Chapter-14

Compound Interest

Exercise 14.1

Q.1 Find the Compound Interest when Principal = Rs 3000 rate = 5% p.a and Time = 2 years

Sol given, Principal = Rs 3000

$R = 5\%$ p.a

$T = 2$ yrs.

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

$$= 3000\left(1+\frac{5}{100}\right)^2 = 3000\left(1+\frac{1}{20}\right)^2$$

$$= 3000\left(\frac{21}{20}\right)^2 = 3000 \times \frac{441}{400}$$

$$= 3307.5$$

$\therefore$ CI = A − P

= 3307.5 − 3000

= Rs 307.5

Q.2 What will be the compound interest on Rs 4000 in two years when rate of interest is 5% per annum.

Sol $P = 4000$, $n = 2$ years, $R = 5\%$

$$A = 4000\left(1+\frac{5}{100}\right)^2 = 4000\left(1+\frac{1}{20}\right)^2$$

$$= 4000 \times \left(\frac{21}{20}\right)^2$$

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$$= 4000 \times \frac{441}{400}$$

$$= 4410$$

$$CI = A - P$$
$$= 4410 - 4000 = Rs\ 410$$

Q.3 Rohit deposited Rs 8000 with a finance Company for 3 years at an interest of 15% per annum. What is the Compound Interest that Rohit gets after 3 years?

Sol: $P = Rs\ 8000$, $T = 3$ years, $R = 15\%$

$$A = P\left(1+\frac{R}{100}\right)^n$$
$$= 8000\left(1+\frac{15}{100}\right)^3 = 8000\left(1+\frac{3}{20}\right)^3$$
$$= 8000\left(\frac{23}{20}\right)^3 = 8000 \times \frac{12167}{8000}$$
$$= Rs\ 12167$$

$\therefore CI = A - P$
$= 12167 - 8000 = Rs\ 4167.00$.

Q.4 Find the Compound Interest on Rs 1000 at the rate of 8% p.a for $1\frac{1}{2}$ year when interest is Compounded half-yearly.

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Sol: Here, $P = Rs\ 1000$, $R = 8\%$ $T = 1\frac{1}{2}$ year $= \frac{3}{2}$ year

when interest is compounded half yearly.

$$A = P\left(1+\frac{R}{200}\right)^{2n}$$

$$= 1000\left(1+\frac{8}{200}\right)^{2\times\frac{3}{2}}$$

$$= 1000\left(1+\frac{1}{25}\right)^{3} = 1000\times\left(\frac{26}{25}\right)^{3}$$

$$= 1000\times\frac{17576}{15625}$$

$$= 1124.86$$

$\therefore$ $CI = A - P$

$= 1124.86 - 1000$

$= Rs\ 124.86$

Q5 Find the compound Interest on Rs 160000 for one year at the rate of 20% per annum, if the Interest is compounded quarterly.

Sol: $P = Rs\ 160000$, $T = 1$ year, $R = 20\%$

When Interest is compounded quarterly.

$$A = P\left(1+\frac{R}{400}\right)^{4n}$$

$$A = 160000\left(1+\frac{20}{400}\right)^{4\times1}$$

$$= 160000\left(1+\frac{1}{20}\right)^{4} = 160000\times\left(\frac{21}{20}\right)^{4}$$

$$= 160000\times\frac{194481}{160000}$$

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$= Rs\ 194481$

$\therefore CI = A - P$

$= 194481 - 160000$

$= Rs\ 34481$

Q.6 Swati took a loan of Rs 16000 against her insurance policy at the rate of $12\frac{1}{2}\%$ p.a. Calculate the total compound Interest payable by Swati after 3 years.

Sol: here, $P = Rs\ 16000$, $R = 12\frac{1}{2}\% = \frac{25}{2}\%$

$n = 3$ years.

Amount at the end of 3 years $= P\left(1+\frac{R}{100}\right)^n$

$= 16000\left(1+\frac{25}{200}\right)^3$

$= 16000\left(1+\frac{1}{8}\right)^3$

$= 16000\left(\frac{9}{8}\right)^3 = \frac{16000 \times 729}{512}$

$= Rs\ 22781.25$

Compound Interest $= A - P$

$= 22781.25 - 16000$

$= Rs\ 6781.25$

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Q7. Roma borrowed Rs 64000 from a bank for $1\frac{1}{2}$ years at the rate of 10% p.a. Compute the total Compound Interest payable by Roma after $1\frac{1}{2}$ years if the interest is compounded half yearly.

Sol: Amount borrowed (P) = Rs 64000

$T = 1\frac{1}{2}$ year $= \frac{3}{2}$ year

$R = 10\%$ p.a

When Interest is compounded half yearly

$$A = P\left(1+\frac{R}{200}\right)^{2n}$$

$$\Rightarrow A = 64000\left(1+\frac{10}{200}\right)^{2\times\frac{3}{2}}$$

$$= 64000\left(1+\frac{1}{20}\right)^{3} = 64000\times\left(\frac{21}{20}\right)^{3}$$

$$= 64000\times\frac{9261}{8000} = 8\times 9261$$

$$= \text{Rs. } 74088$$

$\therefore$ $CI = A - P$

$= 74088 - 64000 = \text{Rs } 10088$

Q8 Mewa Lal borrowed Rs 20000 from his friend Rooplal at 18% p.a simple Interest. He lent it Rampal at the same rate but compounded annually. Find his gain after 2 years.

