Simple Interest (SI) and Compound Interest (CI)

Basic Concepts

Simple Interest (SI)

- **Definition:** Interest calculated only on the principal amount over a period.
- **Formula:**
  - SI = (P × R × T) / 100
- **Amount:**
  - A = P + SI
- **Where:**
  - P = Principal (Initial Amount)
  - R = Rate of Interest (per annum)
  - T = Time (in years)

Compound Interest (CI)

- **Definition:** Interest is calculated on both the principal and previously accumulated interest.
- **Formula:**
  - CI = P × (1 + R/100)^T - P
- **Amount:**
  - A = P × (1 + R/100)^T
- **Where:**
  - P = Principal
  - R = Rate of Interest (per annum)
  - T = Time (in years)

Key Differences Between SI and CI

- **For Two Years:**
  - CI - SI = P × (R/100)^2
- **For Three Years:**
  - CI - SI = P × (R/100)^2 × (3 + R/100)
- **When SI and CI are equal:**
  - Interest is applied only once.
- **For small interest rates and short time periods:**
  - SI ≈ CI.

Special Cases

- **If compounded half-yearly:**
  - R → R/2 and T → 2T
- **If compounded quarterly:**
  - R → R/4 and T → 4T
- **Effective Rate of Interest:**
  - Re = (1 + R/N)^N - 1) × 100, where N is the number of compounding periods.
- **Depreciation Formula:**
  - A = P × (1 - R/100)^T

Examples

Example 1: Finding SI

Problem: What is the simple interest on ₹2000 at 3.5% per annum for 6 years?

Solution:

- Using the formula:
  - SI = (P × R × T) / 100
- Substituting values:
  - SI = (2000 × 3.5 × 6) / 100
- Calculation:
  - SI = ₹420

Example 2: Finding CI

Problem: Find the compound interest on ₹8000 at 10% per annum for 2 years.

Solution:

- Using the formula:
  - CI = P × (1 + R/100)^T - P
- Substituting values:
  - CI = 8000 × (1 + 10/100)^2 - 8000
- Calculation:
  - CI = 8000 × (1.1)^2 - 8000 = ₹1680

Example 3: CI vs SI Difference

Problem: The difference between CI and SI for 2 years at 14.28% per annum is ₹30. Find the principal.

Solution:

- Using the formula:
  - P = (D × 100²) / R²
- Substituting values:
  - P = (30 × 100²) / (14.28²)

- Calculation:
    - P ≈ ₹1430

Example 4: Finding Rate

Problem: If 2 years of SI is ₹200 and the difference between SI and CI is ₹7, find the rate.

Solution:

- Using the formula:
    - CI - SI = P × (R/100)^2
- Substituting values and solving for R:
    - R ≈ 7%

Example 5: Loan Repayment

Problem: A person borrows ₹30000 at 10% SI for 2 years and pays back ₹36480. How much was borrowed at 12%?

Solution:

- Using the SI formula:
    - SI = (P × R × T) / 100
- Breaking into two parts and solving the system of equations:
    - We get ₹12000 at 12% and ₹18000 at 10%.

Example 6: Doubling Money

Problem: If a sum doubles in 6 years, find the rate.

Solution:

- Using SI formula:
    - P = 2P, SI = P
- Rearranging:
    - R = (100 × SI) / (P × T)
- Substituting values:
    - R = (100 × P) / (P × 6)
- Calculation:
    - R = 16.66%

Tips & Tricks

- **For quick CI calculations, use the formula:**
    - CI ≈ SI + (SI × R/100) for small values of R.
- **Use logarithms for solving large exponent CI problems efficiently.**
- **For investments, compare the effective annual interest rate rather than nominal rates.**

Question for Practice

Simple interest

1. What is the simple interest on ₹2000 at the rate of 3.5% for 6 years?
   (a)480₹ (b)480₹ (c)400₹ (d)420₹

2. The simple interest rate at ₹9210 is 4% for the first year, 3.5% for the next year, and 2.5% for the next year. Then find the total simple interest.
   (a)880₹ (b)921₹ (c)800₹ (d)900₹

3. If the rate of simple interest on money is 4.5% for the first year, 5% for the next year, 3.5% for the third year. If we get ₹3900 in simple interest. then find that money?
   (a)39000₹ (b)38000₹ (c)30000₹ (d)37500₹

