 at 8 p.c.p.a. For 2 years.

Ans : Here, Principal (P) = ₹ 20,000

Rate (R) = 8 p.c.p.a.

Duration (N) = 2 years

$$\text{Simple Interest (SI)} = \frac{P \times N \times R}{100}$$

$$= \frac{20000 \times 2 \times 8}{100}$$

$$= 200 \times 16$$

$$= ₹ 3200$$

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

$$= 20000 \left(1 + \frac{8}{100} \right)^2$$

$$= 20000 \times \frac{108}{100} \times \frac{108}{100}$$

$$= 2 \times 108 \times 108 = ₹ 23,328.$$

Compound Interest (CI) = A - P

$$= 23328 - 20000$$

$$= ₹ 3328.$$

Difference between the simple interest and compound interest

$$= \text{CI} - \text{SI}$$

$$= 3328 - 3200 = ₹ 128$$

\therefore The difference between the simple interest and compound interest is ₹ 128.

Q.5 : Solve any one of the following. 03

1) The population of a town was 160000 three years ago. If it had increased by 3%, 2.5% and 5% in the last three years. Find the present population of the town.

Ans : Let P be the present population of the town
Then,

$$P = 160000 \times \left(1 + \frac{3}{100} \right) \times \left(1 + \frac{2.5}{100} \right) \times \left(1 + \frac{5}{100} \right)$$

$$= 160000 \times \frac{103}{100} \times \frac{41}{40} \times \frac{21}{20}$$

$$= 2 \times 103 \times 41 \times 21$$

$$= 177366$$

Hence, Present population of the town
= 177366.

2) Find the number of years for which the compound interest of ₹ 9000 is ₹ 1890, at the rate of 10 p.c.p.a.

Ans : R = 10%; P = ₹ 9000; compound interest
= ₹ 1890

We will find the amount first.

$$A = P + I$$

$$= 9000 + 1890 = ₹ 10890$$

Write the formula for compound interest and substitute the values.

$$A = 10890 = P \times \left(1 + \frac{R}{100}\right)^N$$

$$= 9000 \times \left(1 + \frac{10}{100}\right)^N$$

$$= 9000 \times \left(\frac{11}{10}\right)^N$$

$$\therefore \left(\frac{11}{10}\right)^N = \frac{10890}{9000} = \frac{121}{100}$$

$$\therefore \left(\frac{11}{10}\right)^N = \frac{121}{100}$$

$$\therefore \left(\frac{11}{10}\right)^N = \left(\frac{11}{10}\right)^2$$

$$\therefore N = 2$$

∴ compound interest is for 2 years.

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