CHAPTER 10

COMPOUND INTEREST

1. Find the compound interest when principal = Rs 3000, rate = 5% per annum and time = 2 years.

Solution:

Given details are, Principal (p) = Rs 3000 Rate (r) = 5% Time = 2years Interest for the first year = $(3000 \times 5 \times 1)/100 = 150$ Amount at the end of first year = Rs 3000 + 300 = Rs 3150Principal interest for the second year = $(3150 \times 5 \times 1)/100 = 157.5$ Amount at the end of second year = Rs 3150 + 157.5 = Rs 3307.5 \therefore Compound Interest = Rs 3307.5 - Rs 3000 = Rs 307.5

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

Solution:

Given details are, Principal (p) = Rs 4000 Rate (r) = 5% Time = 2years By using the formula, $A = P (1 + R/100)^n$ = 4000 (1 + 5/100)² = 4000 (105/100)² = Rs 4410 :. Compound Interest = A - P = Rs 4410 - Rs 4000 = Rs 410

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? Solution:

Given details are, Principal (p) = Rs 8000 Rate (r) = 15% Time = 3years By using the formula, $A = P (1 + R/100)^n$ = 8000 (1 + 15/100)³ = 8000 (115/100)³ = Rs 12167 :: Compound Interest = A - P = Rs 12167 - Rs 8000 = Rs 4167

4. Find the compound interest on Rs. 1000 at the rate of 8% per annum for 1 ½ years when interest is compounded half yearly.

Solution: Given details are, Principal (p) = Rs 1000 Rate (r) = 8% Time = 1 $\frac{1}{2}$ years = $3/2 \times 2 = 3$ half years By using the formula, $A = P (1 + R/200)^{2n}$ = 1000 (1 + 8/200)^3 = 1000 (208/200)^3 = Rs 1124.86 \therefore Compound Interest = A – P = Rs 1124.86 – Rs 1000 = Rs 124.86

5. Find the compound interest on Rs. 160000 for one year at the rate of 20% per annum, if the interest is compounded quarterly. Solution:

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Given details are,

Principal (p) = Rs 160000

Rate (r) = 20\% = 20/4 = 5\% (for quarter year)

Time = 1year = 1 \times 4 = 4 quarters

By using the formula,

A = P (1 + R/100)^n

= 160000 (1 + 5/100)^4

= 160000 (105/100)^4

= Rs 194481

\therefore Compound Interest = A - P = Rs 194481 - Rs 160000 = Rs 34481
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6. Swati took a loan of Rs. 16000 against her insurance policy at the rate of 12 ½ % per annum. Calculate the total compound interest payable by Swati after 3 years. Solution:

Given details are, Principal (p) = Rs 16000 Rate (r) = $12 \frac{1}{2} \% = 12.5\%$ Time = 3years By using the formula, $A = P (1 + R/100)^n$ = $16000 (1 + 12.5/100)^3$ = $16000 (112.5/100)^3$ = Rs 22781.25 \therefore Compound Interest = A - P = Rs 22781.25 - Rs 16000 = Rs 6781.25

7. Roma borrowed Rs. 64000 from a bank for 1 ½ years at the rate of 10% per annum. Compare the total compound interest payable by Roma after 1 ½ years, if the interest is compounded half-yearly.

Solution:

Given details are, Principal (p) = Rs 64000 Rate (r) = 10 % = 10/2 % (for half a year) Time = 1 $\frac{1}{2}$ years = $3/2 \times 2 = 3$ (half year) By using the formula, A = P (1 + R/100)ⁿ = 64000 (1 + 10/2×100)³ = 64000 (210/200)³ = Rs 74088 :. Compound Interest = A – P = Rs 74088 – Rs 64000 = Rs 10088

8. Mewa lal borrowed Rs. 20000 from his friend Rooplal at 18% per annum simple interest. He lent it to Rampal at the same rate but compounded annually. Find his gain after 2 years.
Solution:
Given details are,
Principal (p) = Rs 20000
Rate (r) = 18 %

Time = 2 years By using the formula, Interest amount Mewa lal has to pay, By using the formula, Simple interest = $P \times T \times R/100$ = $(20000 \times 18 \times 2)/100 = 7200$

Interest amount Rampal has to pay to Mewa lal, By using the formula, $A = P (1 + R/100)^n$ = 20000 (1 + 18/100)² = 20000 (118/100)² = Rs 27848 - 20000 (principal amount) = Rs 7848

:. Mewa lal gain = Rs (7848 - 7200) = Rs 648

9. Find the compound interest on Rs. 8000 for 9 months at 20% per annum compounded quarterly.

Solution:

Given details are, Principal (p) = Rs 8000 Rate (r) = 20 % = 20/4 = 5% (for quarterly) Time = 9 months = 9/3 = 3 (for quarter year) By using the formula, $A = P (1 + R/100)^n$ = 8000 (1 + 5/100)³ = 8000 (105/100)³ = Rs 9261 :. Compound Interest = A - P = Rs 9261 - Rs 8000 = Rs 1261

10. Find the compound interest at the rate of 10% per annum for two years on that principal which in two years at the rate of 10% per annum given Rs. 200 as simple interest. Solution:

Given details are, Simple interest (SI) = Rs 200 Rate (r) = 10 % Time = 2 years So, by using the formula, Simple interest = $P \times T \times R/100$ $P = (SI \times 100)/T \times R$ $= (200 \times 100)/2 \times 10$ = 20000/20= Rs 1000

Now,

Rate of compound interest = 10% Time = 2years By using the formula, $A = P (1 + R/100)^n$ = 1000 (1 + 10/100)² = 1000 (110/100)² = Rs 1210 ∴ Compound Interest = A - P = Rs 1210 - Rs 1000 = Rs 210

11. Find the compound interest on Rs. 64000 for 1 year at the rate of 10% per annum compounded quarterly.

Solution:

Given details are, Principal (p) = Rs 64000 Rate (r) = 10 % = 10/4 % (for quarterly) Time = 1year = 1 × 4 = 4 (for quarter in a year) By using the formula, $A = P (1 + R/100)^n$ = 64000 (1 + 10/4×100)⁴ = 64000 (410/400)⁴ = Rs 70644.03 :. Compound Interest = A – P = Rs 70644.03 – Rs 64000 = Rs 6644.03

12. Ramesh deposited Rs. 7500 in a bank which pays him 12% interest per annum compounded quarterly. What is the amount which he receives after 9 months. Solution:

Given details are, Principal (p) = Rs 7500 Rate (r) = 12 % = 12/4 = 3 % (for quarterly) Time = 9 months = 9/12 years = $9/12 \times 4 = 3$ (for quarter in a year) By using the formula, $A = P (1 + R/100)^n$ = $7500 (1 + 3/100)^3$ = $7500 (103/100)^3$ = Rs 8195.45 \therefore Required amount is Rs 8195.45

13. Anil borrowed a sum of Rs. 9600 to install a hand pump in his dairy. If the rate of interest is 5 ½ % per annum compounded annually, determine the compound interest which Anil will have to pay after 3 years.

Solution:

Given details are, Principal (p) = Rs 9600 Rate (r) = $5 \frac{1}{2} \% = 11/2 \%$ Time = 3years By using the formula, A = P (1 + R/100)ⁿ = 9600 (1 + 11/2×100)³ = 9600 (211/200)³ = Rs 11272.71 :. Compound Interest = A – P = Rs 11272.71 – Rs 9600 = Rs 1672.71

14. Surabhi borrowed a sum of Rs. 12000 from a finance company to purchase a refrigerator. If the rate of interest is 5% per annum compounded annually, calculate the compound interest that Surabhi has to pay to the company after 3 years. Solution:

Given details are, Principal (p) = Rs 12000 Rate (r) = 5 % Time = 3years By using the formula, $A = P (1 + R/100)^n$ = $12000 (1 + 5/100)^3$ = $12000 (105/100)^3$ = Rs 13891.5 : Compound Interest = A - P = Rs 13891.5 - Rs 12000 = Rs 1891.5

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

Solution:

Given details are, Principal (p) = Rs 40000 Rate (r) = 7% Time = 2years By using the formula, $A = P (1 + R/100)^n$ = 40000 (1 + 7/100)² = 40000 (107/100)² = Rs 45796 \therefore Compound Interest = A – P = Rs 45796 – Rs 40000 = Rs 5796

EXTRA QUESTION

1. Compute the amount and the compound interest in each of the following by using the formulae when :

(i) Principal = Rs 3000, Rate = 5%, Time = 2 years

(ii) Principal = Rs 3000, Rate = 18%, Time = 2 years

- (iii) Principal = Rs 5000, Rate = 10 paise per rupee per annum, Time = 2 years
- (iv) Principal = Rs 2000, Rate = 4 paise per rupee per annum, Time = 3 years
- (v) Principal = Rs 12800, Rate = $7 \frac{1}{2}$ %, Time = 3 years
- (vi) Principal = Rs 10000, Rate = 20% per annum compounded half-yearly, Time = 2 years
- (vii)Principal = Rs 160000, Rate = 10 paise per rupee per annum compounded half yearly, Time = 2 years.

