

Chapter 11: Compound Interest

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Exercise 11A

Question 1:

Solution:

Principal for the first year = Rs.2500

$$\text{Interest for the first year} = \left(\frac{2500 \times 10 \times 1}{100} \right) = \text{Rs.}250$$

Amount at the end of the first year = $(2500 + 250) = \text{Rs. } 2750$

Principal for the second year = Rs. 2750

$$\text{Interest for the second year} = \left(\frac{2750 \times 10 \times 1}{100} \right) = \text{Rs.}275$$

Amount at the end of the second year = $(2750 + 275) = \text{Rs. } 3025$

Therefore, compound interest = $(3025 - 2500) = \text{Rs.}525$

Question 2:

Solution:

Principal for the first year = Rs.15625

$$\text{Interest for the first year} = \left(\frac{15625 \times 12 \times 1}{100} \right) = \text{Rs.}1875$$

Amount at the end of the first year = $(15625 + 1875) = \text{Rs. } 17500$

Principal for the second year = Rs. 17500

$$\text{Interest for the second year} = \left(\frac{17500 \times 12 \times 1}{100} \right) = \text{Rs.}2100$$

Amount at the end of the second year = $(17500 + 2100) = \text{Rs. } 19600$

Principal for the third year = Rs.19600

$$\text{Interest for the third year} = \left(\frac{19600 \times 12 \times 1}{100} \right) = \text{Rs.}2352$$

Amount at the end of the third year = $(19600 + 2352) = \text{Rs. } 21952$

Therefore, compound interest = $(21952 - 15625) = \text{Rs.}6327$

Question 3:

Solution:

Principal amount = Rs.5000

$$\text{Simple interest} = \left(\frac{5000 \times 2 \times 9}{100} \right) = \text{Rs.}900$$

To calculate compound interest,

Principal for the first year = Rs.5000

$$\text{Interest for the first year} = \left(\frac{5000 \times 9 \times 1}{100} \right) = \text{Rs.} 450$$

$$\text{Amount at the end of the first year} = (5000 + 450) = \text{Rs. } 5450$$

$$\text{Principal for the second year} = \text{Rs. } 5450$$

$$\text{Interest for the second year} = \left(\frac{5450 \times 9 \times 1}{100} \right) = \text{Rs.} 490.5$$

$$\text{Amount at the end of the second year} = (5450 + 490.5) = \text{Rs. } 5940.5$$

$$\text{Therefore, compound interest} = (5940.5 - 5000) = \text{Rs.} 940.5$$

$$\begin{aligned} \text{Now, difference between the simple interest and the compound interest} &= (940.5 - 900) \\ &= \text{Rs.} 40.5 \end{aligned}$$

Question 4:

Solution:

$$\text{Principal for the first year} = \text{Rs.} 25000$$

$$\text{Interest for the first year} = \left(\frac{25000 \times 8 \times 1}{100} \right) = \text{Rs.} 2000$$

$$\text{Amount at the end of the first year} = (25000 + 2000) = \text{Rs. } 27000$$

$$\text{Principal for the second year} = \text{Rs. } 27000$$

$$\text{Interest for the second year} = \left(\frac{27000 \times 8 \times 1}{100} \right) = \text{Rs.} 2160$$

$$\text{Amount at the end of the second year} = (27000 + 2160) = \text{Rs. } 29160$$

$$\text{Therefore, Ratna has to pay Rs.} 29160 \text{ after 2 years to discharge her debt.}$$

Question 5:

Solution:

$$\text{Principal amount} = \text{Rs.} 20000$$

$$\text{Simple interest} = \left(\frac{20000 \times 2 \times 12}{100} \right) = \text{Rs.} 4800$$

To calculate compound interest,

$$\text{Principal for the first year} = \text{Rs.} 20000$$

$$\text{Interest for the first year} = \left(\frac{20000 \times 12 \times 1}{100} \right) = \text{Rs.} 2400$$

$$\text{Amount at the end of the first year} = (20000 + 2400) = \text{Rs. } 22400$$

$$\text{Principal for the second year} = \text{Rs. } 22400$$

$$\text{Interest for the second year} = \left(\frac{22400 \times 12 \times 1}{100} \right) = \text{Rs.} 2688$$

$$\text{Amount at the end of the second year} = (22400 + 2688) = \text{Rs. } 25088$$

$$\text{Therefore, compound interest} = (25088 - 20000) = \text{Rs.} 5088$$

$$\text{Now, CI} - \text{SI} = (5088 - 4800) = \text{Rs.} 288$$

Therefore, the amount of money Harpreet will gain after 2 years is Rs. 288.

