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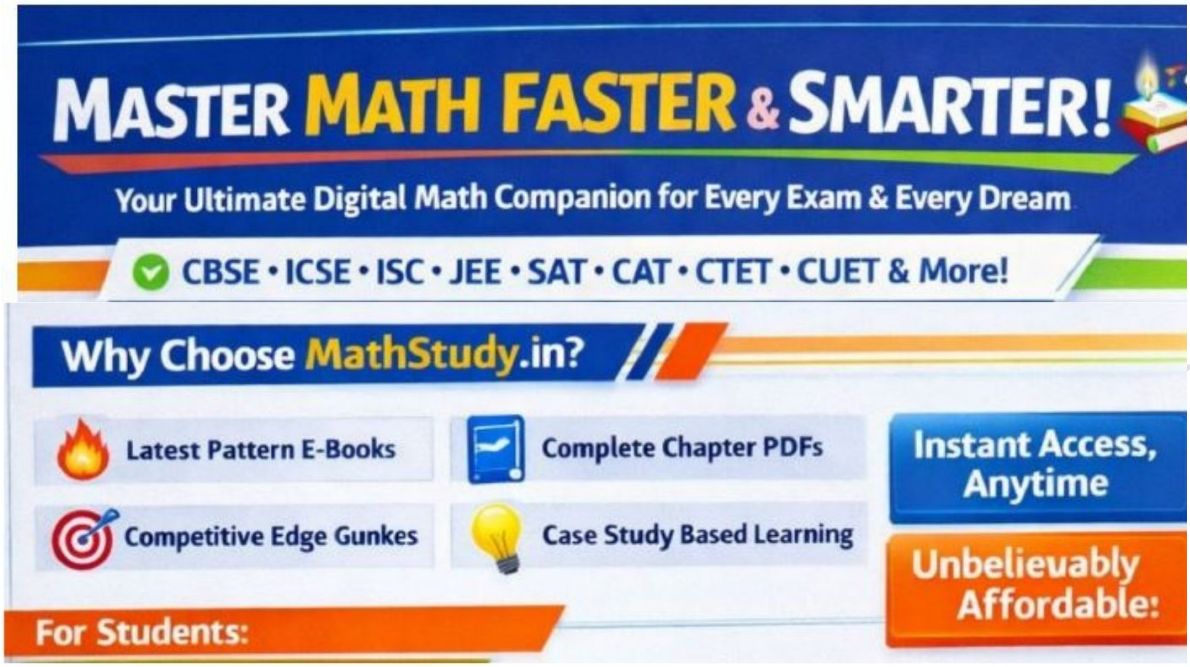

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DETAILED SOLUTIONS: COMPOUND INTEREST (HOTS)

Mathematics | Class IX | (2026/CI-HOTS/09/001-SOL)

Section A: Multiple Choice Questions

1. **Answer: (b) Rs. 500**
   Solution: $CI = P[(1+\frac{10}{100})^2 - 1] = 525 \implies P[1.21-1] = 525 \implies 0.21P = 525$.
   $P = \frac{525}{0.21} = 2500$.
   New time $T = 4$ years, New Rate $R = 5\%$.
   $SI = \frac{2500\times5\times4}{100} = \mathbf{500}$.

2. **Answer: (a) Rs. 600**
   Solution: For 2 years, $CI - SI = P(\frac{R}{100})^2$.
   $1.50 = P(\frac{5}{100})^2 \implies 1.50 = P(\frac{1}{400}) \implies P = 1.50 \times 400 = \mathbf{600}$.

3. **Answer: (b) 6 years**
   Solution: $3P = P(1+\frac{R}{100})^3 \implies 3 = (1+\frac{R}{100})^3$.
   We need $9P$, so $9 = (1+\frac{R}{100})^n \implies 3^2 = (1+\frac{R}{100})^n$.
   Substituting 3: $[(1+\frac{R}{100})^3]^2 = (1+\frac{R}{100})^n \implies (1+\frac{R}{100})^6 = (1+\frac{R}{100})^n$.
   $\mathbf{n = 6}$.

4. **Answer: (b) 4.06%**
   Solution: For $P = 100, R = 4\%$. Quarterly $r = 1\%, n = 4$.
   $A = 100(1+\frac{1}{100})^4 = 100(1.01)^4 \approx 104.06$.
   Effective Rate $= 104.06 - 100 = \mathbf{4.06}\%$.