Solution:

By using the formula, $A = P (1 + R/100)^n$ Let us solve (i) Given, P = Rs 3000, rate = 5%, time = 2 years $A = P (1 + R/100)^n$ $= 3000 (1 + 5/100)^2$ $= 3000 (105/100)^2$ = Rs 3307.5 Compound interest (CI) = A-P = Rs 3307.5 - 3000 = Rs 307.5(ii) Given, P = Rs 3000, rate = 18%, time = 2years $A = P (1 + R/100)^n$ $= 3000 (1 + 18/100)^2$ $= 3000 (118/100)^2$ = Rs 4177.2 Compound interest (CI) = A-P = Rs 4177.2 - 3000 = Rs 1177.2(iii) Given, P = Rs 5000, rate = 10%, time = 2years $A = P (1 + R/100)^n$ $= 5000 (1 + 10/100)^2$ $= 5000 (110/100)^2$ $= Rs \ 6050$ Compound interest (CI) = A-P = Rs 6050 - 5000 = Rs 1050(iv) Given, P = Rs 2000, rate = 4%, time = 3 years $A = P (1 + R/100)^{n}$ $= 2000 (1 + 4/100)^3$ $= 2000 (104/100)^3$ = Rs 2249.72Compound interest (CI) = A-P = Rs 2249.72 - 2000 = Rs 249.72(v) Given, $P = Rs \ 12800$, rate = 7 $\frac{1}{2}$ % = 15/2% = 7.5%, time = 3 years $A = P (1 + R/100)^{n}$ $= 12800 (1 + 7.5/100)^3$ $= 12800 (107.5/100)^{3}$ $= \text{Rs} \ 15901.4$ Compound interest (CI) = A-P = Rs 15901.4 - 12800 = Rs 3101.4

(vi) Given, P = Rs 10000, rate = 20 % = 20/2 = 10% (quarterly), time = 2years = $2 \times 2 = 4$ years A = P (1 + R/100)ⁿ = 10000 (1 + 10/100)⁴ = Rs 14641 Compound interest (CI) = A-P = Rs 14641 - 10000 = Rs 4641 (vii) Given, P = Rs 160000, rate = 10% = 10/2% = 5% (half yearly), time = 2years = 2×2 = 4 quarters A = P (1 + R/100)ⁿ = 160000 (1 + 5/100)⁴ = 160000 (105/100)⁴ = Rs 194481 Compound interest (CI) = A-P = Rs 194481 - 160000 = Rs 34481

2. Find the amount of Rs. 2400 after 3 years, when the interest is compounded annually at the rate of 20% per annum. Solution:

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Given details are,

Principal (p) = Rs 2400

Rate (r) = 20% per annum

Time (t) = 3 years

By using the formula,

A = P (1 + R/100)^n

= 2400 (1 + 20/100)<sup>3</sup>

= 2400 (120/100)<sup>3</sup>

= Rs 4147.2

\therefore Amount is Rs 4147.2
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3. Rahman lent Rs. 16000 to Rasheed at the rate of 12 ½ % per annum compound interest. Find the amount payable by Rasheed to Rahman after 3 years. Solution:

Given details are, Principal (p) = Rs 16000 Rate (r) = $12 \frac{1}{2} \%$ per annum = 12.5%



4. Meera borrowed a sum of Rs. 1000 from Sita for two years. If the rate of interest is 10% compounded annually, find the amount that Meera has to pay back. Solution:

Given details are, Principal (p) = Rs 1000 Rate (r) = 10 % per annum Time (t) = 2 years By using the formula, $A = P (1 + R/100)^n$ = 1000 (1 + 10/100)² = 1000 (110/100)² = Rs 1210 : Amount is Rs 1210

5. Find the difference between the compound interest and simple interest. On a sum of Rs. 50,000 at 10% per annum for 2 years. Solution:

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Given details are,

Principal (p) = Rs 50000

Rate (r) = 10 % per annum

Time (t) = 2 years

By using the formula,

A = P (1 + R/100)^n

= 50000 (1 + 10/100)<sup>2</sup>

= 50000 (110/100)<sup>2</sup>

= Rs 60500

CI = Rs 60500 - 50000 = Rs 10500

We know that SI = (PTR)/100 = (50000 × 10 × 2)/100 = Rs 10000
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: Difference amount between CI and SI = 10500 - 10000 = Rs 500

6. Amit borrowed Rs. 16000 at 17 ½ % per annum simple interest. On the same day, he lent it to Ashu at the same rate but compounded annually. What does he gain at the end of 2 years? Solution:

Given details are, Principal (p) = Rs 16000 Rate (r) = 17 $\frac{1}{2}$ % per annum = 35/2% or 17.5% Time (t) = 2 years Interest paid by Amit = (PTR)/100 = (16000×17.5×2)/100 = Rs 5600 Amount gained by Amit: By using the formula, A = P (1 + R/100)ⁿ = 16000 (1 + 17.5/100)² = 16000 (117.5/100)² = Rs 22090 CI = Rs 22090 - 16000 = Rs 6090 \therefore Amit total gain is = Rs 6090 - 5600 = Rs 490

7. Find the amount of Rs. 4096 for 18 months at 12 $\frac{1}{2}$ % per annum, the interest being compounded semi-annually.

