

EXERCISE NO. 3**-:3.1:-**

If Rs. 10,000 is invested for 6 years at an annual simple interest rate of 16%.

- a) How much interest will be earned?
- b) What is the amount of the investment at the end of the 6 years.

SOLUTION

Here Principal = Rs. 10000, rate = 16%, Time = 6 years

(a)

$$\begin{aligned}\text{Simple Interest} = I &= \frac{P \times r \times t}{100} \\ &= \frac{10000 \times 16 \times 6}{100} = \text{Rs. } 9600\end{aligned}$$

(b)

$$\begin{aligned}\text{Amount} &= \text{Principal} + \text{Simple Interest} = P + I \\ &= \text{Rs. } 10000 + \text{Rs. } 9600 = \text{Rs. } 19600\end{aligned}$$

-:3.2:-

Find the simple interest and amount for the following:

- i) Rs. 2000 for 3 years at 5%.
- ii) Rs. 800 for 7 years at 4%.
- iii) Rs. 4000 for 5 years at 6%.

SOLUTION

(i) Principal = Rs. 2000, Rate = 5%

Time = 3 years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{2000 \times 5 \times 3}{100} = \text{Rs. } 300$$

$$\begin{aligned}\text{Amount} = A &= \text{Principal} + \text{Simple Interest} \\ &= \text{Rs. } 2000 + \text{Rs. } 300 = \text{Rs. } 2300\end{aligned}$$

(ii) Principal = Rs. 800, Rate = 4%,

Time = 7 years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{800 \times 4 \times 7}{100} = \text{Rs. } 224$$

$$\text{Amount} = \text{Principal} + \text{Simple Interest}$$

$$= \text{Rs. } 800 + \text{Rs. } 224 = \text{Rs. } 1024$$

(iii) Principal = Rs. 4000, Rate = 6%, Time = 5 years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{4000 \times 6 \times 5}{100} = \text{Rs. } 1200$$

$$\text{Amount} = \text{Principal} + \text{Simple Interest}$$

$$= \text{Rs. } 4000 + \text{Rs. } 1200 = \text{Rs. } 5200$$

-:3.3:-

Mr. Asghar borrowed Rs. 5000 for 5 years at 8% simple interest. How much he will repay?

SOLUTION

Principal = Rs. 5000, Rate = 8%, Time = 5 years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{5000 \times 8 \times 5}{100} = \text{Rs. } 2000$$

Mr. Asghar will repay

$$\text{Amount} = \text{Principal} + \text{Simple Interest}$$

$$= \text{Rs. } 5000 + \text{Rs. } 2000 = \text{Rs. } 7000$$

-:3.4:-

Mr. Bashir Ahmad borrowed Rs. 4500 from Habib Bank at $8\frac{1}{2}\%$ and lent the whole amount at 10% the same day, what would he gained from this after 4 years.

SOLUTION

Principal = Rs. 4500

$$\text{Rate} = 8\frac{1}{2}\% = \frac{17}{2}\%$$

Time = 4 years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{4500 \times 17 \times 4}{100 \times 2} = \text{Rs. } 1530$$

Mr. Bashir lent = Rs. 4500, Rate = 10%, Time = 4 year

$$\text{Simple Interest} = \frac{4500 \times 10 \times 4}{100} = \text{Rs. } 1800$$

$$\text{He will gain} = \text{Rs. } 1800 - \text{Rs. } 1530 = \text{Rs. } 270$$

-:3.5:-

Khalid Mahmood borrowed Rs. 2500 from Sultan for $3\frac{1}{2}$ years at simple interest at 8% per annum. How much Khalid Mahmood has to pay at the end of the period.

SOLUTION

Principal = Rs. 2500, Rate = 8%

Time = $3\frac{1}{2}$ years = $\frac{7}{2}$ years = 4 years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{2500 \times 8 \times 4}{100 \times 2} = \text{Rs. } 700$$

He will pay = Rs. 2500 + Rs. 700 = Rs. 3200

-:3.6:-

What sum would borrow in Rs. 1250 as simple interest at 3% in 3 years.