Question 6:

Solution:

Principal for the first year = Rs.64000

$$\text{Interest for the first year} = \left(\frac{64000 \times 15 \times 1}{100 \times 2} \right) = \text{Rs.}4800$$

Amount at the end of the first year = $(64000 + 4800) = \text{Rs. } 68800$

Principal for the second year = Rs. 68800

$$\text{Interest for the second year} = \left(\frac{68800 \times 15 \times 1}{100 \times 2} \right) = \text{Rs.}5160$$

Amount at the end of the second year = $(68800 + 5160) = \text{Rs. } 73960$

Principal for the third year = Rs.73960

$$\text{Interest for the third year} = \left(\frac{73960 \times 15 \times 1}{100 \times 2} \right) = \text{Rs.}5547$$

Amount at the end of the third year = $(73960 + 5547) = \text{Rs. } 79507$

Therefore, Amount on maturity will be Rs.79507.

Question 7:

Solution:

Principal for the first half year = Rs.6250

$$\text{Interest for the first half year} = \left(\frac{6250 \times 4 \times 1}{100} \right) = \text{Rs.}250$$

Amount at the end of the first half year = $(6250 + 250) = \text{Rs. } 6500$

Principal for the second half year = Rs.6500

$$\text{Interest for the second half year} = \left(\frac{6500 \times 4 \times 1}{100} \right) = \text{Rs.}260$$

Amount at the end of the second half year = $(6500 + 260) = \text{Rs. } 6760$

Therefore, compound interest = $(6760 - 6250) = \text{Rs.}510$

Question 8:

Solution:

Principal for the first half year = Rs.16000

$$\text{Interest for the first half year} = \left(\frac{16000 \times 5 \times 1}{100} \right) = \text{Rs.}800$$

Amount at the end of the first half year = $(16000 + 800) = \text{Rs. } 16800$

Principal for the second half year = Rs.16800

$$\text{Interest for the second half year} = \left(\frac{16800 \times 5 \times 1}{100} \right) = \text{Rs.}840$$

Amount at the end of the second half year = $(16800 + 840) = \text{Rs. } 17640$

Principal for the third half year = Rs.17640

Interest for the third half year = $\left(\frac{17640 \times 5 \times 1}{100} \right) = \text{Rs. } 882$

Amount at the end of the third half year = $(17640 + 882) = \text{Rs. } 18522$

Therefore, the amount of money Michael has to pay the Finance company after $1\frac{1}{2}$ years is Rs.18522.

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Exercise 11B

Question 1.

Solution:

Here $P = 6000$, $R = 9$ and $n = 2$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 6000 \left(1 + \frac{9}{100} \right)^2$$

$$= 6000 \times \frac{109}{100} \times \frac{109}{100}$$

$$= \text{Rs. } 7128.6$$

And compound interest = $7128.6 - 6000 = \text{Rs. } 1128.6$

Question 2.

Solution:

Here $P = 10000$, $R = 11$ and $n = 2$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 10000 \left(1 + \frac{11}{100} \right)^2$$

$$= 10000 \times \frac{111}{100} \times \frac{111}{100}$$

$$= \text{Rs. } 12321$$

And compound interest = $12321 - 10000 = \text{Rs. } 2321$

Question 3.**Solution:**

Here $P = 31250$, $R = 8$ and $n = 3$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 31250 \left(1 + \frac{8}{100} \right)^3$$

$$= 31250 \times \frac{27}{25} \times \frac{27}{25} \times \frac{27}{25}$$

$$= \text{Rs.} 39366$$

$$\text{And compound interest} = 39366 - 31250 = \text{Rs.} 8116$$

Question 4.**Solution:**

Here $P = 10240$, $R = 12 \frac{1}{2} = \frac{25}{2}$ and $n = 3$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 10240 \left(1 + \frac{\left(\frac{25}{2} \right)}{100} \right)^3$$

$$= 10240 \times \frac{9}{8} \times \frac{9}{8} \times \frac{9}{8}$$

$$= \text{Rs.} 14580$$

$$\text{And compound interest} = 14580 - 10240 = \text{Rs.} 4340$$

Question 5.**Solution:**

Here $P = 62500$, $R = 12$ and $n = 2$ years 6 months

Amount for $2 \frac{1}{2}$ years,

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 62500 \left[\left(1 + \frac{12}{100} \right)^2 \times \left(1 + \frac{\frac{1}{2} \times 12}{100} \right) \right]$$

$$= 62500 \times \frac{112}{100} \times \frac{112}{100} \times \frac{53}{50}$$

$$= \text{Rs.} 83104$$

$$\text{And compound interest} = 83104 - 62500 = \text{Rs.} 20604$$

Question 6.