4. The amount of ₹800 becomes ₹920 at simple interest in 3 years. If the rate is increased by 3%, then how much will it be in the same period?
   (a)980₹ (b)959₹ (c)972₹ (d)992₹

5. Interest received in $2\frac{1}{3}$ years at a rate of $3\frac{3}{4}\%$ simple interest on a money amount is ₹210. then what is that amount?
   (a)1800₹ (b)2000₹ (c)2500₹ (d)2400₹

6. How much amount will become ₹496 in 6 years at the rate of 4% simple interest?
   (a)400₹ (b)360₹ (c)450₹ (d)420₹

7. If the simple interest charged on money at the rate of 12.5% for 3 years is ₹4500 less than the principal. find the principal?
   (a)7200₹ (b)8100₹ (c)9000₹ (d)7750₹

8. The simple interest on money for 4 years is ₹2200 less than the principal. What will be the simple interest if the rate is $16\frac{2}{3}\%$?
   (a)4000₹ (b)3600₹ (c)4400₹ (d)4420₹

9. The amount of ₹2100 is lent in two parts in such a way that the interest earned in 4 years at the rate of 6% on the first part is equal to the interest earned in 2 years at the rate of 9% on the second part. what will be the second part of the money?
   (a)1400₹ (b)1200₹ (c)1450₹ (d)1420₹

10. An amount of ₹5200 is lent in two parts in such a way that the interest earned in 8 years on 3% simple interest on the first part is equal to the interest earned on 5% on 3 years on the second part, then what will be the amount of the first part of the money?
    (a)2000₹ (b)2500₹ (c)1800₹ (d)2400₹

11. ₹2189 is divided into three parts so that their interest is equal in 1, 2, and 3 years respectively. If the rate of simple interest on each part is 4%, then what will be the lowest amount?
    (a)400₹ (b)398₹ (c)450₹ (d)420₹

12. In how many years will ₹72 become ₹81 at the rate of $6\frac{1}{4}$% annual simple interest?
(a)4years (b)3years (c)2years (d)2.5years

13. Prabhat borrowed money from a bank at 8% per annum simple interest and lent the same amount to Ashish at 12% per annum. If he got a profit of ₹960 after 12 years, what was the original amount?
(a)2000₹ (b)2500₹ (c)1800₹ (d)2400₹

14. If money becomes 3 times itself in 5 years, then find the rate.
(a)50% (b)25% (c)60% (d)40%

15. If money becomes double itself in 6 years, find the rate.
(a)12% (b)12.5% (c)16.66% (d)15%

16. If money becomes 8 times itself in 3 years, how much time will it become 64 times itself?
(a)24years (b)27years (c)22years (d)25years

17. If money doubles itself in 6 years. At what time will it become 10 times itself?
(a)56years (b)54years (c)55years (d)53years

18. If money becomes ₹2100 in 2 years and ₹2250 in 5 years. find the rate?
(a)5% (b)2.5% (c)6% (d)4%

19. When the interest rate in a bank is down from 5% to 4%, a person deposits ₹2000 more so that he gets the same amount of interest as before, what was his amount?
(a)5000₹ (b)7000₹ (c)8000₹ (d)9000₹

20. Some part of ₹3000 is lent at 5% and the rest part at 7% per annum. If after 1 year the total simple interest was ₹182. Then find the amount given at the rate of 7% per annum.
(a)2000₹ (b)1500₹ (c)1600₹ (d)1400₹

21. A person has ₹2000. Out of which he lent one part at the rate of 5% per annum and the other part at 4% per annum. He gets a total annual income of ₹92 from interest. So find the amount given at the rate of 5%.
(a)1300₹ (b)1200₹ (c)1800₹ (d)1400₹

22. The simple interest of ₹160 is ₹40 and the number of years is equal to the interest rate. So what is the interest rate?
(a)5% (b)2.5% (c)6% (d)4%

23. The simple interest on money is 4/25 of the principal and the number of years and the rate are equal. Find the rate of interest.
(a)5% (b)2.5% (c)6% (d)4%

24. The simple interest at some rate on a money amount is 25/16 of the principal. If the rate percent is equal to the number of years, what is the rate of interest?
(a)12% (b)12.5% (c)16.66% (d)15%

