21. SIMPLE INTEREST

IMPORTANT FACTS AND FORMULAE

1. **Principal** : The money borrowed or lent out for a certain period is called the ***principal*** or the ***sum.***
2. **Interest** : Extra money paid for using other's money is called ***interest.***
3. **Simple Interest (S.I.)** : If the interest on a sum borrowed for a certain period is reckoned uniformly, then it is called ***simple interest.***

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

(*i*) $\text{S.I.} = \left(\frac{P \times R \times T}{100}\right)$.

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

SOLVED EXAMPLES

Ex. 1. ***Find the simple interest on Rs. 68,000 at $16\frac{2}{3}\%$ per annum for 9 months.***

Sol. P = Rs. 68000, $R = \frac{50}{3}\%$ p.a and $T = \frac{9}{12}$ years $= \frac{3}{4}$ years.

$\therefore$ $\text{S.I.} = \left(\frac{P \times R \times T}{100}\right) = \text{Rs.}\left(68000 \times \frac{50}{3} \times \frac{3}{4} \times \frac{1}{100}\right) = \text{Rs. } 8500.$

Ex. 2. ***Find the simple interest on Rs. 3000 at $6\frac{1}{4}\%$ per annum for the period from 4th Feb., 2005 to 18th April, 2005.***

Sol. Time = (24 + 31 + 18) days = 73 days $= \frac{73}{365}$ year $= \frac{1}{5}$ year.

P = Rs. 3000 and $R = 6\frac{1}{4}\%$ p.a. $= \frac{25}{4}\%$ p.a.

$\therefore$ $\text{S.I.} = \text{Rs.}\left(3000 \times \frac{25}{4} \times \frac{1}{5} \times \frac{1}{100}\right) = \text{Rs. } 37.50.$

Remark : The day on which money is deposited is not counted while the day on which money is withdrawn is counted.

Ex. 3. ***A sum at simple interest at $13\frac{1}{2}\%$ per annum amounts to Rs. 2502.50 after 4 years. Find the sum.***

Sol. Let sum be Rs. x. Then, $\text{S.I.} = \text{Rs.}\left(x \times \frac{27}{2} \times 4 \times \frac{1}{100}\right) = \text{Rs. } \frac{27x}{50}$.

$\therefore$ $\text{Amount} = \text{Rs.}\left(x + \frac{27x}{50}\right) = \text{Rs. } \frac{77x}{50}$.

$\therefore \quad \frac{77x}{50} = 2502.50 \Leftrightarrow x = \frac{2502.50 \times 50}{77} = 1625.$

Hence, sum = Rs. 1625.

Ex. 4. ***A sum of Rs. 800 amounts to Rs. 920 in 3 years at simple interest. If the interest rate is increased by 3%, it would amount to how much ?***

Sol. S.I. = Rs. (920 − 800) = Rs. 120; P = Rs. 800, T = 3 yrs.

$\therefore \quad R = \left(\frac{100 \times 120}{800 \times 3}\right)\% = 5\%.$

New rate = (5 + 3)% = 8%.

New S.I. = Rs. $\left(\frac{800 \times 8 \times 3}{100}\right)$ = Rs. 192.

$\therefore$ New amount = Rs. (800 + 192) = Rs. 992.

Ex. 5. ***Adam borrowed some money at the rate of 6% p.a. for the first two years, at the rate of 9% p.a. for the next three years, and at the rate of 14% p.a. for the period beyond five years. If he pays a total interest of Rs. 11, 400 at the end of nine years, how much money did he borrow ?*** **(Bank P.O. 1999)**

Sol. Let the sum borrowed be x. Then,

$$\left(\frac{x \times 6 \times 2}{100}\right) + \left(\frac{x \times 9 \times 3}{100}\right) + \left(\frac{x \times 14 \times 4}{100}\right) = 11400$$

$$\Leftrightarrow \quad \left(\frac{3x}{25} + \frac{27x}{100} + \frac{14x}{25}\right) = 11400 \Leftrightarrow \frac{95x}{100} = 11400 \Leftrightarrow x = \left(\frac{11400 \times 100}{95}\right) = 12000.$$

Hence, sum borrowed = Rs. 12,000.

