

Practice Set 14.1

Page No: 90

1. Find the amount and the compound interest.

No.	Principal (₹)	Rate (p.c.p.a.)	Duration (years)
1	2000	5	2
2	5000	8	3
3	4000	7.5	2

Solution:

(1) Here we have, $P = ₹ 2000$; $R = 5\%$; $N = 2$ years

$$\begin{aligned}A &= P\left(1 + \frac{R}{100}\right)^N \\&= 2000\left(1 + \frac{5}{100}\right)^2 \\&= 2000 (105/100)^2 \\&= 2000 (21/20)^2 \\&= 2205\end{aligned}$$

So, the compound interest after 2 years will be

$$\begin{aligned}I &= \text{Amount} - \text{Principal} \\&= \text{Rs } 2205 - \text{Rs } 2000 \\&= \text{Rs } 205\end{aligned}$$

Therefore, the amount is Rs 2205 and compound interest is Rs 205.

(2) Here we have, $P = ₹ 5000$; $R = 8\%$; $N = 3$ years

$$\begin{aligned}A &= P\left(1 + \frac{R}{100}\right)^N \\&= 5000\left(1 + \frac{8}{100}\right)^3 \\&= 5000 (108/100)^3 \\&= 5000 (27/25)^3 \\&= 6298.56\end{aligned}$$

So, the compound interest after 3 years will be

$$\begin{aligned}I &= \text{Amount} - \text{Principal} \\&= \text{Rs } 6298.56 - \text{Rs } 5000 \\&= \text{Rs } 1298.56\end{aligned}$$

Therefore, the amount is Rs 6298.56 and compound interest is Rs 1298.56.

(3) Here we have, $P = ₹ 4000$; $R = 7.5\%$; $N = 2$ years

$$\begin{aligned}A &= P\left(1 + \frac{R}{100}\right)^N \\&= 4000\left(1 + \frac{7.5}{100}\right)^2 \\&= 4000\left(1 + \frac{75}{1000}\right)^2 \\&= 4000(1075/1000)^2\end{aligned}$$

$$= 4000(43/40)^2$$
$$= 4622.50$$

So, the compound interest after 2 years will be

$$I = \text{Amount} - \text{Principal}$$
$$= \text{Rs } 4622.50 - \text{Rs } 4000$$
$$= \text{Rs } 622.50$$

Therefore, the amount is Rs 4622.50 and compound interest is Rs 622.50.

2. Sameerrao has taken a loan of Rs 12500 at a rate of 12 p.c.p.a. for 3 years. If the interest is compounded annually then how many rupees should he pay to clear his loan?

Solution:

Here we have, $P = ₹ 12500$; $R = 12 \%$; $N = 3$ years

$$A = P\left(1 + \frac{R}{100}\right)^N$$
$$= 12500\left(1 + \frac{12}{100}\right)^3$$
$$= 12500\left(1 + \frac{3}{25}\right)^3$$
$$= 12500(28/25)^3$$
$$= 17561.60$$

Therefore, Sameerrao should pay an amount of Rs 17561.60 to clear his loan.

3. To start a business Shalaka has taken a loan of Rs 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?

Solution:

Here we have, $P = ₹ 8000$; $R = 10\frac{1}{2} \%$; $N = 2$ years

$$A = P\left(1 + \frac{R}{100}\right)^N$$
$$= 8000\left(1 + \frac{10\frac{1}{2}}{100}\right)^2$$
$$= 8000\left(1 + \frac{21}{200}\right)^2$$
$$= 8000(221/200)^2$$
$$= 9768.20$$

So, the compound interest after 2 years will be

$$I = \text{Amount} - \text{Principal}$$
$$= \text{Rs } 9768.20 - \text{Rs } 8000$$
$$= \text{Rs } 1768.20$$

Therefore, Shalaka will have to pay a compound interest of Rs 1768.20 after 2 years.

Practice Set 14.2

Page No: 93

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.

Solution:

From the given information,

Here we have, P = Number of workers initially = 320

A = Number of workers after 2 years

R = Rate of increase of number of workers per year = 25 %

N = 2 years

So,

$$\begin{aligned}A &= P\left(1 + \frac{R}{100}\right)^N \\&= 320\left(1 + \frac{25}{100}\right)^2 \\&= 320\left(1 + \frac{1}{4}\right)^2 \\&= 320\left(\frac{5}{4}\right)^2 \\&= 500\end{aligned}$$

Therefore, the number of workers after 2 years is 500.

2. A shepherd has 200 sheep with him. Find the number of sheep with him after 3 years if the increase in number of sheep is 8% every year.

Solution:

From the given information,

Here we have, P = Number of sheep initially = 200

A = Number of sheep after 3 years

R = Rate of increase of number of sheep per year = 8 %

N = 3 years

So,

$$\begin{aligned}A &= P\left(1 + \frac{R}{100}\right)^N \\&= 200\left(1 + \frac{8}{100}\right)^3 \\&= 200\left(1 + \frac{2}{25}\right)^3 \\&= 200\left(\frac{27}{25}\right)^3 \\&= 251.94 \sim 252\end{aligned}$$

Therefore, the number of sheep after 3 years is 252.

3. In a forest there are 40,000 trees. Find the expected number of trees after 3 years if the objective is to increase the number at the rate 5% per year.