25. ₹2613 is divided into three parts so that their interest is the same in 2, 3, and 4 years respectively. If the interest rate in each case is 29% per annum, what will be the lowest amount?
(a)610₹ (b)605₹ (c)607₹ (d)603₹

26. A person invested in 3 schemes at the rate of 10%, 12%, and 15% for 6 years, 10 years, and 12 years respectively. He received equal interest at the end of each scheme. Find the ratio of its investment.
(a)6: 3: 2 (b)5: 3: 2 (c)7: 4: 5 (d)3: 4: 5

Compound interest

27. An amount becomes ₹9800 at the rate of compound interest16.66% in 2 years. Find the amount.
(a)7200₹ (b)6400₹ (c)8100₹ (d)8000₹

28. What will be the amount on principal ₹1280 at the rate of compound interest 12.5% for 2 years?
(a)1440₹ (b)1680₹ (c)1620₹ (d)1280₹

29. What will be the principal if the rate of compound interest is 33.33% for 1.5 years amounting ₹4200?
(a)2700₹ (b)2160₹ (c)2200₹ (d)2900₹

30. what will be the principal in the rate of compound interest 33.33% for 2.5 years amounting ₹5600?
(a)2700₹ (b)2160₹ (c)2200₹ (d)2900₹

31. what will be the principal if the rate of compound interest is 33.33% for 2.5 years and the compound interest is ₹580?
(a)720₹ (b)640₹ (c)540₹ (d)800₹

32. what will be the principal if the rate of compound interest is 50% for 1 year and 4 months and the amount is ₹4200?
(a)2500₹ (b)2200₹ (c)2100₹ (d)2400₹

33. If the compound interest of a sum of money is ₹2100 and the rate of compound interest is 12.5% for 1 year 8 months. what is the principal?
(a)7200₹ (b)9600₹ (c)8100₹ (d)8000₹

34. At the rate of 50% compound interest which money will the compound interest become ₹590 in 2 years 73 days?
(a)420₹ (b)440₹ (c)450₹ (d)400₹

35. A sum of money becomes ₹390 if the rate of compound interest is 33.33% for the first year and 12.5% for the second year what is the principal?
(a)220₹ (b)260₹ (c)250₹ (d)300₹

36. If money becomes 1.44 times its own in 2 years, then what is the rate of compound interest?
(a)15% (b)10% (c)25% (d)20%

37. If money becomes 2.25 times its own in 2 years then what is the rate of interest?

(a)50% (b)10% (c)40% (d)20%

38. ₹27 will become ₹64 at the rate of compound interest in 3 years, then what is the rate of interest?
(a)37.5% (b)12.5% (c)33.33% (d)30%

39. If ₹102400 becomes ₹145800 in 3 years at compound interest, find the interest rate.
(a)37.5% (b)12.5% (c)30% (d)33.33%

40. If a sum becomes ₹8000 in 2 years and ₹27000 in 5 years, then find the rate of compound interest.
(a)50% (b)40% (c)33.33% (d)60%

41. In how many years will ₹625 become ₹676 at 4% compound interest annually?
(a)4years (b)3years (c)2years (d)1.5years

42. At what time will the sum of ₹10000 become ₹13310 at the rate of 20% compound interest compounded half-yearly?
(a)4years (b)3years (c)2years (d)1.5years

43. If money becomes 4 times its own in 7 years at compound interest, then in how many years will the money become 64 times its own?
(a)27years (b)24years (c)22years (d)21years

44. If money becomes 3 times its own in 8 years at the rate of compound interest, then in how many years will that money become 81 times of itself?
(a)34years (b)33years (c)32years (d)30years

45. If money becomes 8 times its own in 3 years at the rate of compound interest, then in how many years will that money become 128 times its own?
(a)9years (b)8years (c)6years (d)7years

46. If money becomes ₹6000 in 7 years at compound interest and the same money becomes ₹9000 in 14 years, then find the principal?
(a)4800₹ (b)4600₹ (c)4200₹ (d)4000₹

47. If money becomes ₹4500 in 11 years at compound interest and the same money becomes ₹6750 in the next 11 years, then find the principal.
(a)2700₹ (b)3000₹ (c)2200₹ d)2900₹

48. What is the difference between simple interest and compound interest for 2 years at 4% If the principal is ₹5000?
(a)8₹ (b)11₹ (c)10₹ (d)9₹