Solution:

Here $P = 9000$, $R = 10$ and $n = 2$ years 4 months

Amount for $2\frac{1}{3}$ years,

$$\text{Using the formula, } A = P \left(1 + \frac{R}{100} \right)^n$$

$$= 9000 \left[\left(1 + \frac{10}{100} \right)^2 \times \left(1 + \frac{\frac{1}{3} \times 10}{100} \right) \right]$$

$$= 9000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{31}{30}$$

$$= \text{Rs.} 11253$$

$$\text{And compound interest} = 11253 - 9000 = \text{Rs.} 2253$$

Question 7.

Solution:

Principal for the first year = Rs. 8000

$$\text{Interest for the first year} = \left(\frac{8000 \times 9 \times 1}{100} \right) = \text{Rs.} 720$$

Amount at the end of the first year = $(8000 + 720) = \text{Rs.} 8720$

Principal for the second year = Rs. 8720

$$\text{Interest for the second year} = \left(\frac{8720 \times 10 \times 1}{100} \right) = \text{Rs.} 872$$

Amount at the end of the second year = $(8720 + 872) = \text{Rs.} 9592$

Therefore, amount after 2 years is Rs. 9592.

Question 8.**Solution:**

Principal for the first year = Rs.125000

$$\text{Interest for the first year} = \left(\frac{125000 \times 8 \times 1}{100} \right) = \text{Rs.}10000$$

Amount at the end of the first year = (125000 + 10000) = Rs. 135000

Principal for the second year = Rs. 135000

$$\text{Interest for the second year} = \left(\frac{135000 \times 8 \times 1}{100} \right) = \text{Rs.}10800$$

Amount at the end of the second year = (135000 + 10800) = Rs. 145800

Principal for the third year = Rs.145800

$$\text{Interest for the third year} = \left(\frac{145800 \times 8 \times 1}{100} \right) = \text{Rs.}11664$$

Amount at the end of the third year = (145800 + 11664) = Rs. 157464

Therefore, Anand has to pay Rs.157464.

Question 9.**Solution:**

Principal for the first year = Rs.11000

$$\text{Interest for the first year} = \left(\frac{11000 \times 10 \times 1}{100} \right) = \text{Rs.}1100$$

Amount at the end of the first year = (11000 + 1100) = Rs. 12100

Principal for the second year = Rs. 12100

$$\text{Interest for the second year} = \left(\frac{12100 \times 10 \times 1}{100} \right) = \text{Rs.}1210$$

Amount at the end of the second year = (12100 + 1210) = Rs. 13310

Principal for the third year = Rs.13310

$$\text{Interest for the third year} = \left(\frac{13310 \times 10 \times 1}{100} \right) = \text{Rs.}1331$$

Amount at the end of the third year = (13310 + 1331) = Rs. 14641

Therefore, amount to discharge the debt after 3 years is Rs.14641.

Question 10.**Solution:**

Principal for the first year = Rs.18000

$$\text{Interest for the first year} = \left(\frac{18000 \times 12 \times 1}{100} \right) = \text{Rs.}2160$$

Amount at the end of the first year = (18000 + 2160) = Rs. 20160

Principal for the second year = Rs. 20160

$$\text{Interest for the second year} = \left(\frac{20160 \times \frac{25}{2} \times 1}{100} \right) = \text{Rs.} 2520$$

Amount at the end of the second year = $(20160 + 2520) = \text{Rs. } 22680$

Therefore, she have to pay Rs.22680 after 2 years.

Question 11.

