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SOLUTIONS: COMPOUND INTEREST

Mathematics | Class IX (2026/COMINT/09/002-SOL)

Section A (Multiple Choice Questions)

1. (c) **5**. Compounding half-yearly means 2 periods per year. $2.5 \times 2 = 5$.
2. (b) **Rs 210**. $A = 1000(1 + 0.10)^2 = 1210$. $CI = 1210 - 1000 = 210$.
3. (c) $(Pr/100)(1 + r/100)$. Interest for 2nd year is the interest on the amount at the end of the 1st year $(P + Pr/100)$. Interest = $(P + Pr/100) \times r/100$.
4. (b) **Equal to Simple Interest**. For the first year/period, $CI = SI$.
5. (b) $P(1 + r_1/100)(1 + r_2/100)$. Successive compounding formula.
6. (a) **Rs 10,000**. For 1 year half-yearly, $n = 2, R = 5\%$. $CI - SI = P(R/100)^2 \implies 25 = P(5/100)^2 \implies P = 25 \times 400 = 10000$.
7. (b) **12 years**. $2P$ in 4 yrs. $4P$ (2^2) in $4 \times 2 = 8$ yrs. $8P$ (2^3) in $4 \times 3 = 12$ yrs.
8. (a) **5% per period**. 20% per annum $\div 4$ quarters = 5% .

Section B (Very Short Answer)

1. $P = 8000, R = 10\%$ p.a. = 5% half-yearly, $n = 2$. $A = 8000(1 + 5/100)^2 = 8000(21/20)^2 = 8000 \times 441/400 = \mathbf{Rs 8820}$.
 $CI = 8820 - 8000 = \mathbf{Rs 820}$.
2. $A = 4000 + 410 = 4410$. $4410 = 4000(1 + r/100)^2 \implies 441/400 = (1 + r/100)^2$.
 $21/20 = 1 + r/100 \implies 1.05 = 1 + r/100 \implies r = \mathbf{5\%}$.
3. $Diff = P(r/100)^2 = 5000(6/100)^2 = 5000 \times 36/10000 = 180000/10000 = \mathbf{Rs 18}$.
4. $A = 12500(1 + 12/100)(1 + 15/100) = 12500 \times 1.12 \times 1.15 = \mathbf{Rs 16100}$.

Section C (Short Answer)

1. $246 = P[(1.05)^2 - 1] \implies 246 = P[0.1025] \implies P = 246/0.1025 = 2400$.
 $SI = (2400 \times 6 \times 3)/100 = \mathbf{Rs 432}$.
2. $P(1 + 5/100)^4 - P(1 + 10/100)^2 = 220$.
 $P[(1.05)^4 - (1.1)^2] = 220 \implies P[1.215506 - 1.21] = 220 \implies P[0.005506] = 220$.
 $P \approx \mathbf{Rs 40,000}$ (rounded based on standard exam values).
3. $r = (11000 - 10000)/10000 \times 100 = \mathbf{10\%}$.
Year 3 Amount = $12100 \times 1.1 = 13310$. Year 4 Amount = $13310 \times 1.1 = \mathbf{Rs 14641}$.

Section D (Long Answer)

1. End of Yr 1: $20000 \times 1.1 = 22000$. Balance = $22000 - 8000 = 14000$.
End of Yr 2: $14000 \times 1.1 = 15400$. Balance = $15400 - 9000 = 6400$.
End of Yr 3: $6400 \times 1.1 = \mathbf{Rs\ 7040}$.
2. $CI - SI = P[R^2/100^2 \times (3 + R/100)]$.
 $93 = P[100/10000 \times 3.1] \implies 93 = P \times 0.031 \implies P = \mathbf{Rs\ 3000}$.
If compounded half-yearly, the difference would **increase** because more frequent compounding yields higher interest.

Section E: Case Study Solutions

1. **B)** Rate is halved ($r/2$), Time is doubled ($2n$).
2. **B)** $\$500,000 + 10\%$ of $500,000 = \mathbf{\$550,000}$.
3. **C)** $A = P(1 - 5/100)^n$ (Depreciation formula).
4. **C)** $3 \text{ years} \times 4 \text{ quarters} = \mathbf{12}$ periods.
5. **C)** For the first year, annually compounded $CI = SI$.