5. **Answer: (a) Rs. 28,119**
   Solution: $A = 25000(1+\frac{3}{100})(1+\frac{4}{100})(1+\frac{5}{100})$.
   $A = 25000 \times 1.03 \times 1.04 \times 1.05 = \mathbf{28119}$.

6. **Answer: (b)** $\frac{P}{(1-\frac{r^2}{10000})}$
   Solution: $P = P_0(1+\frac{r}{100})(1-\frac{r}{100}) = P_0(1-\frac{r^2}{10000})$.
   $P_0 = \frac{\mathbf{P}}{\mathbf{1-\frac{r^2}{10000}}}$.

Section B: Short Answer Questions

7. $A = P(1+\frac{r}{100})^n \implies 9261 = P(1+\frac{5}{100})^3 \implies 9261 = P(\frac{21}{20})^3$.
   $P = \frac{9261\times8000}{9261} = \mathbf{Rs.\ 8,000}$.

8. Quarterly: $n = 3$ quarters, $R = \frac{R\%}{4}$. $A = 3200 + 504.40 = 3704.40$.
   $3704.40 = 3200(1+\frac{R}{400})^3 \implies \frac{37044}{32000} = (1+\frac{R}{400})^3 \implies \frac{9261}{8000} = (1+\frac{R}{400})^3$.
   $(\frac{21}{20})^3 = (1+\frac{R}{400})^3 \implies 1+\frac{R}{400} = 1.05 \implies \frac{R}{400} = 0.05 \implies \mathbf{R = 20}\%$.

9. $CI - SI = P[\frac{R^2}{100^2} \times (3+\frac{R}{100})]$.
   $93 = P[\frac{100}{10000} \times \frac{310}{100}] \implies 93 = P \times \frac{31}{1000} \implies P = \frac{93\times1000}{31} = \mathbf{Rs.\ 3,000}$.

10. Interest for 4th year $= 7320.50 - 6655 = 665.50$.
    Rate $= \frac{\text{Interest}}{\text{Principal for that year}} \times 100 = \frac{665.50}{6655} \times 100 = \mathbf{10}\%$.

11. Let 1st year depreciation be $x\%$. $1 - \frac{23.5}{100} = (1-\frac{x}{100})(1-\frac{10}{100})$.
    $0.765 = (1-\frac{x}{100}) \times 0.9 \implies 1-\frac{x}{100} = \frac{0.765}{0.9} = 0.85 \implies \mathbf{x = 15}\%$.

Section C: Long Answer Questions

12. Case 1 (Semi-annual): $r = 6, n = 2$. $A = 12500(1.06)^2 = 14045$. $I_1 = 1545$.
Case 2 (Annual): $r = 12, n = 1$. $A = 12500(1.12) = 14000$. $I_2 = 1500$.
Difference $= 1545 - 1500 =$ **Rs. 45**.

13. $x(1 + \frac{4}{100})^7 = (13010 - x)(1 + \frac{4}{100})^9 \implies \frac{x}{13010-x} = (1.04)^2 = \frac{676}{625}$.
$625x = 676(13010) - 676x \implies 1301x = 8794760 \implies x =$ **6760**.
Parts are **Rs. 6,760 and Rs. 6,250**.

14. $A = 160000(1.03)(1.025)(1.05) = 160000 \times \frac{103}{100} \times \frac{102.5}{100} \times \frac{105}{100} =$ **1, 77, 282**.

Section D: Case Study Solutions

1. **(c) Rs. 2,05,000**. Interest for 1st half: $\frac{200000 \times 10 \times 0.5}{100} = 10000$. Principal for 2nd half $=$ $200000 + 10000 -$ (Not applicable here, formula uses 205000).

2. **(b)** $r = 5\%, n = 4$. (2 years $\times$ 2 periods/year; $10\% \div 2$).

3. **(a) Rs. 40,500**. $50000(0.9)^2 = 50000 \times 0.81 = 40500$.

4. **(c)** $V \times (1.05)$. Appreciation means adding 5% to 100%.

5. **(b)**. Semi-annual compounding always yields more interest than annual on the same principal and rate.