Solution:

Here $P = 24000$, $R = 10$ and $n = 2 \text{ years } 3 \text{ months}$

Amount for $2\frac{1}{4}$ years,

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 24000 \left[\left(1 + \frac{10}{100} \right)^2 \times \left(1 + \frac{\frac{1}{4} \times 10}{100} \right) \right]$$

$$= 24000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{41}{40}$$

$$= \text{Rs.} 29766$$

Therefore, she will have to make a payment of Rs.29766.

Question 12.

Solution:

Principal amount = Rs.16000

$$\text{Simple interest} = \left(\frac{16000 \times 2 \times 7.5}{100} \right) = \text{Rs.} 2400$$

To calculate compound interest,

Principal for the first year = Rs.16000

$$\text{Interest for the first year} = \left(\frac{16000 \times 7.5 \times 1}{100} \right) = \text{Rs.} 1200$$

Amount at the end of the first year = $(16000 + 1200) = \text{Rs. } 17200$

Principal for the second year = Rs. 17200

$$\text{Interest for the second year} = \left(\frac{17200 \times 7.5 \times 1}{100} \right) = \text{Rs.} 1290$$

Amount at the end of the second year = $(17200 + 1290) = \text{Rs. } 18490$

Therefore, compound interest = $(18490 - 16000) = \text{Rs.} 2490$

Now, $CI - SI = (2490 - 2400) = \text{Rs.} 90$

Therefore, the amount of money Abhay will gain after 2 years is Rs. 90.

Question 13.

Solution:

Let the Principal amount = Rs. P

$$\text{Simple interest} = \left(\frac{P \times 2 \times 8}{100} \right)$$

$$\therefore 2400 = \left(\frac{P \times 2 \times 8}{100} \right)$$

$$\therefore P = \frac{2400 \times 100}{2 \times 8}$$

$$\therefore P = 15000$$

To calculate compound interest,

Principal for the first year = Rs. 15000

$$\text{Interest for the first year} = \left(\frac{15000 \times 8 \times 1}{100} \right) = \text{Rs. } 1200$$

Amount at the end of the first year = (15000 + 1200) = Rs. 16200

Principal for the second year = Rs. 16200

$$\text{Interest for the second year} = \left(\frac{16200 \times 8 \times 1}{100} \right) = \text{Rs. } 1296$$

Amount at the end of the second year = (16200 + 1296) = Rs. 17496

Therefore, compound interest = (17496 – 15000) = Rs. 2496

Question 14.

Solution:

CI – SI = Rs. 90

$$\text{Simple interest} = \left(\frac{x \times 2 \times 6}{100} \right) = \frac{12x}{100}$$

Compound interest = Amount - Principal

$$= \left[x \left(1 + \frac{6}{100} \right)^2 \right] - x$$

$$= \left[x \times \frac{53}{50} \times \frac{53}{50} \right] - x$$

$$= \frac{2809x}{2500} - x$$

$$= \frac{309x}{2500}$$

$$\therefore \frac{309x}{2500} - \frac{12x}{100} = 90$$

$$\therefore \frac{9x}{2500} = 90$$

$$\therefore x = \frac{90 \times 2500}{9}$$

$$\therefore x = 25000$$

Therefore, the sum is Rs.25000.

Question 15.

Solution:

$$CI - SI = \text{Rs.}93$$

$$\text{Simple interest} = \left(\frac{x \times 3 \times 10}{100} \right) = \frac{3x}{10}$$

$$\text{Compound interest} = \text{Amount} - \text{Principal}$$

$$= \left[x \left(1 + \frac{10}{100} \right)^3 \right] - x$$

$$= \left[x \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10} \right] - x$$

$$= \frac{1331x}{1000} - x$$

$$= \frac{331x}{1000}$$

$$\therefore \frac{331x}{1000} - \frac{3x}{10} = 93$$

$$\therefore \frac{31x}{1000} = 93$$

$$\therefore x = \frac{93 \times 1000}{31}$$

$$\therefore x = 3000$$

Therefore, the sum is Rs.3000.

Question 16.

Solution:

$$\text{Here } A = \text{Rs.}10240, P = x, R = 6\frac{2}{3} = \frac{20}{3} \text{ and } n = 2$$

$$\text{Using the formula, } A = P \left(1 + \frac{R}{100} \right)^n$$

$$\therefore 10240 = x \left(1 + \frac{\left(\frac{20}{3} \right)}{100} \right)^2$$

$$\therefore 10240 = x \times \frac{16}{15} \times \frac{16}{15}$$

$$\therefore x = \frac{10240 \times 15 \times 15}{16 \times 16}$$

$$\therefore x = 9000$$

Therefore, the sum is Rs.9000.