SOLUTION

Simple Interest = Rs. 1250, Rate = 3%, Time = 3 years

$$\begin{aligned}\text{Principal} = P &= \frac{I \times 100}{r \times t} = \frac{1250 \times 100}{3 \times 3} \\ &= \text{Rs. } 13888.89 = \text{Rs. } 13889\end{aligned}$$

-:3.7:-

Find the principal, if the amount for 5 years at 5% is Rs. 5550.

SOLUTION

Here Amount = Rs. 5550, Rate = 5%, Time = 5 years

$$\begin{aligned}\text{Principal} = P &= \frac{A \times 100}{100 + (r \times t)} \\ &= \frac{5550 \times 100}{100 + (5 \times 5)} = \frac{555000}{125} = \text{Rs. } 4440\end{aligned}$$

-:3.8:-

How much should Mr. Arif borrow from Mr. Hanif so that he may have to repay Rs. 4425 after 3 years if Hanif charges a simple interest rate 5%.

SOLUTION

Here Amount = Rs. 4425, Rate = 5%, Time = 3 years

We have

$$\begin{aligned}\text{Principal} = P &= \frac{A \times 100}{100 + (r + t)} \\ &= \frac{4425 \times 100}{100 + (5 \times 3)} = \frac{442500}{115} = \text{Rs. } 3847.83 = \text{Rs. } 3848\end{aligned}$$

:-3.9:-

How much should Mr. Maqbool borrows from a bank so that he may have to repay Rs. 2800 after 2 years if the bank charges a simple interest rate 4%.

SOLUTION

Here Amount = Rs. 2800, Rate = 4%, Time = 2 years

We have

$$\begin{aligned}\text{Principal} = P &= \frac{A \times 100}{100 + (r + t)} \\ &= \frac{2800 \times 100}{100 + (4 \times 2)} = \frac{280000}{108} = \text{Rs. } 2592.59 = \text{Rs. } 2593\end{aligned}$$

:-3.10:-

Find the sum of money that amount to Rs. 2775 in five years Nine months at 4%.

SOLUTION

Here Amount = Rs. 2775, Rate = 4%,

Time = 5 years and 9 month.

$$5 + \frac{9}{12} \text{ year} = 5\frac{3}{4} \text{ year} = \frac{23}{4} \text{ year}$$

We have

$$\begin{aligned}\text{Principal} = P &= \frac{A \times 100}{100 + (r + t)} \\ &= \frac{2775 \times 100}{100 + (4 \times \frac{23}{4})} = \frac{2775 \times 100}{100 + 23} = \frac{277500}{123}\end{aligned}$$

$$\text{Principal} = P = \text{Rs. } 2256.097 = \text{Rs. } 2256$$

-:3.11:-

At what rate of interest, would Rs. 1800 amount to Rs. 2500 in 2 years.

SOLUTION

Here Principal = P = Rs. 1800 and Amount = A = Rs. 2500

Simple Interest = Amount - Principal

$$= \text{Rs. } 2500 - \text{Rs. } 1800 = \text{Rs. } 700$$

Time = 2 years

We have

$$\text{Rate} = r = \frac{I \times 100}{P \times t} = \frac{700 \times 100}{1800 \times 2} = 19.44\%$$

-:3.12:-

Find the rate percent of interest, if the simple interest on Rs. 21540 for 4 years 9 months is Rs. 5000.

SOLUTION

Here Simple Interest = I = Rs. 5000

Principal = P = Rs. 21540

Time = 4 years and 9 months

$$4\frac{9}{12} \text{ years} = 4\frac{3}{4} \text{ years} = \frac{19}{4} \text{ years}$$

We have

$$\begin{aligned} \text{Rate} = r &= \frac{I \times 100}{P \times t} \\ &= \frac{5000 \times 100 \times 4}{21540 \times 19} = \frac{2000000}{409260} = 4.89\% \end{aligned}$$

-:3.13:-

At what rate of interest would a sum of money becomes one and a half in 10 years.