49. What is the difference between compound interest and simple interest for 2 years at 3%? If the principal ₹300?
(a)0.28₹ (b)0.27₹ (c)0.30₹ (d)0.29₹

50. What is the difference between simple interest and compound interest for 3 years at 4% If the principal ₹25000?
(a)125₹ (b)110₹ (c)121.6₹ (d)121₹

51. What is the difference between simple interest and compound interest for 3 years at 3%? If the principal ₹30000?
(a)80.80₹ (b)82.8₹ (c)100₹ (d)81.81₹

52. What is the difference between 4 years of compound interest and simple interest at 5%? If the principal ₹40000?
(a)620.25₹ (b)600₹ (c)621.5₹ (d)620₹

53. At what amount the rate of compound interest is 5% and the difference between simple interest and compound interest becomes ₹305 in 3 years?
(a)45000₹ (b)40000₹ (c)30000₹ (d)35000₹

54. At what amount will the difference between simple interest and compound interest be ₹124 at 3 years at the rate of 10% compound interest?
(a)4800₹ (b)4600₹ (c)4200₹ (d)4000₹

55. Find the compound interest at ₹20000 for 1 year and 6 months at the rate of 20% compound interest, if the rate is imposed half-yearly.
(a)4800₹ (b)4600₹ (c)6620₹ (d)5000₹

56. Find the difference between simple interest and compound interest for 1 year at 20% compound interest at ₹8000 if the rate is quarterly.
(a)124.5₹ (b)124.05₹ (c)124₹ (d)125₹

57. If the difference between 2 years of compound interest and simple interest at the rate of 3% compound interest on money is ₹54, find the money.
(a)45000₹ (b)40000₹ (c)60000₹ (d))50000₹

58. If the difference between 2 years of compound interest and simple interest is ₹98 at the rate of 7% compound interest on money, then find the money.
a)25000₹ (b)40000₹ (c)30000₹ (d)20000₹

59. If the difference between compound interest and simple interest received in 2 years is ₹72, find the rate.
(a)15% (c)10% (c)25% d)12%

60. If money is kept at compound interest at 33.33% for 2 years and for the second year the compound interest is ₹280, then find the principal?
(a)250₹ (b)400₹ (c)630₹ (d)600₹

61. If money is kept at compound interest at 12.5% for 2 years and the compound interest for the second year is ₹720, then find the principal.
(a)4800₹ (b)4600₹ (c)5120₹ (d)5000₹

62. If money is kept at the rate of compound interest at 11.11% for the first year and 14.28% for the second year and the difference between compound interest and simple interest is ₹50, then find the principal.
(a)3800₹ (b)4400₹ (c)3150₹ (d)3200₹

63. If money is kept at compound interest at 14.28% for 2 years and the difference between compound interest and simple interest is ₹30, then find the principal.
(a)1800₹ (b)1430₹ (c)1120₹ (d)1470₹

64. If 2 years of simple interest on money at a rate is ₹200 and the difference between simple interest and compound interest on the same money at the same rate is ₹7, then find the rate.
(a)5% (b)7% (c)8% (d)9%

65. The compound interest of 2 years on a money amount is ₹615, and the simple interest for the same period is ₹600. Then, find the principal.
(a)6000₹ (b)4000₹ (c)5500₹ (d)5000₹

66. If the simple interest on a sum for 3 years is ₹225 and the 2-year compound interest at the same rate is ₹153, then what is the principal invested?
(a)1875₹ (b)1900₹ (c)1820₹ (d)1850₹

ANSWERS

SI AND CI

1 d	8 c	15 c	22 a	29 a	36 d	43 d	50 c	57 c	64 b
2 b	9 b	16 b	23 d	30 a	37 a	44 c	51 d	58 d	65 a
3 c	10 a	17 b	24 b	31 c	38 c	45 d	52 a	59 d	66 a
4 d	11 b	18 b	25 d	32 d	39 b	46 d	53 b	60 c	
5 d	12 c	19 c	26 a	33 b	40 a	47 b	54 d	61 c	
6 a	13 a	20 c	27 a	34 d	41 c	48 a	55 c	62 c	
7 a	14 d	21 b	28 c	35 b	42 d	49 b	56 b	63 b	