Ex. 6. ***A certain sum of money amounts to Rs. 1008 in 2 years and to Rs. 1164 in*** $3\frac{1}{2}$ ***years. Find the sum and the rate of interest.***

Sol. S.I. for $1\frac{1}{2}$ years = Rs. (1164 − 1008) = Rs. 156.

S.I. for 2 years = Rs. $\left(156 \times \frac{2}{3} \times 2\right)$ = Rs. 208.

$\therefore$ Principal = Rs. (1008 − 208) = Rs. 800.

Now, P = 800, T = 2 and S.I. = 208.

$\therefore \quad$ Rate = $\left(\frac{100 \times 208}{800 \times 2}\right)\%$ = 13%.

Ex. 7. ***At what rate percent per annum will a sum of money double in 16 years ?*** **(R.R.B. 2003)**

Sol. Let principal = P. Then, S.I. = P and T = 16 yrs.

$\therefore \quad$ Rate = $\left(\frac{100 \times P}{P \times 16}\right)\% = 6\frac{1}{4}\%$ p.a.

Ex. 8. ***The simple interest on a sum of money is*** $\frac{4}{9}$ ***of the principal. Find the rate percent and time, if both are numerically equal.*** **(S.S.C. 2000)**

Sol. Let sum = Rs. x. Then, S.I. = Rs. $\frac{4x}{9}$.

Let rate = R% and time = R years.

Then, $\left(\frac{x \times R \times R}{100}\right) = \frac{4x}{9}$ or $R^2 = \frac{400}{9}$ or $R = \frac{20}{3} = 6\frac{2}{3}$.

$\therefore$ Rate $= 6\frac{2}{3}\%$ and Time $= 6\frac{2}{3}$ yrs $= 6$ yrs 8 months.

Ex. 9. ***The simple interest on a certain sum of money for $2\frac{1}{2}$ years at 12% per annum is Rs. 40 less than the simple interest on the same sum for $3\frac{1}{2}$ years at 10% per annum. Find the sum.***

Sol. Let the sum be Rs. x. Then, $\left(\frac{x \times 10 \times 7}{100 \times 2}\right) - \left(\frac{x \times 12 \times 5}{100 \times 2}\right) = 40$

$\Leftrightarrow \quad \frac{7x}{20} - \frac{3x}{10} = 40 \quad \Leftrightarrow \quad x = (40 \times 20) = 800.$

Hence, the sum is Rs. 800.

Ex. 10. ***A sum was put at simple interest at a certain rate for 3 years. Had it been put at 2% higher rate, it would have fetched Rs. 360 more. Find the sum.***

Sol. Let sum = P and original rate = R. Then, $\left[\frac{P \times (R+2) \times 3}{100}\right] - \left[\frac{P \times R \times 3}{100}\right] = 360$

$\Leftrightarrow \quad 3PR + 6P - 3PR = 36000 \quad \Leftrightarrow \quad 6P = 36000 \quad \Leftrightarrow \quad P = 6000.$

Hence, sum = Rs. 6000.

Ex. 11. ***What annual instalment will discharge a debt of Rs. 1092 due in 3 years at 12% simple interest ?***

Sol. Let each instalment be Rs. x. Then, $\left(x + \frac{x \times 12 \times 1}{100}\right) + \left(x + \frac{x \times 12 \times 2}{100}\right) + x = 1092$

$\Leftrightarrow \quad \frac{28x}{25} + \frac{31x}{25} + x = 1092 \quad \Leftrightarrow \quad (28x + 31x + 25x) = (1092 \times 25)$

$\Leftrightarrow \quad x = \left(\frac{1092 \times 25}{84}\right) = 325.$

$\therefore$ Each instalment = Rs. 325.