Question 17.

Solution:

Here A = Rs.21296, P = x, R = 10 and $n = 3$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$\therefore 21296 = x \left(1 + \frac{10}{100} \right)^3$$

$$\therefore 21296 = x \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$\therefore x = \frac{21296 \times 10 \times 10 \times 10}{11 \times 11 \times 11}$$

$$\therefore x = 16000$$

Therefore, the sum is Rs.16000.

Question 18.

Solution:

Here A = Rs.4410, P = 4000, R = x and $n = 2$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$\therefore 4410 = 4000 \left(1 + \frac{x}{100} \right)^2$$

$$\therefore \frac{4410}{4000} = \left(\frac{100+x}{100} \right)^2$$

$$\therefore \sqrt{\frac{441}{400}} = \frac{100+x}{100}$$

$$\therefore \frac{21}{20} = \frac{100+x}{100}$$

$$\therefore x = \left(\frac{21 \times 100}{20} \right) - 100$$

$$\therefore x = 5$$

Therefore, the rate is 5% per annum.

Question 19.

Solution:

Here A = Rs.774.40, P = 640, R = x and $n = 2$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$\therefore 774.4 = 640 \left(1 + \frac{x}{100} \right)^2$$

$$\therefore \frac{774.4}{640} = \left(\frac{100+x}{100} \right)^2$$

$$\therefore \sqrt{\frac{7744}{6400}} = \frac{100+x}{100}$$

$$\therefore \frac{88}{80} = \frac{100+x}{100}$$

$$\therefore \frac{11}{10} = \frac{100+x}{100}$$

$$\therefore x = \left(\frac{11 \times 100}{10} \right) - 100$$

$$\therefore x = 10$$

Therefore, the rate is 10% per annum.

Question 20.

Solution:

Here A = Rs.2178, P = 1800, R = 10 and $n = x$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$\therefore 2178 = 1800\left(1 + \frac{10}{100}\right)^x$$

$$\therefore \frac{2178}{1800} = \left(\frac{11}{10}\right)^x$$

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

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

$$\therefore x = 2$$

Therefore, the time period required is 2 years.

Question 21.

Solution:

Here A = Rs.7290, P = 6250, R = 8 and $n = x$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$\therefore 7290 = 6250\left(1 + \frac{8}{100}\right)^x$$

$$\therefore \frac{7290}{6250} = \left(\frac{27}{25}\right)^x$$

$$\therefore \frac{729}{625} = \left(\frac{27}{25}\right)^x$$

$$\therefore \left(\frac{27}{25}\right)^2 = \left(\frac{27}{25}\right)^x$$

$$\therefore x = 2$$

Therefore, the time period required is 2 years.

Question 22.

Solution:

Here P = 125000, R = 2 and $n = 3$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$\begin{aligned}
&= 125000 \left(1 + \frac{2}{100}\right)^3 \\
&= 125000 \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50} \\
&= 1105425
\end{aligned}$$

Therefore, the population after three years will be 1105425.

Question 23.

Solution:

Initial population = 50000

$$\text{Increase in first year} = \left(\frac{50000 \times 5 \times 1}{100} \right) = 2500$$

Increase at the end of the first year = $(50000 + 2500) = 52500$

$$\text{Increase in second year} = \left(\frac{52500 \times 4 \times 1}{100} \right) = 2100$$

Increase at the end of the second year = $(52500 + 2100) = 54600$

$$\text{Increase in third year} = \left(\frac{54600 \times 3 \times 1}{100} \right) = 1638$$

Increase at the end of the third year = $(54600 + 1638) = 56238$

Therefore, present population is 56238.

Question 24.

Solution:

Initial population = 120000

$$\text{Increase in first year} = \left(\frac{120000 \times 6 \times 1}{100} \right) = 7200$$

Increase at the end of the first year = $(120000 + 7200) = 127200$

$$\text{Decrease in second year} = \left(\frac{127200 \times 5 \times 1}{100} \right) = 6360$$

Increase at the end of the second year = $(127200 - 6360) = 120840$

Therefore, population in 2015 was 120840.

Question 25.

