SIMPLE INTEREST

- KOUSTAV

CONCEPT

Simple Interest (S.I.)

If the interest is calculated every year or every time period on the principal or the sum at the beginning of first year, then it is called **simple interest**.

Let Principal = P, Rate = R% per annum (p.a.) and Time = T years.

(i). Simple Interest = $\left(\frac{P \times R \times T}{100}\right)$

(ii). P = $\left(\frac{100 \times S.I.}{R \times T}\right)$; R = $\left(\frac{100 \times S.I.}{P \times T}\right)$ and T = $\left(\frac{100 \times S.I.}{P \times R}\right)$.

$A = P + I$

1. Joey took a loan from Chandler at the rate of 12% p.a. simple interest. After 3 years he had to pay Rs. 5400 as interest for the period. What was the principal amount borrowed by Joey?

A) 18000 ✓B) 15000 C) 12000 D) 16000

$$P = \frac{100 \times 5400}{12 \times 3} = 15000$$

2. How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at the rate of 4.5% p.a. simple interest?

A) 5 years B) 3 years C) 4 years D) 6 years

$$T = \frac{100 \times 81}{450 \times 4.5} = 4$$

3. A sum of Rs. 800 amounts to Rs. 920 in 3 years at SI. If the interest rate is increased by 3% it would amount to how much?

A) 992 B) 800 C) 900 D) 920

Inc per year = 3% of 800 = 24

Inc for 3 years = 24 x 3 = 72

920 + 72 = 992

4. A certain sum of money in simple interest amounts to Rs. 1008 in 2 years and to Rs. 1164 in 3 ½ years. Find the sum.

A) 208 B) 900 C) 804 ✓D) 800

$A_2 = P + I_2 = 1008$ —①

$A_{3.5} = P + I_{3.5} = 1164$ —②

② − ①

$I_{3.5} - I_2 = 1164 - 1008$

$I_{1.5} = 156$

$I_1 = \frac{156}{1.5}$

$I_2 = \frac{156}{1.5} \times 2 = 208$

$P = 1008 - 208$

$= 800$

5. In how many years will a sum double itself at 12.5% p.a. simple interest?

A) 4 B) 8 C) 10 D) 16

$P = x2$ $P \Rightarrow \uparrow 1x$ $P \Rightarrow \uparrow 100\%$

$$T = \frac{100\%}{12.5\%} = 8$$

$P = 3x$ $R = 25\%$

$P \uparrow 2x$ $\uparrow 200\%$

$$T = \frac{200\%}{25\%} = 8$$

$P = 7x$ $R = 50\%$

$P \uparrow 6x$ $\uparrow 600\%$

$$T = \frac{600\%}{50\%} = 12$$

6. A sum becomes 5 times in 20 years at SI. Find rate.

A) 10% B) 25% C) 40% D) 20%

$P = 5x$ $P \uparrow 4x$ $P \uparrow 400\%$.

$R = \frac{400\%}{20} = 20\%$

7. Guddu Bhaiya invested 1/3 of his capital at 7%, 1/4 at 8% and the remainder at 10% SI respectively. If his annual income becomes 510, the capital is

A. 6000 B. 5600 C. 5400 D. 6600

$$\text{Rem} = C - \frac{1}{3}C - \frac{1}{4}C = \frac{12C - 4C - 3C}{12} = \frac{5C}{12}$$

$$\frac{C}{3} \times \frac{7 \times 1}{100} + \frac{C}{4} \times \frac{8 \times 1}{100} + \frac{5C}{12} \times \frac{10 \times 1}{100} = 510$$

$$\frac{14C + 12C + 25C}{6} = 510 \times 100$$

$$\frac{51C}{6} = 510 \times 100$$

$$C = 6000$$

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

A. 23818 B. 23000 ✓C. 26200 D. 26818

Total Rate = 15% + 10% + 6%

= 31%

20000

↓ +31% = 6200

26200

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.

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

$$CI = A - P$$

$P = 100$

$R = 10\%$

$T = 4$ yrs

$CI = 146.41 - 100$

$= 46.41$

100
↓ +10% = 10
+
110
↓ +10% = 11
+
121
↓ +10% = 12.1
+
133.1
↓ +10% = 13.31
146.41 ←

