

COMPOUND INTEREST

CONCEPT

Compound Interest (C. I.)

In case of compound interest, principal keeps changing. The principal at a beginning of particular period is the sum of the principal at the beginning of the previous period and the interest accrued in that period.

Let Principal = P, Rate = R% per annum, Time = T years.

$$A = P \left(1 + \frac{R}{100} \right)^T$$

$$CI = A - P$$

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$$P = 100$$

$$T = 4$$

$$R = 10\%$$

$$CI = ?$$

$$CI = 146.41 - 100 \\ = 46.41$$

$$\begin{array}{l} 100 \\ \text{I } \downarrow +10\% = 10 \\ 110 \\ \text{II } \downarrow +10\% = 11 \\ 121 \\ \text{III } \downarrow +10\% = 12.1 \\ 133.1 \\ \text{IV } \downarrow +10\% = 13.31 \\ 146.41 \end{array}$$

9. Find the amount on a sum of 20000 after 3 years if the compound interest rate offered for the 1st, 2nd and 3rd year was 15%, 10% and 6% respectively.

~~A. 23818~~

~~B. 23000~~

~~C. 26200~~

~~D. 26818~~

$$\begin{aligned}
 &20000 \\
 &\text{I} \downarrow +15\% = 3000 \\
 &23000 \\
 &\text{II} \downarrow +10\% = 2300 \\
 &\textcircled{25300} \\
 &\downarrow +6\% = 153 \times 6 = \textcircled{253 \times 6} \\
 &\underline{\underline{26818}}
 \end{aligned}$$

10. The compound interest on Rs. 30,000 at 7% p.a. is Rs. 4347. The period (in years) is _____.

~~A) 3 years~~

~~B) 4 years~~

~~C) 2 years~~

~~D) 1 year~~

$$\begin{aligned}
 &\Rightarrow 30000 \\
 &\text{I} \downarrow +7\% = \textcircled{2100} \\
 &32100 \\
 &\textcircled{\text{II}} \downarrow +7\% = \textcircled{2247}
 \end{aligned}$$

$$\begin{aligned}
 SI_1 &= 2100 \\
 \checkmark SI_2 &= 2100 \times 2 = 4200 \\
 SI_3 &= 2100 \times 3 = 6300
 \end{aligned}$$

11. What will Rs. 2000 amount to in two years if it is invested in 20% p.a. compound interest, interest being compounded semiannually?

A) Rs. 2880

B) Rs. 3160

☒ C) Rs. 2928.20

D) Rs. 3148.40

$$\begin{array}{l}
 \text{I} \left\{ \begin{array}{l} 2000 \\ 6M \downarrow +10\% = 200 \\ 2200 \\ 6M \downarrow +10\% = 220 \end{array} \right. \\
 \text{II} \left\{ \begin{array}{l} 2420 \\ 6M \downarrow +10\% = 242 \\ \textcircled{2662} \\ 6M \downarrow +10\% = \textcircled{266.2} \\ \underline{\underline{2928.2}} \end{array} \right.
 \end{array}$$

12. Tyrion invests Rs. 5000 for three years at a certain rate of interest, compounded annually. At the end of one year it amounts to Rs. 5600. Calculate the amount due at end of the second year.

A) Rs. 6200

☒ B) Rs. 6272

C) Rs. 6260

D) Rs. 6320

$$A_1 = 5600 \quad P = 5000 \quad SI_1 = 600$$

$$R = \frac{600 \times 100}{5000 \times 1} = 12\%$$

$$\begin{array}{l}
 5600 \\
 \downarrow +12\% = 10\% + 1\% + 1\% \\
 = 560 + 56 + 56 \\
 \underline{\underline{6272}}
 \end{array}$$

13. The difference between the CI and SI on a certain sum at 10% per annum for 2 years is Rs. 631. Find the sum.

A) Rs. 63100

B) Rs. 6310

C) Rs. 63200

D) Rs. 63000

$$\begin{array}{lcl}
 \text{SI} & P=100 & \text{CI} \\
 \frac{100 \times 2 \times 10}{100} & & \begin{array}{l} +10\% \\ 110 \\ \downarrow +10\% = 11 \\ 121 \\ \text{CI} = 121 - 100 = 21 \end{array} \\
 = 20 & &
 \end{array}$$

$$\begin{array}{lcl}
 \text{Diff} & P & \\
 21 - 20 = 1 & 100 & \\
 631 & 63100 &
 \end{array}$$