Solution:

Given details are, Principal (p) = Rs 4096 Rate (r) = $12 \frac{1}{2} \%$ per annum = 25/4% or 12.5/2%Time (t) = 18 months = $(18/12) \times 2 = 3$ half years By using the formula, A = P (1 + R/100)ⁿ = 4096 (1 + $12.5/2 \times 100)^3$ = 4096 (212.5/200)³ = Rs 4913 \therefore Amount is Rs 4913

8. Find the amount and the compound interest on Rs. 8000 for 1 ½ years at 10% per annum, compounded half-yearly.

Solution:

Given details are, Principal (p) = Rs 8000 Rate (r) = 10 % per annum = 10/2% = 5% (half yearly) Time (t) = 1 ½ years = $(3/2) \times 2 = 3$ half years By using the formula, A = P (1 + R/100)ⁿ = $8000 (1 + 5/100)^3$ = $8000 (105/100)^3$ = Rs 9261 \therefore CI = Rs 9261 - 8000 = Rs 1261

9. Kamal borrowed Rs. 57600 from LIC against her policy at 12 ½ % per annum to build a house. Find the amount that she pays to the LIC after 1 ½ years if the interest is calculated half-yearly.

Solution:

Given details are, Principal (p) = Rs 57600 Rate (r) = $12 \frac{1}{2} \frac{9}{0}$ per annum = $25/2 \times 2\% = 25/4\% = 12.5/2\%$ (half yearly) Time (t) = $1 \frac{1}{2}$ years = $(3/2) \times 2 = 3$ half years By using the formula, A = P (1 + R/100)ⁿ = $57600 (1 + 12.5/2 \times 100)^3$ = $57600 (212.5/200)^3$ = Rs 69089.06 : Amount is Rs 69089.06

10. Abha purchased a house from Avas Parishad on credit. If the cost of the house is Rs. 64000 and the rate of interest is 5% per annum compounded half-yearly, find the interest paid by Abha after one year and a half. Solution:

Given details are, Principal (p) = Rs 64000 Rate (r) = 5 % per annum = 5/2% (half yearly) Time (t) = 1 ½ years = $(3/2) \times 2 = 3$ half years By using the formula, A = P (1 + R/100)ⁿ = 64000 (1 + 5/2×100)³ = 64000 (205/200)³ = Rs 68921 ∴ CI = Rs 68921 - 64000 = Rs 4921

11. Rakesh lent out Rs. 10000 for 2 years at 20% per annum, compounded annually. How much more he could earn if the interest be compounded half-yearly? Solution:

Given details are, Principal (p) = Rs 10000 Rate (r) = 20% per annum Time (t) = 2years By using the formula, $A = P (1 + R/100)^n$ = 10000 (1 + 20/100)² = 10000 (120/100)² = Rs 14400

When the interest is compounded half yearly, Rate = 20/2 % = 10%Time = 2×2 years = 4years By using the formula, $A = P (1 + R/100)^n$ = $10000 (1 + 10/100)^4$ = $10000 (110/100)^4$ = Rs 14641 \therefore Rakesh could earn Rs (14641 - 14400) = Rs 241 more

12. Romesh borrowed a sum of Rs. 245760 at 12.5% per annum, compounded annually. On the same day, he lent out his money to Ramu at the same rate of interest, but compounded semi-annually. Find his gain after 2 years. Solution:

Given details are, Principal (p) = Rs 245760 Rate (r) = 12.5% per annum Time (t) = 2years By using the formula, $A = P (1 + R/100)^n$ = 245760 (1 + 12.5/100)² = 245760 (112.5/100)² = Rs 311040

When compounded semi-annually, Rate = 12.5/2% = 6.25%Time = 2×2 years = 4years By using the formula, $A = P (1 + R/100)^n$ = $245760 (1 + 6.25/100)^4$ = $245760 (106.25/100)^4$ = Rs 313203.75 \therefore Romesh gain is Rs (313203.75 - 311040) = Rs 2163.75

13. Find the amount that David would receive if he invests Rs. 8192 for 18 months at 12 ¹/₂ % per annum, the interest being compounded half-yearly. Solution:

Given details are, Principal (p) = Rs 8192 Rate (r) = $12 \frac{1}{2} \frac{6}{9}$ per annum = $25/2 \times 2 = 25/4\% = 12.5/2\%$ (half yearly) Time (t) = 18 months = $18/12 = 1 \frac{1}{2}$ years = $(3/2) \times 2 = 3$ years By using the formula, A = P (1 + R/100)ⁿ = $8192 (1 + 12.5/2 \times 100)^3$ = $8192 (212.5/200)^3$ = Rs 9826 \therefore Amount is Rs 9826

