

BANK PROBATIONERY OFFICER QUANTITATIVE APTITUDE

SIMPLE & COMPOUND INTEREST

Interest is the money paid by the borrower to the lender for the use of money lent. Interest is of two kinds, simple and compound. Money borrowed or deposited is called the principal. The sum of principal and interest is called the amount.

i) Simple Interest:

If the interest on a certain sum borrowed for a certain period is reckoned uniformly, it is called Simple Interest.

The simple interest (I) for a principal (P) for (N) years at (R) rate percent per annum is

$$I = \frac{PNR}{100}$$

$$P = \frac{Ix100}{NxR}; R = \frac{Ix100}{PxN}; N = \frac{Ix100}{PxR}$$

ii) Compound Interest:

Money is said to be lent at Compound Interest if the interest is not paid as soon as it falls due, but is added to the principal after a fixed period, so that the amount at the end of the period, becomes the principal for the next period.

a) When interest is compounded annually:

$$\text{Amount} = P \left(1 + \frac{R}{100}\right)^N$$

b) When interest is compounded half yearly:

$$\text{Amount} = P \left(1 + \frac{R}{200}\right)^{2N}$$

c) When interest is compounded quarterly

$$\text{Amount} = P \left(1 + \frac{R}{400}\right)^{4N}$$

$$d) \text{ C.I.} = P \left(1 + \frac{R}{100}\right)^N - P \quad (\text{or})$$

$$= P \left[\left(1 + \frac{R}{100}\right)^N - 1 \right]$$

Solved Examples:

1. Calculate the amount on Rs. 4480 at 8% per annum for 3 years.

$$\text{Ans: S.I.} = \frac{PxNxR}{100}$$

$$= \text{Rs.} \frac{4480 \times 3 \times 8}{100} = \text{Rs.} 1075.20$$

$$\begin{aligned} \text{Amount} &= \text{Rs.} (4480 + 1075.20) \\ &= \text{Rs.} 5555.20 \end{aligned}$$

2. S.I. on Rs. 1500 at 7% per annum for a certain time is Rs. 210. Find the time

$$\text{Ans: Time, } N = \frac{210 \times 100}{1500 \times 7} = 2 \text{ years}$$

3. A certain sum of money at simple interest amounts to Rs. 1260 in 2 years and to Rs. 1350 in 5 years. The rate percent per annum is -----

$$\text{Ans: S.I. for 3 years} = \text{Rs.} (1350 - 1260) = \text{Rs.} 90$$

$$\therefore \text{S.I. for 2 years} = \text{Rs.} \frac{90}{3} \times 2 = \text{Rs.} 60$$

$$\text{Principal} = \text{Rs.} (1260 - 60) = \text{Rs.} 1200$$

$$\text{Rate, } R = \frac{100 \times 60}{1200 \times 2} \% = 2.5\%$$

4. A man invested $\frac{1}{3}$ of his capital at 7%, $\frac{1}{4}$ at 8% and the remainder at 10%. If his annual income is Rs. 561, the capital is -----

Let the capital be Rs. x Then,

$$\frac{x}{3} \times \frac{7}{100} \times 1 + \frac{x}{4} \times \frac{8}{100} \times 1 + \frac{5x}{12} \times \frac{10}{100} \times 1 = 561$$

$$\Rightarrow \frac{7x}{300} \times \frac{8x}{400} \times 1 + \frac{50x}{1200} = 561$$

$$\Rightarrow \frac{102x}{1200} = 561$$

$$\Rightarrow x = \frac{561 \times 1200}{102} = \text{Rs. } 6,600$$

5. Find the sum of money which increases $\frac{1}{10}$ of itself every year and amounts to Rs. 450 in 5 years at S.I.

Ans: Let $P = \text{Rs. } 100$

$$\text{S.I.} = \text{Rs. } 100 \times \frac{1}{10} = \text{Rs. } 10$$

$$\text{S.I. for 5 years} = \text{Rs. } 50$$

$$\begin{aligned} \text{Amount after 5 years} &= 100 + 50 \\ &= \text{Rs. } 150 \end{aligned}$$

$$\text{If the amount is Rs. } 150, P = \text{Rs. } 100$$

\therefore If the amount is Rs. 450,

$$P = \frac{100 \times 450}{150} = \text{Rs. } 300$$

6. A sum was put at simple interest at a certain rate for 2 years. Had it been put at 1% higher rate, it would have fetched Rs. 24 more. Find the sum.