46.41

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

20000

↓ +15% = 3000

23000

↓ +10% = 2300

→ 25300 ←

↓ +6% = 1% × 6 = 253 × 6

26818

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

30000

I ↓ +7% = 2100

32100 +

II ↓ +7% = 2247

4347

$SI_1 = 2100$ X

$SI_2 = 4200$ ✓

$SI_3 = 6300$ X

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

2000

I
- 6M ↓ +10% = 200
- 2200
- 6M ↓ +10% = 220

2420

II
- 6M ↓ +10% = 242
- 2662
- 6M ↓ +10% = 266.2

2928.2

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

$I_1 = 5600 - 5000 = 600$

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

5600

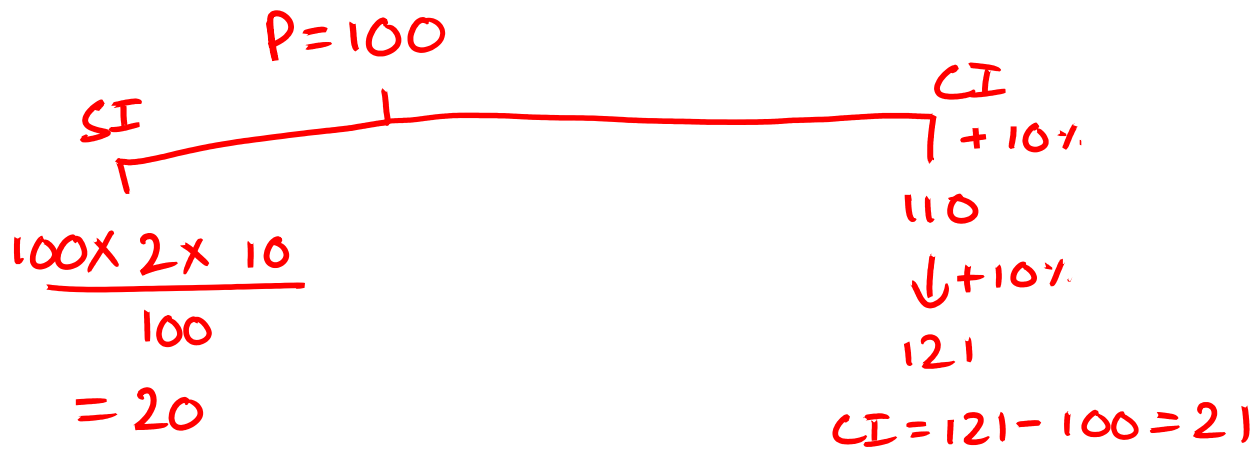
↓ $+12\% = 10\% + 1\% + 1\%$

$= 560 + 56 + 56$

6272

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



Diff

21-20=1

631

P

100

63100

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

2400

I ↓ +10% = 240

2640

II ↓ +10% = 264

2904

4M ↓ +10% × $\frac{4}{12}$ = 290.4 × $\frac{1}{3}$

3000 8

15. If the amount becomes 6 ¼ times of the principal after 2 years of CI, the rate of interest p.a. is

A) 115% B) 150% C) 15% D) 105%

$A = 6\frac{1}{4}P = \frac{25}{4}P$

$P\left(1+\frac{R}{100}\right)^T = \frac{25}{4}P$

$\left(1+\frac{R}{100}\right)^2 = \frac{25}{4}$

$1+\frac{R}{100} = \frac{5}{2}$

$\frac{R}{100} = \frac{5}{2} - 1 = \frac{3}{2}$

$R = \frac{3}{2} \times 100 = 150\%$

[Use the formula only when Rate is 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%

121

CI = 121 − 100 = 21

CI	P
21	100
525	P

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

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

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

$= 500$

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

$P \rightarrow \times 2 \longrightarrow 4$ yrs

$P \rightarrow \times 2^n \longrightarrow 4 \times n$ years

$P \rightarrow \times 2^2 \longrightarrow 4 \times 2$

$P \rightarrow \times 2^3 \longrightarrow 4 \times 3 = 12$ years

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

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

$$2^n = \left[\left(1+\frac{R}{100}\right)^4\right]^n = \left(1+\frac{R}{100}\right)^{4n=T}$$

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

1% × 2 = 2% = 24

1% = 12

100% = 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

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

12000

↓ +10% = 1200

13200

↓ +10% = 1320

14520

↓ +10% = 1452

3972

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

5000

↓ +5% = 250

5250 +

↓ +5% = 262.5

512.5

EXTRA QUESTIONS:

21. Find the amount due on Rs8000 in 2 years if the rate of compound interest is 10% for the first year and 12% for the second year.

A. Rs.9716 B. Rs.9856 C. Rs.10156 D. Rs.9756

22. The difference between simple and compound interests compounded annually on a certain sum of money for 2 years at 4% per annum is Re. 1. The sum (in Rs.) is:

A. 625 B. 630 C. 640 D. 650

23. What will be the compound interest on a sum of Rs. 25,000 after 3 years at the rate of 12 p.c.p.a.?

A. Rs. 9000.30 B. Rs. 9720 C. Rs. 10123.20 D. Rs. 10483.20

24. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:

A. Rs. 650 B. Rs. 690 C. Rs. 698 D. Rs. 700

25. Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a. respectively. If the total amount of simple interest earned in 2 years be Rs. 3508, what was the amount invested in Scheme B?

A. Rs. 6400 B. Rs. 6500 C. Rs. 7200 D. Rs. 7500

ANSWER KEY – SIMPLE INTEREST & COMPOUND INTEREST

QUESTION	ANSWER	QUESTION	ANSWER	QUESTION	ANSWER
1	B	11	C	21	B
2	C	12	B	22	A
3	A	13	A	23	C
4	D	14	C	24	C
5	B	15	B	25	A
6	D	16	B		
7	A	17	B		
8	C	18	B		
9	D	19	C		
10	C	20	B		