14. Find the compound interest on Rs. 15625 for 9 months, at 16% per annum, compounded quarterly. Solution:

Given details are,

Principal (p) = Rs 15625 Rate (r) = 16% per annum = 16/4 = 4% (quarterly) Time (t) = 9 months = 9/12 ×4 = 3quarters of a year By using the formula, $A = P (1 + R/100)^n$ = 15625 (1 + 4/100)³ = 15625 (104/100)³ = Rs 17576 \therefore CI = Rs 17576 - 15625 = Rs 1951

15. Rekha deposited Rs. 16000 in a foreign bank which pays interest at the rate of 20% per annum compounded quarterly, find the interest received by Rekha after one year Solution:

Given details are, Principal (p) = Rs 16000 Rate (r) = 20% per annum = 20/4 = 5% (quarterly) Time (t) = 1 year = 4 quarters of a year By using the formula, $A = P (1 + R/100)^n$ = 16000 (1 + 5/100)⁴ = 16000 (105/100)⁴ = Rs 19448.1 \therefore CI = Rs 19448.1 - 16000 = Rs 3448.1

16. Find the amount of Rs. 12500 for 2 years compounded annually, the rate of interest being 15% for the first year and 16% for the second year. Solution:

Given details are, Principal (p) = Rs 12500 Rate₁ (r) = 15% and Rate₂ = 16% Time (t) = 2 years By using the formula, $A = P (1 + R_1/100 \times 1 + R_2/100)$ = 12500 (1 + 15/100 × 1 + 16/100) = 12500 (1.15 × 1.16) = Rs 16675 : Amount after two years is Rs 16675

17. Ramu borrowed Rs. 15625 from a finance company to buy scooter. If the rate of interest be 16% per annum compounded annually, what payment will he have to make after 2 ¼ years?

Solution: Given details are, Principal (p) = Rs 15625 Rate (r) = 16% Time (t) = 2 ¼ years By using the formula, $A = P (1 + R/100 \times 1 + R/100)$ = 15625 (1 + 16/100)² × (1 + (16/4)/100) = 15625 (1 + 16/100)² × (1 + 4/100) = 15625 (1.16)² × (1.04) = Rs 21866 ∴ Amount after 2 ¼ years is Rs 21866

18. What will Rs. 125000 amount to at the rate of 6%, if the interest is calculated after every four months?

Solution: Given details are, Principal (p) = Rs 125000 Rate (r) = 6% per annum Time (t) = 1 year Since interest is compounded after 4months, interest will be counted as 6/3 = 2% and Time will be 12/4 = 3 quarters By using the formula, $A = P (1 + R/100)^n$ $= 125000 (1 + 2/100)^3$ $= 125000 (102/100)^3$ = Rs 132651 \therefore Amount is Rs 132651

19. Find the compound interest at the rate of 5% for three years on that principal which in three years at the rate of 5% per annum gives Rs. 12000 as simple interest.

Solution:

Given details are, Simple interest (SI) = Rs 12000 Rate (r) = 5% per annum Time (t) = 3 years SI = (PTR)/100 P = (SI×100) / (T×R) = (12000×100) / (3×5) = 1200000/15 = 80000 By using the formula, A = P (1 + R/100)ⁿ = 80000 (1 + 5/100)³ = 80000 (105/100)³ = Rs 92610 \therefore CI = Rs 92610 - 80000 = Rs 12610

20. A sum of money was lent for 2 years at 20% compounded annually. If the interest is payable half-yearly instead of yearly, then the interest is Rs. 482 more. Find the sum.

Solution:

Given details are, Rate (r) = 20% per annum = 20/2 = 10% (half yearly) Time (t) = 2 years = $2 \times 2 = 4$ half years Principal be = Rs P P (1 + R/100)ⁿ - P (1 + R/100)ⁿ = 482 P (1 + 10/100)⁴ - P (1 + 20/100)² = 482 P (110/100)⁴ - P (120/100)² = 482 P (1.4641) - P (1.44) = 482 0.0241P = 482 P = 482/0.0241 = 20000 \therefore Amount is Rs 20000

21. Simple interest on a sum of money for 2 years at 6 ½ % per annum is Rs. 5200. What will be the compound interest on the sum at the same rate for the same period? Solution:

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Given details are,
Rate = 6 \frac{1}{2} \% per annum = 13/2\%
Simple Interest (SI) = Rs 5200
Time (t) = 2 years
By using the formula,
SI = (PTR)/100
P = (SI \times 100) / (T \times R)
  = (5200 \times 100) / (2 \times 13/2)
 = (5200 \times 100 \times 2) / (2 \times 13)
  = 104000/26
  = \text{Rs} 40000
Now,
P = Rs 40000
R = 13/2\% = 6.5\%
T = 2years
By using the formula,
A = P (1 + R/100)^n
  =40000 (1+6.5/100)^2
  =40000 (106.5/100)^2
  = Rs 45369
\therefore CI = Rs 45369 - 40000 = Rs 5369
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22. What will be the compound interest at the rate of 5% per annum for 3 years on that principal which in 3 years at the rate of 5% per annum gives Rs. 1200 as simple interest. Solution: Given details are, Rate = 5 % per annum Simple Interest (SI) = Rs 1200 Time (t) = 3 years