Ans: Let the sum be Rs. x and rate be $R\%$ and $(R+1)\%$

$$\text{Then, } \frac{x \times (R+1) \times 2}{100} - \frac{x \times R \times 2}{100} = 24$$

$$\Rightarrow \frac{2xR}{100} + \frac{2x}{100} - \frac{2xR}{100} = 24$$

$$x = \frac{24 \times 100}{2} = \text{Rs. } 1,200$$

7. Find compound interest on Rs. 5,000 at 10% per annum for 3 years

$$\text{Ans: Amount} = P \left(1 + \frac{R}{100} \right)^N$$

$$= 5000 \left(1 + \frac{10}{100} \right)^3 = \text{Rs. } 6,655$$

\therefore Compound Interest

$$= \text{Rs. } (6,655 - 5,000) = \text{Rs. } 1,655$$

8. If the compound interest on a certain sum for 3 years at 20% per annum is Rs. 728, find the simple interest.

$$\text{Ans: Given that } P \left(1 + \frac{20}{100} \right)^3 - P = \text{Rs. } 728$$

$$\text{or } 1.728 P - P = \text{Rs. } 728$$

$$\therefore P = \text{Rs. } 1,000$$

$$\text{Now, S.I.} = \text{Rs. } \frac{1000 \times 3 \times 20}{100} = \text{Rs. } 600$$

9. The difference between the compound interest and the simple interest on a certain sum at 10% per annum for two years is Rs. 60. Find the sum.

Ans: Let the sum be Rs. x

$$\text{So, S.I.} = \text{Rs. } \frac{x \times 10 \times 2}{100} = \text{Rs. } \frac{x}{5}$$

$$\text{C.I.} = \text{Rs. } x \left[1 + \frac{10}{100} \right]^2 - x = \text{Rs. } \frac{21x}{100}$$

$$\therefore \text{C.I.} - \text{S.I.} = \frac{21x}{100} - \frac{x}{5} = \frac{x}{100} = \text{Rs.60}$$

$$\therefore x = \text{Rs. } 6,000$$

PRACTICE TEST

1. At what rate percent per annum will a sum of Rs. 3,600 become Rs. 4,500 in 10 years at simple interest?

- 1) 5% 2) 2.5%
3) 10% 4) 6.75%

2. A sum of Rs. 1600 lent at simple interest at 12.5% per annum will become double in

- 1) 6 years 2) $7\frac{1}{2}$ years
3) 8 years 4) $9\frac{1}{4}$ years

3. The difference in simple interest at 13% and 12% p.a. of a sum in one year is Rs. 110. Then the sum is

- 1) Rs. 13,000 2) Rs. 15,000
3) Rs. 10,000 4) Rs. 11,000

4. The difference in the interests received from two different banks on Rs. 1000 for 2 years is Rs. 20. Thus, the difference in their rates is

- 1) 2% 2) 1%
3) 1.5% 4) 0.5%

5. Find out the capital required to earn a monthly interest of Rs. 600 at 6% simple interest.

- 1) Rs. 1 lakhs 2) Rs. 1.2 lakhs
3) Rs. 1.1 lakhs 4) Rs. 1.3 lakhs

6. A man invested $\frac{1}{3}$ rd of the sum at 7%, $\frac{1}{4}$ th at 8% and the remaining at 10% for one year. If the annual interest is Rs. 408, then the investment is

- 1) Rs. 8,400 2) Rs. 4,800
3) Rs. 5,000 4) Rs. 7,200

7. The difference in simple interest on a certain sum of money for 3 years and 5 years at 18% per annum is Rs. 2,160. Then the sum is

- 1) Rs. 6,500 2) Rs. 4,500
3) Rs. 6,000 4) Rs. 7,500

8. At what rate percent per annum simple interest will a sum of money triple itself in 25 years?

- 1) 8 2) $8\frac{1}{3}$
3) $9\frac{1}{11}$ 4) 10

9. What sum of money lent out at compound interest will amount to Rs. 968 in 2 years at 10% per annum, interest being charged annually?