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Sol: Given, $P = Rs\ 20000$, $R = 18\%$ $T = 2$ year

$$S.I = \frac{P \times R \times T}{100} = \frac{20000 \times 18 \times 2}{100} = Rs\ 7200$$

Total ~~Amount~~ Intrest amount Rampal has to pay to Newalal

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

$$= 20000\left(1 + \frac{18}{100}\right)^2 = 20000\left(\frac{59}{50}\right)^2$$

$$= Rs\ 27848$$

Now, $CI = A - P$

$$= 27848 - 20000 = Rs\ 7848$$

$\therefore$ Mewa lal gain $= Rs\ (7848 - 7200)$

$= Rs\ 648$

Q.9 Find the Compound Interest on Rs 8000 for 9 months at 20% per annum compounded Quarterly.

Sol: $P = Rs\ 8000$, $R = \frac{9}{12} = \frac{3}{4}$ yrs, $R = 20\%$

$$Amount = 8000\left(1 + \frac{20}{400}\right)^{4 \times \frac{3}{4}}$$

$$= 8000\left(1 + \frac{1}{20}\right)^3 = 8000 \times \left(\frac{21}{20}\right)^3$$

$$= 8000 \times \frac{9261}{8000} = Rs\ 9261$$

$CI = A - P$

$= 9261 - 8000 = Rs\ 1261$

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Q.10 Find the Compound Interest at the rate of 10% P.a for two years on that principal which in two years at the rate of 10% P.a gives Rs 200 as Simple Interest.

Sol: $SI = Rs\ 200$, $R = 10\%$. $T = 2yrs$.

$$\therefore P = \frac{SI \times 100}{T \times R} = \frac{200 \times 100}{2 \times 10} = Rs\ 1000.$$

Now, Rate of Compound Int = 10%

$T = 2yrs$.

$$A = P\left(1+\frac{R}{100}\right)^n = 1000\left(1+\frac{10}{100}\right)^2$$

$$= 1000\left(\frac{11}{10}\right)^2$$

$$= 1000 \times \frac{121}{100} = Rs\ 1210.$$

$$CI = A - P$$
$$= Rs\ 1210 - Rs\ 1000$$
$$= Rs\ 210.$$

Q.11 Find the Compound Interest on Rs 64000 for 1 ye at the rate of 10% P.a Compounded Quarterly.

Sol: $P = 64000$, $R = 10\%$. $T = 1$ year.

When Compounded Quarterly

$$A = P\left(1+\frac{R}{400}\right)^{4n}$$

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$$\Rightarrow A = 64000\left(1+\frac{10}{100}\right)^{4\times1}$$

$$= 64000\left(\frac{11}{10}\right)^{4} = 64000 \times \frac{121\times121}{10000}$$

$$= \text{Rs } 70644{\cdot}03$$

$$\therefore CI = A - P$$

$$= 70644{\cdot}03 - 64000 = \text{Rs } 6644{\cdot}03$$

Q.12 Ramesh deposited Rs 7500 in a bank which pays him 12% Interest. p.a Compounded Quarterly. What is the amount which he receives after 9 months.

Sol: $P = \text{Rs } 7500$, $R = 12\%$ p.a, $T = 9$ Months

$$= \frac{9}{12} = \frac{3}{4} \text{ years.}$$

Compounded Quarterly

$$A = P\left(1+\frac{R}{400}\right)^{4n}$$

$$= 7500\left(1+\frac{12}{400}\right)^{4\times\frac{3}{4}}$$

$$= 7500\left(1+\frac{3}{100}\right)^{3} = 7500 \times \frac{103}{100} \times \frac{103}{100} \times \frac{103}{100}$$

$$= \text{Rs } 8195{\cdot}45$$

$\therefore$ Total Amount received = Rs 8195.45

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Q.13 Anil borrowed a sum of Rs 9600 to install a hand pump in his dairy. If the rate of interest is $5\frac{1}{2}$ % p.a compounded annually, determine the Compound Interest which Anil will have to pay after 3 yrs.

Sol: $P = Rs\ 9600$, $R = 5\frac{1}{2}\% = \frac{11}{2}\%$ p.a, $T = 3$ yrs.

When Interest Compounded annually.

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

$$= 9600\left(1+\frac{11}{200}\right)^3$$

$$= 9600 \times \left(\frac{211}{200}\right)^3 = 9600 \times \frac{211}{200} \times \frac{211}{200} \times \frac{211}{200}$$

$$= Rs\ 11272.71$$

$$C.I = A - P$$

$$= 11272.71 - 9600 = Rs\ 1672.72$$

Q.14 Swabhi borrowed a sum of Rs 12000 from a finance company to purchase a refrigerator. If the rate of Interest is 5% p.a Compounded annually, Calculate the Compound Interest that Swabhi has to pay to the company after 3 years.

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Sol: $P = Rs\ 12000$, $R = 5\%\ p.a$, $T = 3\ yrs$.

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

$$= 12000\left(1+\frac{5}{100}\right)^3 = 12000\left(1+\frac{1}{20}\right)^3$$

$$= 12000 \times \left(\frac{21}{20}\right)^3$$

$$= 12000 \times \frac{9261}{8000}$$

$$= Rs\ 13891.5$$

$\therefore CI = A - P$

$= 13891.5 - 12000 = Rs\ 1891.5$

Q.15 Daljit received a sum of Rs. 40000 as a loan from a finance company. If the rate of interest is 7% p.a compounded annually, calculate the compound Interest that Daljit pays after 2 years.

Sol: $P = Rs\ 40000$, $R = 7\%\ p.a$, $T = 2\ years$.

$$A = 40000\left(1+\frac{7}{100}\right)^2 = 40000 \times \left(\frac{107}{100}\right)^2$$

$$= 40000 \times \frac{107}{100} \times \frac{107}{100}$$

$$= 45796$$

$\therefore CI = A - P$

$= 45796 - 40000$

$= Rs\ 5796$

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