By using the formula, SI = (PTR)/100 $P = (SI \times 100) / (T \times R)$ $= (1200 \times 100) / (3 \times 5)$ = 120000/15= Rs 8000 Now, P = Rs 8000 R = 5% T = 3 years By using the formula, A = P (1 + R/100)ⁿ = $8000 (1 + 5/100)^3$ = $8000 (105/100)^3$ = Rs 9261 \therefore CI = Rs 9261 - 8000 = Rs 1261

EXTRA QUESTION

1. On what sum will the compound interest at 5% per annum for 2 years compounded annually be Rs 164? Solution:

Given details are, Rate = 5% per annum Compound Interest (CI) = Rs 164 Time (t) = 2 years By using the formula, Let P be 'x' CI = A - P $164 = P (1 + R/100)^{n} - P$ $= P [(1 + R/100)^{n} - 1]$ $= x [(1 + 5/100)^2 - 1]$ $= x [(105/100)^2 - 1]$ $164 = x ((1.05)^2 - 1) x$ $= 164 / ((1.05)^2 - 1)$ = 164/0.1025 $= Rs \ 1600$: The required sum is Rs 1600

2. Find the principal if the interest compounded annually at the rate of 10% for two years is Rs. 210.

Solution:

Given details are, Rate = 10% per annum Compound Interest (CI) = Rs 210 Time (t) = 2 years By using the formula, Let P be 'x' CI = A - P $210 = P (1 + R/100)^{n} - P$ $= P [(1 + R/100)^{n} - 1]$ $= x [(1 + 10/100)^2 - 1]$ $= x [(110/100)^2 - 1]$ $210 = x ((1.1)^2 - 1) x =$ $210 / ((1.1)^2 - 1)$ = 210/0.21 $= Rs \ 1000$: The required sum is Rs 1000

3. A sum amounts to Rs. 756.25 at 10% per annum in 2 years, compounded annually. Find the sum. Solution:

Given details are, Rate = 10 % per annum Amount = Rs 756.25 Time (t) = 2 years By using the formula, $A = P (1 + R/100)^n$ $756.25 = P (1 + 10/100)^2$ $P = 756.25 / (1 + 10/100)^2$ = 756.25/1.21 = 625 \therefore The principal amount is Rs 625

4. What sum will amount to Rs. 4913 in 18 months, if the rate of interest is 12 ½ % per annum, compounded half-yearly?

Solution:

Given details are, Rate = $12 \frac{1}{2}\%$ per annum = 25/2% = 25/2/2 = 25/4% half yearly Amount = Rs 4913 Time (t) = 18months = 18/12 years = $3/2 \times 2 = 3$ half years By using the formula, A = P (1 + R/100)ⁿ 4913 = P (1 + $25/4 \times 100)^3$ P = $4913 / (1 + <math>25/400)^3$ = 4913/1.19946= 4096 \therefore The principal amount is Rs 4096

5. The difference between the compound interest and simple interest on a certain sum at 15% per annum for 3 years is Rs. 283.50. Find the sum. Solution:

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Given details are,

Rate = 15 % per annum

Compound Interest (CI) – Simple Interest (SI)= Rs 283.50

Time (t) = 3 years

By using the formula,

CI - SI = 283.50

P [(1 + R/100)^n - 1] - (PTR)/100 = 283.50

P [(1 + 15/100)^3 - 1] - (P(3)(15))/100 = 283.50

P[1.520 - 1] - (45P)/100 = 283.50

0.52P - 0.45P = 283.50

0.07P = 283.50

P = 283.50/0.07

= 4000

\therefore The sum is Rs 4000
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6. Rachana borrowed a certain sum at the rate of 15% per annum. If she paid at the end of two years Rs. 1290 as interest compounded annually, find the sum she borrowed.