Solution:

From the given information,

Here we have, P = Number of trees initially = 40,000

A = Number of trees after 3 years

R = Rate of increase of number of trees per year = 5 %

N = 3 years

So,

$$\begin{aligned}A &= P\left(1 + \frac{R}{100}\right)^N \\&= 40000\left(1 + \frac{5}{100}\right)^3 \\&= 40000\left(1 + \frac{1}{20}\right)^3 \\&= 40000\left(\frac{21}{20}\right)^3 \\&= 46305\end{aligned}$$

Therefore, the expected number of trees after 3 years is 46,305.

4. 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.

Solution:

From the given information,

Here we have, P = Cost price of the machine = 2,50,000

A = Cost price after 2 years

I = Depreciation in price after 2 years

R = Rate of depreciation = 10 %

N = 2 years

So,

$$\begin{aligned}A &= P\left(1 + \frac{R}{100}\right)^N \\&= 250000\left(1 + \frac{-10}{100}\right)^2 \\&= 250000\left(1 - \frac{1}{10}\right)^2 \\&= 250000\left(\frac{9}{10}\right)^2 \\&= 202500\end{aligned}$$

Also, the interest is

I = P - A

= Rs 250000 - Rs 202500

= Rs 47500

Therefore, the depreciation in price of the machine after two years is Rs 47,500.

5. Find the compound interest if the amount of a certain principal after two years is Rs 4036.80 at the rate of 16 p.c.p.a.

Solution:

From the given information,

Here we have,

P = Principal

A = ₹ 4036.80

I = Compound Interest

R = 16 %

N = 2 years

So,

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

$$4036.80 = P\left(1 + \frac{16}{100}\right)^2$$

$$4036.80 = P\left(1 + \frac{4}{25}\right)^2$$

$$4036.80 = P\left(\frac{29}{25}\right)^2$$

$$P = \frac{4036.80 \times 25 \times 25}{29 \times 29}$$

$$P = 3000$$

Now, the interest is

$$I = A - P$$

$$= 4036.80 - 3000$$

$$= 1036.80$$

Therefore, the compound interest is ₹ 1036.80

6. A loan of Rs 15000 was taken on compound interest. If the rate of compound interest is 12 p.c.p.a. find the amount to settle the loan after 3 years.

Solution:

From the given information,

Here we have, P = Principal = ₹ 15000

A = Amount

R = 12 %

N = 3 years

So, the amount

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

$$= 15000\left(1 + \frac{12}{100}\right)^3$$

$$= 15000\left(1 + \frac{3}{25}\right)^3$$

$$= 15000\left(\frac{28}{25}\right)^3$$

$$= 21073.92$$

Therefore, the amount to settle the loan is ₹ 21073.92

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

Solution:

From the given information,

Here we have, P = Principal

$$A = ₹ 13924$$

$$R = 18 \%$$

$$N = 2 \text{ years}$$

We know that, the amount is

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

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

$$13924 = P\left(1 + \frac{9}{50}\right)^2$$

$$13924 = P\left(\frac{59}{50}\right)^2$$

$$P = (13924 \times 50 \times 50) / (59 \times 59)$$

$$\Rightarrow P = 10000$$

Therefore, the principal is Rs 10000.

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

Solution:

From the given information,

Here we have, P = Population of a suburb = 16000

A = Population after two years = 17640

R = R %

N = 2 years

We know that, the amount is given by

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

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

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

$$\frac{441}{400} = \left(1 + \frac{R}{100}\right)^2$$

$$\left(\frac{21}{20}\right)^2 = \left(1 + \frac{R}{100}\right)^2$$

$$1 + \frac{R}{100} = \frac{21}{20}$$

$$R/100 = 21/20 - 1$$

$$R/100 = 1/20$$

$$\Rightarrow R = 5$$

Therefore, the rate of increase in the population is 5 p.c.p.a.

9. In how many years Rs 700 will amount to Rs 847 at a compound interest rate of 10 p.c.p.a.

Solution:

From the given information,

Here we have, P = Principal = ₹ 700

A = Amount = ₹ 847

$$R = 10 \%$$

$$N = N \text{ years}$$

We know that, the amount is given by

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

$$847 = 700\left(1 + \frac{10}{100}\right)^N$$

$$\frac{847}{700} = \left(1 + \frac{10}{100}\right)^N$$

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

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

$$\Rightarrow N = 2$$

Therefore, the numbers of years is 2 years.

**10. Find the difference between simple interest and compound interest on Rs 20000 at 8 p.c.p.a.
Solution:**

Given,

$$P = \text{Principal} = ₹ 20000$$

$$R = 8 \%$$

As the time is not given, the question is solved by taking time as 2 years, because simple interest and compound interest will be same for one year.

$$N = 2 \text{ years}$$

$$\begin{aligned} \text{Simple interest} &= \frac{P \times R \times N}{100} \\ &= \frac{20000 \times 8 \times 2}{100} \\ &= 3200 \end{aligned}$$

$$\begin{aligned} \text{Amount} &= P\left(1 + \frac{R}{100}\right)^N \\ &= 20000\left(1 + \frac{8}{100}\right)^2 \\ &= 20000\left(1 + \frac{2}{25}\right)^2 \\ &= 20000\left(\frac{27}{25}\right)^2 \\ &= 23328 \end{aligned}$$

So, the compound interest = Rs 23328 – Rs 20000 = Rs 3328

Now, comparing compound interest and simple interest we have

$$\Rightarrow \text{Compound interest} - \text{Simple interest} = \text{Rs } 3328 - \text{Rs } 3200 = \text{Rs } 128$$

Therefore, the difference between simple interest and compound interest is Rs 128.