SOLUTION

Suppose Sum = Rs. 100

Simple I becomes one and half itself, so Amount A = Rs. 150

Simple Interest = Rs. 150 - Rs. 100 = Rs. 50

Time = 10 years

Hence

$$\text{Rate} = r = \frac{I \times 100}{P \times t} = \frac{50 \times 100}{100 \times 10} = 5\%$$

-:3.14:-

How long will it take for Rs. 1000 to amount Rs. 1180 at 6% per annum simple interest.

SOLUTION

We know that

Amount = Principal + Simple Interest

$$A = P + I$$

$$I = A - P$$

Amount = Rs. 1180, Principal = Rs. 1000

Simple Interest = Rs. 1180 - Rs. 1000 = Rs. 180

Rate = 6%

$$\text{Time} = t = \frac{I \times 100}{P \times r} = \frac{180 \times 100}{1000 \times 6} = 3 \text{ years}$$

-:3.15:-

In how many years would a sum lent at 8% be doubled.

SOLUTION

Suppose the sum = Rs. 100, Amount = Rs. 200

Simple Interest = I = Rs. 200 - Rs. 100, Rate = $r = 8\%$

Hence

$$\text{Time} = t = \frac{I \times 100}{P \times r} = \frac{100 \times 100}{100 \times 8} = 12\frac{1}{2} \text{ years}$$

-:3.16:-

Find the compound interest on Rs. 8000 for 3 years at 5% per annum.

SOLUTION

Principal = Rs. 8000, Rate = $r = 5\%$, Time = $n = 3$ years

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

$$\begin{aligned}\text{Amount} &= 8000 \left(1 + \frac{5}{100}\right)^3 = 8000 \left(\frac{105}{100}\right)^3 \\ &= 8000 (1.05)^3 = 8000 (1.157625) = \text{Rs. } 9261\end{aligned}$$

$$\text{Compound Interest} = \text{Rs. } 9261 - \text{Rs. } 8000 = \text{Rs. } 1261$$

-:3.17:-

Find the amount at compound interest of Rs. 12000 at 6% per annum for 2 years and 6 months. Also find the compound interest.

SOLUTION

Principal = Rs. 12000, Rate = $r = 6\%$

Time = $n = 2$ years 6 months

The number of six month periods in 2 years 6 month are 5, 6% per annum compounded semi-annually is equivalent to 3% every six months. So,

Here $n = 5$ six months periods

Rate = 3% compounded semi-annually

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100}\right)^n \\ &= 12000 \left(1 + \frac{3}{100}\right)^5 = 12000 \left(\frac{103}{100}\right)^5 \\ &= 12000 (1.03)^5 = 12000 (1.15927074) \\ &= \text{Rs. } 13911.28889 = \text{Rs. } 13911.29\end{aligned}$$

-:3.18:-

Find the compound amounts and compound interest for the given investments.

- a) Rs. 5000 at 5% compounded annually for ten years.
- b) Rs. 5000 at 5% compounded semi annually for ten years.
- c) Rs. 5000 at 5% compounded quarterly for ten years.
- d) Rs. 8000 at 8% compounded annually for ten years.
- e) Rs. 8000 at 8% compounded semi annually for ten years.
- f) Rs. 8000 at 8% compounded quarterly for ten years.