Solution:

Given details are, Rate = 15 % per annum Time = 2 years CI = Rs 1290 By using the formula, CI = P [$(1 + R/100)^n - 1$] 1290 = P [$(1 + 15/100)^2 - 1$] 1290 = P [0.3225] P = 1290/0.3225 = 4000 \therefore The sum is Rs 4000

7. The interest on a sum of Rs. 2000 is being compounded annually at the rate of 4% per annum. Find the period for which the compound interest is Rs. 163.20. Solution:

Given details are, Rate = 4% per annum $CI = Rs \ 163.20$ Principal (P) = Rs 2000 By using the formula, $CI = P[(1 + R/100)^{n} - 1]$ $163.20 = 2000[(1 + 4/100)^{n} - 1]$ $163.20 = 2000 [(1.04)^{n} - 1]$ $163.20 = 2000 \times (1.04)^{n} - 2000$ $163.20 + 2000 = 2000 \times (1.04)^{n}$ $2163.2 = 2000 \times (1.04)^{n}$ $(1.04)^n = 2163.2/2000$ $(1.04)^n = 1.0816$ $(1.04)^n = (1.04)^2$ So on comparing both the sides, n = 2 :. Time required is 2years

8. In how much time would Rs. 5000 amount to Rs. 6655 at 10% per annum compound interest? Solution:

Given details are, Rate = 10% per annum A = Rs 6655 Principal (P) = Rs 5000 By using the formula, A = P $(1 + R/100)^n$ 6655 = 5000 $(1 + 10/100)^n$ 6655 = 5000 $(11/10)^n$ $(11/10)^n = 6655/5000$ $(11/10)^n = 1331/1000$ $(11/10)^n = (11/10)^3$ So on comparing both the sides, n = 3 ... Time required is 3 years

9. In what time will Rs. 4400 become Rs. 4576 at 8% per annum interest compounded half-yearly?

Solution:

Given details are, Rate = 8% per annum = 8/2 = 4% (half yearly) A = Rs 4576 Principal (P) = Rs 4400 Let n be '2T' By using the formula, A = P (1 + R/100)ⁿ 4576 = 4400 (1 + 4/100)^{2T} 4576 = 4400 (104/100)^{2T} (104/100)^{2T} = 4576/4400 (104/100)^{2T} = 26/25 (26/25)^{2T} = (26/25)¹ So on comparing both the sides, n = 2T = 1 :. Time required is ¹/₂ year

10. The difference between the S.I. and C.I. on a certain sum of money for 2 years at 4% per annum is Rs. 20. Find the sum. Solution:

Given details are,

Rate = 4 % per annum Time = 2years Compound Interest (CI) – Simple Interest (SI)= Rs 20 By using the formula, CI - SI = 20P [(1 + R/100)ⁿ - 1] – (PTR)/100 = 20 P [(1 + 4/100)² - 1] – (P(2)(4))/100 = 20 P[51/625] – (2P)/25 = 20 51/625P – 2/25P = 20 (51P-50P)/625 = 20 P = 20 × 625 P = 20/7.918 = 12500 ∴ The sum is Rs 12500

11. In what time will Rs. 1000 amount to Rs. 1331 at 10% per annum, compound interest? Solution:

Given details are, Principal = Rs 1000 Amount = Rs 1331 Rate = 10% per annum Let time = T years By using the formula, $A = P (1 + R/100)^n$ $1331 = 1000 (1 + 10/100)^T$ $1331 = 1000 (110/100)^T$ $(11/10)^T = 1331/1000$ $(11/10)^T = (11/10)^3$ So on comparing both the sides, n = T = 3 \therefore Time required is 3 years

12. At what rate percent compound interest per annum will Rs. 640 amount to Rs. 774.40 in 2 years?

Solution: Given details are, Principal = Rs 640

Amount = $\operatorname{Rs} 774.40$ Time = 2 years Let rate = R%By using the formula, $A = P (1 + R/100)^n$ $774.40 = 640 (1 + R/100)^2 (1$ $+ R/100)^2 = 774.40/640$ $(1 + R/100)^2 = 484/400 (1$ $(+ R/100)^2 = (22/20)^2$ By cancelling the powers on both sides, (1 + R/100) = (22/20)R/100 = 22/20 - 1=(22-20)/20= 2/20= 1/10R = 100/10= 10%

.: Required Rate is 10% per annum

13. Find the rate percent per annum if Rs. 2000 amount to Rs. 2662 in 1 ½ years, interest being compounded half-yearly?

Solution:

Given details are, Principal = Rs 2000 Amount = Rs 2662 Time = 1 ¹/₂ years = $3/2 \times 2 = 3$ half years Let rate be = R% per annum = R/2 % half yearly By using the formula, A = P (1 + R/100)ⁿ 2662 = 2000 (1 + R/2×100)³ (1 + R/200)³ = 1331/1000 (1 + R/100)³ = (11/10)³ By cancelling the powers on both sides, (1 + R/200) = (11/10) R/200 = 11/10 - 1 = (11-10)/10 = 1/10 R = 200/10 = 20% ∴ Required Rate is 20% per annum