14. Find the compound interest (reckoned yearly) on Rs. 2400 at 10% p.a. for 2 years 4 months.

~~A) Rs. 3000.80~~

~~B) Rs. 400.80~~

C) Rs. 600.80

~~D) Rs. 700~~

$$\begin{array}{l}
 2400 \\
 \text{I} \downarrow +10\% = 240 \\
 + \\
 2640 \\
 \text{II} \downarrow +10\% = 264 \\
 + \\
 2904 \\
 \text{4M} \downarrow +10\% \times \frac{4}{12} = 290.4 \times \frac{1}{3} \\
 = 600.8
 \end{array}$$

15. If the amount becomes $6\frac{1}{4}$ times of the principal after 2 years of CI, the rate of interest p.a. is

A) 115%

B) 150%

C) 15%

D) 105%

$$A = P \left(1 + \frac{R}{100}\right)^T$$

$$6.25P = P \left(1 + \frac{R}{100}\right)^2$$

$$\left(1 + \frac{R}{100}\right)^2 = \frac{625}{100} = \left(\frac{25}{10}\right)^2$$

$$1 + \frac{R}{100} = \frac{25}{10}$$

$$\frac{R}{100} = \frac{25}{10} - 1 = \frac{15}{10}$$

$$R = \frac{15}{10} \times 100$$

$$= 150\%$$

Use formula
only when
Rate NOT given

16. The compound interest on a certain sum for 2 years at 10% per annum is Rs. 525. The simple interest on the same sum for double the time at half the rate percent per annum is

~~A) 2500~~

~~B) 500~~

~~C) 1000~~

~~D) 400~~

$$P = 100$$

↓ +10%

$$110$$

↓ +10% = 11

$$121$$

$$CI = 121 - 100 = 21$$

$\frac{CI}{21}$	$\frac{P}{100}$	$P = \frac{100 \times 525}{21}$
$\frac{525}{21}$	$\frac{100}{P}$	$= 2500$

$$SI = \frac{2500 \times 4 \times 5}{100} = 500$$

$$SI = \frac{P \times T \times R}{100}$$

17. A sum of money at compound interest doubled at a certain rate in 4 years. In how many years will it become 8 times at the same rate?

A) 24

☒ B) 12

C) 16

D) 18

$$P \Rightarrow \times 2 \longrightarrow 4 \text{ years}$$

$$\boxed{\times 2^n \longrightarrow 4 \times n \text{ years}}$$

$$\times 2^2 \longrightarrow 4 \times 2 \text{ years}$$

$$\times 2^3 \longrightarrow 4 \times 3 = \underline{\underline{12 \text{ years}}}$$

$$A = P \left(1 + \frac{R}{100} \right)^T$$

$$2P = P \left(1 + \frac{R}{100} \right)^4$$

$$2^3 = \left(\left(1 + \frac{R}{100} \right)^4 \right)^3 = \left(1 + \frac{R}{100} \right)^{12}$$

$$2^n = \left(1 + \frac{R}{100} \right)^{4n \Rightarrow \text{Time}}$$

$(a^x)^y = a^{xy}$

18. A sum of money was put at SI at a certain rate for 2 years. Had it been at 1% higher rate, it would have fetched Rs. 24 more. Find the sum.

A) Rs. 2400

☒ B) Rs. 1200

C) Rs. 4800

D) Rs. 600

$$\text{Inc per year} = 1\%$$

$$\text{Total Inc} = 1\% \times 2$$

$$= 2\% = 24$$

$$\Rightarrow 1\% = 12$$

$$\Rightarrow 100\% = \underline{\underline{1200}}$$

19. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest on Rs. 12,000 after 3 years at the same rate?

A) Rs. 2160

B) Rs. 3120

☒ C) Rs. 3972

D) Rs. 6240

$$R = \frac{60\%}{6} = 10\%$$

$$\begin{array}{l} 12000 \\ \downarrow +10\% = 1200 \\ 13200 \\ \downarrow +10\% = 1320 \\ 14520 \\ \downarrow +10\% = 1452 \\ 3972 \end{array}$$

20. Find the compound interest on 5000 @ 10% for a period of a year compounded half yearly?

A. 500

☒ B. 512.5

C. 450

D. 665

$$\begin{array}{l} 5000 \\ \downarrow +5\% = 250 \\ 5250 \\ \downarrow +5\% = 262.5 \\ 5512.5 \end{array}$$