SOLUTION

- (a) Principal = $P = 5000$, Rate = $r = 5\%$ Compounded annually
Time = $n = 10$ years

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100} \right)^n = 5000 \left(1 + \frac{5}{100} \right)^{10} \\ &= 5000 \left(\frac{105}{100} \right)^{10} = 5000(1.05)^{10} \\ &= 5000(1.628894627) = \text{Rs. } 8144.47\end{aligned}$$

Hence Amount = Rs. 8144.47 and Interest = Rs. 3144.47

- (b) Principal = $P = 5000$, Rate = $r = 5\%$ Compounded annually
Time = $n = 20$ six months periods semi-annually

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100} \right)^n \\ &= 5000 \left(1 + \frac{2.5}{100} \right)^{20} = 5000 (1 + 0.025)^{20} \\ &= 5000 (1.163861644) = \text{Rs. } 8193.08\end{aligned}$$

Hence Amount = Rs. 8193.08 and Interest = Rs. 3193.08

- (c) Principal = $P = 5000$, Rate = $r = 5\%$ per annum
Five percent compounded quarterly = $\frac{0.05}{4} = 0.0125$ per quarter.
Since there are four quarters in a year, the number of interest periods is $n = 40$ quarters. Hence the compound amount is:

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100} \right)^n = 5000 \left(1 + \frac{1.25}{100} \right)^{40} \\ &= 5000 (1 + 0.0125)^{40} = 5000 (1.0125)^{40} \\ &= 5000(1.643619463) = \text{Rs. } 8218.10\end{aligned}$$

Hence Amount = Rs. 8218.10 and Interest = Rs. 3218.10

- (d) Principal = $P = 8000$, Rate = $r = 8\%$ per annum
Time = $n = 10$ years

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

$$\begin{aligned}\text{Amount} &= 8000 \left(1 + \frac{8}{100}\right)^{10} = 8000 \left(\frac{108}{100}\right)^{10} \\ &= 8000(1.08)^{10} = 8000 (2.158924997) = \text{Rs. } 17271.40 \\ \text{Hence Amount} &= \text{Rs. } 17271.40 \text{ and Interest} = \text{Rs. } 9271.40\end{aligned}$$

- (e) Principal = $P = 8000$, Rate = $r = 8\%$ per annum
 8% compounded semi-annually is $\frac{8}{2}\% = 4\%$ each six month.
 There are 20 six month periods i.e. $n = 20$

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100}\right)^n \\ &= 8000 \left(1 + \frac{4}{100}\right)^{20} = 8000 \left(\frac{104}{100}\right)^{20} \\ &= 8000(1.04)^{20} = 8000 (2.191123143) \\ &= \text{Rs. } 17528.99\end{aligned}$$

Hence Amount = Rs. 17528.99 and Interest = Rs. 9528.99

- (f) Principal = $P = 8000$, Rate = $r = 8\%$ per annum
 8% compounded quarterly is $\frac{8\%}{4} = 2\%$ per quarter.
 There are 40 quarters in 10 years. So $n = 40$ quarters.

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100}\right)^n \\ &= 8000 \left(1 + \frac{2}{100}\right)^{40} = 8000 \left(\frac{102}{100}\right)^{40} \\ &= 8000(1.02)^{40} = 8000 (2.208039664) \\ &= \text{Rs. } 17664.32\end{aligned}$$

Hence Amount = Rs. 17664.32 and Interest = Rs. 9664.32

-:3.19:-

A man deposits Rs. 5000 at the time of his son's birth, in an investment that pays 4% compounded semi annually. How much will be on deposit on the son's 21st birthday.

SOLUTION

Principal = $P = 5000$, Rate = $r = 4\%$
 $r = 2\%$ Compounded semi-annually

Time = $n = 21$ years = 42 six month periods

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100} \right)^n = 5000 \left(1 + \frac{2}{100} \right)^{42} \\ &= 5000 (1.02)^{42}\end{aligned}$$

$$\text{Let } x = (1.02)^{42}$$

taking log of both sides

$$\log x = 42 \log (1.02)$$

$$\log x = 42 (0.0086001717)$$

$$\log x = 0.361207214$$

taking antilog of both sides

$$x = 2.29724466$$

Hence Amount = $5000 (2.29724466) = \text{Rs. } 11448.62$

-:3.20:-

Mr. Aslam has invested Rs. 25000 at 6% compounded annually. What amount would be received after 4 years.