14. Kamala borrowed from Ratan a certain sum at a certain rate for two years simple interest. She lent this sum at the same rate to Hari for two years compound interest. At the end of two years she received Rs. 210 as compound interest, but paid Rs. 200 only as simple interest. Find the sum and the rate of interest.

```
Solution:
Given details are,
C.I that Kamala receives = Rs 210
S.I that Kamala paid = Rs 200
Time = 2 years
So,
We know, SI = PTR/100
              = P \times 2 \times R/100
        P \times R = 10000 ..... Equation 1
CI = A - P
CI = P [(1 + R/100)^n - 1]
210 = P [(1 + R/100)^2 - 1]
210 = P(1^2 + R^2/100^2 + 2(1)(R/100) - 1) (by using the formula (a+b)^2)
210 = P (1 + R^2/10000 + R/50 - 1)
210 = P (R^2 / 10000 + R / 50)
210 = PR^2/10000 + PR/50
We know PR = 10000 from Equation 1
210 = 10000 \text{R} / 10000 + 10000 / 50
210 = R + 200
R = 210 - 200
  = 10\%
In Equation 1, PR = 10000
               P = 10000/R
                 = 10000/10
= 1000
: Required sum is Rs 1000
```

15. Find the rate percent per annum, if Rs. 2000 amount to Rs. 2315.25 in a year and a half, interest being compounded six monthly. Solution:

Given details are, Principal = Rs 2000 Amount = Rs 2315.25 Time = 1 $\frac{1}{2}$ years = $\frac{3}{2}$ years Let rate be = R % per annum By using the formula, A = P (1 + R/100)ⁿ 2315.25 = 2000 (1 + R/100)^{3/2} (1 + R/100)^{3/2} = 2315.25/2000 (1 + R/100)^{3/2} = (1.1576) (1 + R/100) = 1.1025 R/100 = 1.1025 - 1 = 0.1025 × 100 = 10.25 \therefore Required Rate is 10.25% per annum

16. Find the rate at which a sum of money will double itself in 3 years, if the interest is compounded annually.

Solution:

Given details are, Time = 3 years Let rate be = R % Also principal be = P So, amount becomes = 2P By using the formula, $A = P (1 + R/100)^n$ $2P = P (1 + R/100)^3$ $(1 + R/100)^3 = 2$ $(1 + R/100) = 2^{1/3}$ 1 + R/100 = 1.2599 R/100 = 1.2599 - 1 = 0.2599 $R = 0.2599 \times 100$ = 25.99

: Required Rate is 25.99% per annum

17. Find the rate at which a sum of money will become four times the original amount in 2 years, if the interest is compounded half-yearly. Solution:

Given details are. Time = 2 years = $2 \times 2 = 4$ half years Let rate = R % per annum = R/2% half years Let principal be = PSo, Amount becomes = 4PBy using the formula, $A = P (1 + R/100)^n$ $4P = P (1 + R/2 \times 100)^4$ $(1 + R/200)^4 = 4$ $(1 + R/200) = 4^{1/4}$ 1 + R/200 = 1.4142R/200 = 1.4142-1= 0.4142 $R = 0.4142 \times 200$ = 82.84%.: Required Rate is 82.84% per annum

18. A certain sum amounts to Rs. 5832 in 2 years at 8% compounded interest. Find the sum. Solution:

Given details are, Amount = Rs 5832 Time = 2 years Rate = 8% Let principal be = P By using the formula, A = P $(1 + R/100)^n$ 5832 = P $(1 + 8/100)^2$ 5832 = P (1.1664)P = 5832/1.1664 = 5000 : Required sum is Rs 5000

19. The difference between the compound interest and simple interest on a certain sum for 2 years at 7.5% per annum is Rs. 360. Find the sum. Solution:

```
Given,
Time = 2 years
Rate = 7.5 % per annum
Let principal = Rs P
Compound Interest (CI) – Simple Interest (SI) = Rs 360
C.I - S.I = Rs 360
By using the formula,
P[(1 + R/100)^n - 1] - (PTR)/100 = 360
P[(1 + 7.5/100)^2 - 1] - (P(2)(7.5))/100 = 360
P[249/1600] - (3P)/20 = 360
249/1600P - 3/20P = 360
(249P-240P)/1600 = 360
9P = 360 \times 1600
P = 576000/9
 = 64000
:. The sum is Rs 64000
```

20. The difference in simple interest and compound interest on a certain sum of money at 6 2/3 % per annum for 3 years in Rs. 46. Determine the sum. Solution: Given,

Time = 3 years Rate = 6 2/3 % per annum = 20/3% Let principal = Rs P Compound Interest (CI) – Simple Interest (SI) = Rs 46 C.I – S.I = Rs 46 By using the formula, P [$(1 + R/100)^n - 1$] - (PTR)/100 = 46 P [$(1 + 20/3 \times 100)^3 - 1$] - (P(3)(20/3))/100 = 46 P[$(1 + 20/300)^3 - 1$] - P/5 = 46 P[(21/3375) - 1/5P = 46 (721P-675P)/3375 = 46 $46P = 46 \times 3375$ $46P = 46 \times 3375/46$ = 3375 \therefore The sum is Rs 3375