- 1) Rs. 900 2) Rs. 825
3) Rs. 780 4) Rs. 800

10. The difference between compound interest and simple interest on certain sum of money in 2 years at 4% per annum is Rs. 50. Find the sum

- 1) Rs. 30,550 2) Rs. 31,250
3) Rs. 25,670 4) Rs. 35,400

11. A sum of money lent at compound interest amounts to Rs. 1210 in two years and to Rs. 1464.10 in 4 years. Find the rate of interest.

- 1) 12% 2) 10%
3) 8% 4) 15%

12. A man borrows Rs. 4,000 at 8% per annum on compound interest. At the end of every year he pays Rs. 1,500 as part payment of loan and interest. How much does he still owe to the bank after 3 such annual payments?

- 1) Rs. 1,799 2) Rs. 169.25
3) Rs. 2,000 4) Rs. 234

13. The cost of a machine is estimated to be decreasing at the rate of 15% every year. If it costs Rs. 6,000 now, what will be the estimated value of the machine after 2 years?

- 1) Rs. 3,750 2) Rs. 4,335
3) Rs. 3,225 4) Rs. 5,000

14. A tank contains 18,000 litres of water. If it decreases at the rate of 5% a day, what will be the quantity of water after 2 days

- 1) 16,245 litres 2) 15,234 litres
3) 17,225 litres 4) 18,200 litres

15. A sum of money doubles itself at compound interest in 15 years. It will become 8 times in

- 1) 40 years 2) 30 years
3) 60 years 4) 45 years

16. Ram borrowed Rs. 5,000 from Sanjay with simple interest. After 2 years, Sanjay got Rs. 1,000 more than what he had given to Ram. What was the percentage of interest per annum?

- 1) 10 2) 20 3) 15 4) 5

17. A sum doubles in 20 years at simple interest. How much is the rate per annum?

- 1) 5% 2) 4% 3) 12% 4) $6\frac{2}{3}\%$

18. The simple interest on a sum of money is $\frac{1}{9}$ th of the principal and the number of years is equal to the rate percent per annum. The

rate of interest per annum is -----

- 1) 2% 2) 5%
3) 4% 4) $3\frac{1}{3}\%$

19. The simple interest on a certain sum of money for 4 years at 4 percent per annum exceeds the compound interest on the same sum for 3 years at 5 percent per annum by Rs. 57. Find the sum.

- 1) Rs. 24,000 2) Rs. 12,500
3) Rs. 26,700 4) Rs. 23,050

20. A man borrows Rs. 4,000 from a bank at $7\frac{1}{2}\%$ interest. At the end of every year, he pays Rs. 1,500 as part repayment of loan and interest. How much does he still owe to the Bank after 3 such annual payments?

- 1) Rs. 123.25 2) Rs. 25
3) Rs. 124.25 4) 125

21. A certain sum lent out at simple Interest and the true discount on a certain sum for 1 year at 5% is Rs. 1 find the sum.

- 1) Rs. 400 2) Rs. 420
3) Rs. 450 4) Rs. 500

22. If the amounts for a fixed principal after 3 and 2 years at a certain rate of compound interest are in the ratio 21 : 20. The rate of interest is

- 1) 7% 2) 6%
3) 5% 4) 4%

ANSWERS TO PRACTICE TEST

1. (2) 2. (3) 3. (4) 4. (2) 5. (2) 6. (2) 7. (3) 8.(1)
9. (4) 10. (2) 11. (2) 12. (2) 13. (2) 14. (1) 15. (4) 16.(1)
17. (1) 18. (4) 19. (1) 20. (1) 21.(2) 22. (3)