SOLUTION

Principal = $P = 25000$, Rate = $r = 6\%$, Time = $n = 4$ years

$$\begin{aligned}\text{Amount} &= P \left(1 + \frac{r}{100} \right)^n \\ &= 25000 \left(1 + \frac{6}{100} \right)^4 = 25000 \left(\frac{106}{100} \right)^4\end{aligned}$$

$$\begin{aligned}\text{Amount} &= 25000 (1.06)^4 = 25000 (1.26247696) \\ &= \text{Rs. } 31561.92\end{aligned}$$

-:3.21:-

On a saving bank account Bank-A pays 3% interest compounded annually, while Bank-B pays 6% interest compounded semi annually on a deposit of Rs. 2000, how much more interest will be earned in 3 years at Bank-B as compared to Bank-A.

SOLUTION

Principal = $P = 2000$

Bank A:-

Principal = P = Rs. 2000, Rate = 3%, Time = 3 years

$$\begin{aligned}
 \text{Amount} &= P \left(1 + \frac{r}{100} \right)^n \\
 &= 2000 \left(1 + \frac{6}{100} \right)^3 = 2000 \left(\frac{106}{100} \right)^3 \\
 &= 2000 (1.06)^3 = 2000 (1.092727) = \text{Rs. } 2185.45
 \end{aligned}$$

Bank B:-

Principal = P = Rs. 2000

The number of six months periods in 3 years are 6 and 6% per annum compounded semi-annually is equal to 3% every six months. So,

Rate = 3% Compounded semi-annually, Time = n = 6

$$\begin{aligned}
 \text{Amount} &= P \left(1 + \frac{r}{100} \right)^n \\
 &= 2000 \left(1 + \frac{3}{100} \right)^6 = 2000 \left(\frac{103}{100} \right)^6 \\
 &= 2000 (1.03)^6 = 2000 (1.194052297) = \text{Rs. } 2388.10
 \end{aligned}$$

Bank B will earn more than Bank A

$$= \text{Rs. } 2388.10 - \text{Rs. } 2185.45 = \text{Rs. } 202.65$$

:-3.22:-**Find the principal of Rs. 9628.20 due at the end of 8 years if money is worth 6% compounded semi annually.****SOLUTION**

We have to find principal

Time = n = 8 x 2 = 16 six month periods

Rate = r = 6% per annum = 3% Semi annually

Amount = Rs. 9628.20

$$P = \frac{A}{\left(1 + \frac{r}{100} \right)^n} = \frac{9628.20}{\left(1 + \frac{3}{100} \right)^{16}} = \frac{9628.20}{(1.03)^{16}} = \frac{9628.20}{(1.03)^{16}}$$

$$\text{Let } x = (1.03)^{16}$$

Taking log of both sides

$$\log x = 16 \log (1.03)$$

$$\log x = 16 (0.012837224)$$

$$\log x = 0.205395584$$

Taking antilog of both sides

$$x = 1.604706397$$

Hence

$$P = \frac{9628.20}{1.604706397} = \text{Rs. } 6000$$

∴3.23:-

The compound interest for 5 years at 5% is Rs. 1000. Find the principal.

SOLUTION

Compound Interest = Rs. 1000, Rate = 5%, Time = 5 years

We have to find principal, Suppose

Principal = P = Rs. 100

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

$$= 100 \left(1 + \frac{5}{100} \right)^5 = 100 \left(\frac{105}{100} \right)^5$$

$$= 100 (1.05)^5 = 100 (1.276281563)$$

$$= \text{Rs. } 127.7281563 = \text{Rs. } 127.63$$

Compound Interest = Amount - Principal

$$= \text{Rs. } 127.63 - \text{Rs. } 100 = \text{Rs. } 27.63$$

If C-I is Rs. 27.63, Principal = Rs. 100

If C-I is Rs. 1000, then

$$P = \frac{100 \times 1000}{27.63} = \text{Rs. } 3619.25$$

∴3.24:-

In how many years a sum of Rs. 1000 would amount Rs. 1350 at 4% compounded interest.