Solution:

Here $P = 500000$, $R = 2$ and $n = 2$

$$\text{Using the formula, } A = P \left(1 + \frac{R}{100}\right)^n$$

$$= 500000 \left(1 + \frac{2}{100} \right)^2$$

$$= 500000 \times \frac{51}{50} \times \frac{51}{50}$$

$$= 520200$$

Therefore, the population after 2 hours will be 520200.

Question 26.

Solution:

Initial population = 20000

$$\text{Increase in first hour} = \left(\frac{20000 \times 10 \times 1}{100} \right) = 2000$$

$$\text{Increase at the end of the first hour} = (20000 + 2000) = 22000$$

$$\text{Decrease in second hour} = \left(\frac{22000 \times 10 \times 1}{100} \right) = 2200$$

$$\text{Decrease at the end of the second hour} = (22000 - 2200) = 19800$$

$$\text{Increase in third hour} = \left(\frac{19800 \times 10 \times 1}{100} \right) = 1980$$

$$\text{Increase at the end of the third hour} = (19800 + 1980) = 21780$$

Therefore, bacteria at the end of 3 hours is 21780.

Question 27.

Solution:

Here $P = 625000$, $R = 8$ and $n = 2$

To calculate depreciation,

$$\text{Using the formula, } A = P \left(1 - \frac{R}{100} \right)^n$$

$$= 625000 \left(1 - \frac{8}{100} \right)^2$$

$$= 625000 \times \frac{23}{25} \times \frac{23}{25}$$

$$= 529000$$

Therefore, the value of machine after 2 years will be Rs.529000.

Question 28.

Solution:

Here $P = 56000$, $R = 10$ and $n = 3$

To calculate depreciation,

Using the formula, $A = P\left(1 - \frac{R}{100}\right)^n$

$$= 56000\left(1 - \frac{10}{100}\right)^3$$

$$= 56000 \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10}$$

$$= 40824$$

Therefore, the value of scooter after 3 years will be Rs.40824.

Question 29.

Solution:

Price of car = Rs.348000

$$\text{Depreciation for the first year} = \left(\frac{348000 \times 10 \times 1}{100}\right) = \text{Rs.}34800$$

$$\text{Value at the end of the first year} = (348000 - 34800) = \text{Rs. } 313200$$

$$\text{Depreciation for the second year} = \left(\frac{313200 \times 10 \times 1}{100}\right) = \text{Rs.}62640$$

$$\text{Value at the end of the second year} = (313200 - 62640) = \text{Rs. } 250560$$

Question 30.

Solution:

Here $A = 291600$, $P = x$, $R = 10$ and $n = 3$

To calculate depreciation,

$$\text{Using the formula, } A = P\left(1 - \frac{R}{100}\right)^n$$

$$\therefore 291600 = x\left(1 - \frac{10}{100}\right)^3$$

$$\therefore 291600 = x\left(\frac{9}{10} \times \frac{9}{10} \times \frac{9}{10}\right)$$

$$\therefore 291600 = \frac{729x}{1000}$$

$$\therefore x = \frac{291600 \times 1000}{729}$$

$$\therefore x = 400000$$

Therefore, the machine was purchased for Rs.400000.

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Exercise 11C

Question 1:

Solution:

Here $P = 8000$

$R = 10\%$ per annum

So, for half-yearly $R = 5\%$

$n = 1$ year $= 2$ half years

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$= 8000\left(1 + \frac{5}{100}\right)^2$$

$$= 8000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs.}8820$$

And compound interest $= 8820 - 8000 = \text{Rs.}820$

Question 2:

Solution:

Here $P = 31250$

$R = 8\%$ per annum

So, for half-yearly $R = 4\%$

$n = 1\frac{1}{2}$ years $= 3$ half years

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$= 31250\left(1 + \frac{4}{100}\right)^3$$

$$= 31250 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$$

$$= \text{Rs.}35152$$

And compound interest $= 35152 - 31250 = \text{Rs.}3902$

Question 3:

Solution:

Here $P = 12800$

$$R = 7\frac{1}{2}\% = \frac{15}{2}\% \text{ per annum}$$

$$\text{So, for half-yearly } R = \frac{15}{4}\%$$

$$n = 1 \text{ year} = 2 \text{ half years}$$

$$\text{Using the formula, } A = P\left(1 + \frac{R}{100}\right)^n$$

$$= 12800 \left(1 + \frac{\left(\frac{15}{4}\right)}{100}\right)^2$$

$$= 12800 \times \frac{83}{80} \times \frac{83}{80}$$

$$= \text{Rs.}13778$$

$$\text{And compound interest} = 13778 - 12800 = \text{Rs.}978$$

Question 4:

Solution:

$$\text{Here } P = 160000$$

$$R = 10\% \text{ per annum}$$

$$\text{So, for half-yearly } R = 5\%$$

$$n = 2 \text{ years} = 4 \text{ half years}$$

$$\text{Using the formula, } A = P\left(1 + \frac{R}{100}\right)^n$$

$$= 160000 \left(1 + \frac{5}{100}\right)^4$$

$$= 160000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs.}194481$$

$$\text{And compound interest} = 194481 - 160000 = \text{Rs.}34481$$

Question 5:

Solution:

$$\text{Here } P = 40960$$

$$R = \frac{25}{2}\% \text{ per annum}$$

$$\text{So, for half-yearly } R = \frac{25}{4}\%$$

$$n = 1\frac{1}{2} \text{ years} = 3 \text{ half years}$$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$= 40960 \left(1 + \frac{\left(\frac{25}{4}\right)}{100}\right)^3$$

$$= 40960 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}$$

$$= \text{Rs.}49130$$

And compound interest = $49130 - 40960 = \text{Rs.}8170$

Question 6:

Solution:

Here $P = 125000$

$R = 12\%$ per annum

So, for half-yearly $R = 6\%$

$$n = 1\frac{1}{2} \text{ year} = 3 \text{ half years}$$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$= 125000 \left(1 + \frac{6}{100}\right)^3$$

$$= 125000 \times \frac{53}{50} \times \frac{53}{50} \times \frac{53}{50}$$

$$= \text{Rs.}148877$$

And compound interest = $148877 - 125000 = \text{Rs.}23877$

Question 7:

Solution:

Here $P = 20000$

$R = 6\%$ per annum

So, for half-yearly $R = 3\%$

$$n = 1 \text{ year} = 2 \text{ half years}$$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$\begin{aligned}
&= 20000 \left(1 + \frac{3}{100} \right)^2 \\
&= 20000 \times \frac{103}{100} \times \frac{103}{100} \\
&= \text{Rs.} 21218
\end{aligned}$$

Therefore, amount she will get after 1 year is Rs.21218.

Question 8:

Solution:

For annual interest, Here $P = 65536$, $R = \frac{25}{2}$ and $n = 1$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 65536 \left(1 + \frac{\left(\frac{25}{2} \right)}{100} \right)$$

$$\begin{aligned}
&= 65536 \times \frac{9}{8} \\
&= \text{Rs.} 73728
\end{aligned}$$

And compound interest = $73728 - 65536 = \text{Rs.} 8192$

For half-yearly interest, Here $P = 65536$

$$R = \frac{25}{2} \% \text{ per annum}$$

$$\text{So, for half-yearly } R = \frac{25}{4} \%$$

$$n = 1 \text{ year} = 2 \text{ half years}$$

Using the formula, $A = P \left(1 + \frac{R}{100} \right)^n$

$$= 65536 \left(1 + \frac{\left(\frac{25}{4} \right)}{100} \right)^2$$

$$\begin{aligned}
&= 65536 \times \frac{17}{16} \times \frac{17}{16} \\
&= \text{Rs.} 73984
\end{aligned}$$

And compound interest = $73984 - 65536 = \text{Rs.} 8448$

Gain = half-yearly interest – annual interest

$$= 8448 - 8192 = \text{Rs.}256$$

Question 9:

Solution:

Here $P = 32000$

$R = 5\%$ per annum

So, for quarterly $R = \frac{5}{4}\%$

$n = 6$ months = 2 quarter years

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$= 32000 \left(1 + \frac{\left(\frac{5}{4}\right)}{100}\right)^2$$

$$= 32000 \times \frac{81}{80} \times \frac{81}{80}$$

$$= \text{Rs.}32805$$

Question 10:

Solution:

Here $P = 390625$

$R = 16\%$ per annum

So, for quarterly $R = 4\%$

$n = 1$ year = 4 quarter years

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$= 390625 \left(1 + \frac{4}{100}\right)^4$$

$$= 390625 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$$

$$= \text{Rs.}456976$$

Amount to discharge the debt is Rs.456976.

