

SOLUTIONS

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SOLUTIONS: COMPOUND INTEREST

Mathematics | Class IX | ICSE-CBSE Standard

Section A: Multiple Choice Questions

1. **Answer: (a) $2n, R/2$**

Reasoning: When interest is compounded half-yearly, there are two conversion periods in a year. Thus, the rate is halved ($R/2$) and the number of periods is doubled ($2n$).

2. **Answer: (b) Rs. 2,100**

Solution: $A = 10000(1 + \frac{10}{100})^2 = 10000(1.1)^2 = 10000 \times 1.21 = 12100$.
 $CI = A - P = 12100 - 10000 = 2100$.

3. **Answer: (c) Rs. 81,000**

Solution: $V = P(1 - \frac{R}{100})^n = 100000(1 - \frac{10}{100})^2 = 100000(0.9)^2 = 100000 \times 0.81 = 81000$.

4. **Answer: (b) $P(1 + \frac{r_1}{100})(1 + \frac{r_2}{100})$**

Reasoning: For successive years with different rates, the principal for the second year includes the interest of the first year.

5. **Answer: (c) Rs. 0**

Reasoning: For the first year (or first conversion period), the Simple Interest and Compound Interest are identical.

Section B: Short Answer Questions

6. **Solution:** $P = 8000, R = 10\%$ p.a., $n = 1$ year.

Compounded half-yearly: $R' = 5\%$ per half-year, $n' = 2$ half-years.

$$A = 8000(1 + \frac{5}{100})^2 = 8000(\frac{21}{20})^2 = 8000 \times \frac{441}{400} = 20 \times 441 = \mathbf{8820}.$$

$$CI = 8820 - 8000 = \mathbf{820}.$$

7. **Solution:** $P = 4000, CI = 410, n = 2$.

$$A = P + CI = 4410.$$

$$4410 = 4000(1 + \frac{R}{100})^2 \implies \frac{441}{400} = (1 + \frac{R}{100})^2 \implies (\frac{21}{20})^2 = (1 + \frac{R}{100})^2.$$

$$1 + \frac{R}{100} = \frac{21}{20} \implies \frac{R}{100} = \frac{1}{20} \implies R = \mathbf{5\%}.$$

8. **Solution:** $P = 10800, R = 12.5\% = \frac{25}{2}\%$, $n = 3$.

$$A = 10800(1 + \frac{25/2}{100})^3 = 10800(1 + \frac{1}{8})^3 = 10800(\frac{9}{8})^3.$$

$$A = 10800 \times \frac{729}{512} \approx \mathbf{15377.34}.$$

9. **Solution:** Let population 3 years ago be P . $A = 92610, R = 5\%, n = 3$.

$$92610 = P(1 + \frac{5}{100})^3 \implies 92610 = P(\frac{21}{20})^3.$$

$$P = \frac{92610 \times 8000}{9261} = 10 \times 8000 = \mathbf{80000}.$$

Section C: Long Answer Questions

10. **Solution:** Let Principal be P .

$$SI = \frac{P \times 4 \times 2}{100} = 0.08P.$$

$$CI = P[(1 + \frac{4}{100})^2 - 1] = P[(1.04)^2 - 1] = P[1.0816 - 1] = 0.0816P.$$

Difference: $0.0816P - 0.08P = 1 \implies 0.0016P = 1$.
 $P = \frac{1}{0.0016} = \mathbf{625}$.

11. **Solution:** Let Sum be P . $R = 20\%$, $n = 2$.
Case 1 (Annual): $A_1 = P(1 + 0.20)^2 = 1.44P$.
Case 2 (Half-yearly): $R = 10\%$, $n = 4$. $A_2 = P(1 + 0.10)^4 = 1.4641P$.
 $A_2 - A_1 = 482 \implies 0.0241P = 482 \implies P = \frac{482}{0.0241} = \mathbf{20000}$.
12. **Solution:** $P = 24000$, $R = 10\%$, $n = 2$ yrs 4 months $= 2\frac{1}{3}$ yrs.
Amount for 2 years: $A = 24000(1.1)^2 = 24000 \times 1.21 = 29040$.
Interest for next $1/3$ year: $I = \frac{29040 \times 10 \times 1/3}{100} = 968$.
Total Amount: $29040 + 968 = \mathbf{30008}$.
Total Interest: $30008 - 24000 = \mathbf{6008}$.
13. **Solution:** $P = 500000$, $r_1 = 10\%$, $r_2 = 12\%$.
 $A = 500000(1 + \frac{10}{100})(1 + \frac{12}{100}) = 500000(1.1)(1.12)$.
 $A = 500000 \times 1.232 = 616000$.
Profit $= 616000 - 500000 = \mathbf{116000}$.

Section D: One Liners

1. divided by **4**.
2. **number of conversion periods**.
3. $1 - \frac{R}{100}$.
4. **first**.