SOLUTION

Principal = Rs. 1000, Amount = Rs. 1350, Rate = 4%

We have to find n

$$\begin{aligned}
 n &= \frac{\log A - \log P}{\log \left(1 + \frac{r}{100} \right)} \\
 &= \frac{\log 1350 - \log 1000}{\log \left(1 + \frac{4}{100} \right)} = \frac{\log 1350 - \log 1000}{\log(1.04)} \\
 &= \frac{3.13033 - 3.00000}{0.01703} = \frac{0.13033}{0.01703} = 7.65 \text{ years}
 \end{aligned}$$

-:3.25:-

In how many years a sum of Rs. 5560 would amount Rs. 7000 at 8% interest compounded semi annually.

SOLUTION

Principal = P = Rs. 5560, Amount = A = Rs. 7000

Rate = 8% per annum = 4% semi-annually

We have to find n

$$\begin{aligned}
 n &= \frac{\log A - \log P}{\log \left(1 + \frac{r}{100} \right)} \\
 &= \frac{\log 7000 - \log 5560}{\log \left(1 + \frac{4}{100} \right)} = \frac{\log 7000 - \log 5560}{\log(1.04)} \\
 &= \frac{3.84509 - 3.74507}{0.01703} = \frac{0.10002}{0.01703}
 \end{aligned}$$

$n = 5.87 = 6$ periods of six months = 3 years.

-:3.26:-

In how many years a sum of Rs. 3000 would amount Rs. 6130.43 at 6% compounded quarterly.

SOLUTION

Principal = P = Rs. 3000, Amount = A = Rs. 6130.43

Rate = 6% per annum

6% compounded quarterly = $\frac{6\%}{4} = 1.5\%$

We have to find n

$$\begin{aligned} n &= \frac{\log A - \log P}{\log \left(1 + \frac{r}{100}\right)} = \frac{\log 6130.43 - \log 3000}{\log \left(1 + \frac{1.5}{100}\right)} \\ &= \frac{\log 6130.43 - \log 3000}{\log(1.015)} = \frac{3.78749038 - 3.477121255}{0.006466042} \\ &= \frac{0.310369683}{0.006444042} = 47.9999485 = 48 \text{ quarters} = 12 \text{ years} \end{aligned}$$

-:3.27:-

At what rate of interest compounded per annum for 5 years will Rs. 2000 amount to Rs. 2250.

SOLUTION

Here Principal = P = Rs. 2000

Amount = A = Rs. 2250

n = 5 years.

We have to find the value of r.

$$\frac{r}{100} = \text{Anti log} \left[\frac{1}{n} (\log A - \log P) \right] - 1 \Rightarrow \frac{r}{100} = \text{Anti log} \left[\frac{\log A - \log P}{n} \right] - 1$$

$$\frac{r}{100} = \text{Anti log} \left[\frac{\log 2250 - \log 2000}{5} \right] - 1$$

$$\frac{r}{100} = \text{Anti log} \left[\frac{3.40654 - 3.30103}{5} \right] - 1 \Rightarrow \frac{r}{100} = \text{Anti log} \left[\frac{0.10551}{5} \right] - 1$$

$$\frac{r}{100} = \text{Anti log}(0.021102) - 1 = 1.049788957 - 1$$

$$r = 4.9788957\% = 5\%$$

-:3.28:-

At what rate of interest compounded quarterly for $2\frac{1}{2}$ years will Rs. 2500 amount to Rs. 3900

SOLUTION

Principal = P = Rs. 2500, Amount = A = Rs. 3900

$n = 2\frac{1}{2}$ years = 10 periods of three months as interest compounded is quarterly

We have to find the value of r .