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Exercise 11D

Question 1.

Solution:(c) Rs.832

Question 2.

Solution:(b) Rs.3310

Question 3.

Solution:(a) Rs.1872

Question 4.

Solution:(c) Rs.961

Question 5.

Solution: (b) Rs.5051

Question 6.

Solution:(b) Rs.510

Question 7.

Solution:(a) Rs.1209

Question 8.

Solution:(b) 26460

Question 9.

Solution:(c) Rs.65200

Question 10.

Solution:(c) Rs.65200

Question 11.

Solution:(a) 25000

Question 12.

Solution:(d) Rs.1261

Question 13.

Solution:(d) Rs.480

Question 14.**Solution:**(d) Rs.4096**Question 15.****Solution:**(c) 6%**Page number: 157****TEST PAPER 11****A. Question 1.****Solution:**

Principal for the first year = Rs.3000

$$\text{Interest for the first year} = \left(\frac{3000 \times 10 \times 1}{100} \right) = \text{Rs.}300$$

Amount at the end of the first year = $(3000 + 300) = \text{Rs. } 3300$

Principal for the second year = Rs. 3300

$$\text{Interest for the second year} = \left(\frac{3300 \times 10 \times 1}{100} \right) = \text{Rs.}330$$

Amount at the end of the second year = $(3300 + 330) = \text{Rs. } 3630$

Principal for the third year = Rs.3630

$$\text{Interest for the third year} = \left(\frac{3630 \times 10 \times 1}{100} \right) = \text{Rs.}363$$

Amount at the end of the third year = $(3630 + 363) = \text{Rs. } 3993$ Therefore, compound interest = $(3993 - 3000) = \text{Rs.}993$ **Question 2.****Solution:**Principal for the first year = Rs.10000

$$\text{Interest for the first year} = \left(\frac{10000 \times 10 \times 1}{100} \right) = \text{Rs.}1000$$

Amount at the end of the first year = $(10000 + 1000) = \text{Rs. } 11000$

Principal for the second year = Rs. 11000

$$\text{Interest for the second year} = \left(\frac{11000 \times 12 \times 1}{100} \right) = \text{Rs.}1320$$

Amount at the end of the second year = $(11000 + 1320) = \text{Rs. } 12320$ Therefore, compound interest = $(12320 - 10000) = \text{Rs.}2320$ **Question 3.****Solution:**Here $P = 6000$ $R = 10\%$ per annum

So, for half-yearly $R = 5\%$

$n = 1 \text{ year} = 2 \text{ half years}$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$= 6000\left(1 + \frac{5}{100}\right)^2$$

$$= 6000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs.}6615$$

And compound interest $= 6615 - 6000 = \text{Rs.}615$

Question 4.

Solution:

Here $A = \text{Rs.}23762$, $P = x$, $R = 9$ and $n = 2$

Using the formula, $A = P\left(1 + \frac{R}{100}\right)^n$

$$\therefore 23762 = x\left(1 + \frac{9}{100}\right)^2$$

$$\therefore 23762 = x \times \frac{109}{100} \times \frac{109}{100}$$

$$\therefore x = \frac{23762 \times 100 \times 100}{109 \times 109}$$

$$\therefore x = 20000$$

Therefore, the sum is Rs.20000.

Question 5.

Solution:

Here $P = 32000$, $R = 10$ and $n = 2$

To calculate depreciation,

Using the formula, $A = P\left(1 - \frac{R}{100}\right)^n$

$$= 32000\left(1 - \frac{10}{100}\right)^2$$

$$= 32000 \times \frac{9}{10} \times \frac{9}{10}$$

$$= 25920$$

Therefore, the value of scooter after 2 years will be Rs.25920.

B.

Question 6.

Solution:(b) Rs.1050

Question 7.

Solution:(c) 4410

Question 8.

Solution:(d) 8%

Question 9.

Solution:(a) Rs.1655

Question 10.

Solution:(c) Rs.5000

C. Question 11.

Solution:

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

(ii) (Amount) – (Principal) = *Compound Interest*.

(iii) If the value of a machine is Rs.P and it depreciates at R% per annum, then its value after 2

years is $Rs.P \left(1 - \frac{R}{100} \right)^2$.

(iv) If the population P of a town increases at R% per annum, then its population after 5 years is

$P \left(1 + \frac{R}{100} \right)^5$.