$$\frac{r}{100} = \text{Anti log} \left[\frac{1}{n} (\log A - \log P) \right] - 1$$

$$\frac{r}{100} = \text{Anti log} \left[\frac{\log 3900 - \log 2500}{10} \right] - 1$$

$$\frac{r}{100} = \text{Anti log} \left[\frac{3.59106 - 3.39794}{10} \right] - 1 \Rightarrow \frac{r}{100} = \text{Anti log} \left[\frac{0.19312}{10} \right] - 1$$

$$\frac{r}{100} = \text{Anti log}(0.019312) - 1 = 1.04547 - 1$$

$$r = 4.547\% \text{ quarterly} = 18.18\% \text{ per annum}$$

-:3.29:-

What is the difference between the compound and simple interest of Rs. 15625 for 4 years at 4%.

SOLUTION

Principal = P = Rs. 15625, Rate = r = 4%, Time = n = 4 years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{15625 \times 4 \times 4}{100}$$

Simple Interest = Rs. 2500

Compound Interest

$$\begin{aligned} \text{Amount} &= P \left(1 + \frac{r}{100} \right)^n = 15625 \left(1 + \frac{4}{100} \right)^4 = 15625 \left(\frac{104}{100} \right)^4 \\ &= 15625 (1.04)^4 = 15625 (1.16985856) = \text{Rs. } 18279.04 \end{aligned}$$

Compound Interest = Amount - Principal

$$= \text{Rs. } 18279.04 - \text{Rs. } 15625 = \text{Rs. } 2654.04$$

Difference between simple and compound interest

$$= \text{Rs. } 2654.04 - \text{Rs. } 2500 = \text{Rs. } 154.04$$

-:3.30:-

If the difference between the simple and compound interest for 3 years at 5% is Rs. 61. Find the principal.

SOLUTION

Let the Principal = $P = \text{Rs. } 100$, Rate = $r = 5\%$, Time = $n = 3$ years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{100 \times 5 \times 3}{100} = \text{Rs. } 15$$

Compound Interest

$$\begin{aligned} \text{Amount} &= P \left(1 + \frac{r}{100}\right)^n = 100 \left(1 + \frac{5}{100}\right)^3 \\ &= 100 (1.05)^3 = 100 (1.157625) = \text{Rs. } 115.76 \end{aligned}$$

Compound interest = $\text{Rs. } 115.76 - \text{Rs. } 100 = \text{Rs. } 15.76$

Difference between simple and compound interest

$$= \text{Rs. } 15.76 - \text{Rs. } 15 = \text{Rs. } 0.76$$

If difference is $\text{Rs. } 0.76$, then principal = $\text{Rs. } 100$

If difference is $\text{Rs. } 61$, then

$$\text{Principal} = \frac{100 \times 61}{0.76} = \text{Rs. } 8026.32$$

:-3.31:-

The difference between the simple and compound interest on a certain sum is $\text{Rs. } 2.50$ for 2 years at 5%. Find the sum.

SOLUTION

Let the Principal = $P = \text{Rs. } 100$, Rate = $r = 5\%$, Time = $n = 2$ years

$$\text{Simple Interest} = I = \frac{P \times r \times t}{100} = \frac{100 \times 5 \times 2}{100} = \text{Rs. } 10$$

Compound Interest

$$\begin{aligned} \text{Amount} &= P \left(1 + \frac{r}{100}\right)^n = 100 \left(1 + \frac{5}{100}\right)^2 = 100 \left(\frac{105}{100}\right)^2 \\ &= 100 (1.05)^2 = 100 (1.1025) = \text{Rs. } 110.25 \end{aligned}$$

Compound interest = $\text{Rs. } 110.25 - \text{Rs. } 100 = \text{Rs. } 10.25$

Difference between simple and compound interest

$$= \text{Rs. } 10.25 - \text{Rs. } 10 = \text{Rs. } 0.25$$

If difference is $\text{Rs. } 0.25$, then principal = $\text{Rs. } 100$

If difference is $\text{Rs. } 2.5$, then

$$\text{Principal} = \frac{100 \times 2.50}{0.25} = \text{Rs. } 1000$$