Ex. 12. ***A sum of Rs. 1550 is lent out into two parts, one at 8% and another one at 6%. If the total annual income is Rs. 106, find the money lent at each rate.***

(L.I.C. A.A.O. 2003)

Sol. Let the sum lent at 8% be Rs. x and that at 6% be Rs. $(1550 - x)$.

$\therefore \quad \left[\frac{x \times 8 \times 1}{100}\right] + \left[\frac{(1550 - x) \times 6 \times 1}{100}\right] = 106$

$\Leftrightarrow \quad 8x + 9300 - 6x = 10600 \quad \Leftrightarrow \quad 2x = 1300 \quad \Leftrightarrow \quad x = 650.$

$\therefore$ Money lent at 8% = Rs. 650. Money lent at 6% = Rs. (1550 − 650) = Rs. 900.

EXERCISE 21A

(OBJECTIVE TYPE QUESTIONS)

Directions : *Mark (✓) against the correct answer :*

1. At the rate of $8\frac{1}{2}\%$ p.a. simple interest, a sum of Rs. 4800 will earn how much interest in 2 years 3 months ?

(*a*) Rs. 796 (*b*) Rs. 816 (*c*) Rs. 918 (*d*) Rs. 956

2. What will be the simple interest earned on an amount of Rs. 16,800 in 9 months at the rate of $6\frac{1}{4}\%$ p.a. ?
(a) Rs. 787.50 (b) Rs. 812.50 (c) Rs. 860 (d) Rs. 887.50

3. The simple interest on Rs. 1820 from March 9, 2003 to May 21, 2003 at $7\frac{1}{2}\%$ rate will be :
(a) Rs. 22.50 (b) Rs. 27.30 (c) Rs. 28.80 (d) Rs. 29

4. A person borrows Rs. 5000 for 2 years at 4% p.a. simple interest. He immediately lends it to another person at $6\frac{1}{4}\%$ p.a. for 2 years. Find his gain in the transaction per year. (S.S.C. 2000)
(a) Rs. 112.50 (b) Rs. 125 (c) Rs. 150 (d) Rs. 167.50

5. How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest ? (IGNOU, 2003)
(a) 3.5 years (b) 4 years (c) 4.5 years (d) 5 years

6. A sum of Rs. 12,500 amounts to Rs. 15,500 in 4 years at the rate of simple interest. What is the rate of interest ? (Bank P.O. 2003)
(a) 3% (b) 4% (c) 5% (d) 6% (e) None of these

7. A sum of Rs. 1600 gives a simple interest of Rs. 252 in 2 years and 4 months. The rate of interest per annum is :
(a) 6% (b) $6\frac{1}{4}\%$ (c) $6\frac{1}{2}\%$ (d) $6\frac{3}{4}\%$

8. Reena took a loan of Rs. 1200 with simple interest for as many years as the rate of interest. If she paid Rs. 432 as interest at the end of the loan period, what was the rate of interest ? (R.B.I. 2003)
(a) 3.6 (b) 6 (c) 18
(d) Cannot be determined (e) None of these

9. A man took a loan from a bank at the rate of 12% p.a. simple interest. After 3 years he had to pay Rs. 5400 interest only for the period. The principal amount borrowed by him was : (S.S.C. 2004)
(a) Rs. 2000 (b) Rs. 10,000 (c) Rs. 15,000 (d) Rs. 20,000

10. What is the present worth of Rs. 132 due in 2 years at 5% simple interest per annum ?
(a) Rs. 112 (b) Rs. 118.80 (c) Rs. 120 (d) Rs. 122
(C.B.I. 1997)

11. A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9 p.c.p.a. in 5 years. What is the sum ? (NABARD, 2002)
(a) Rs. 4462.50 (b) Rs. 8032.50 (c) Rs. 8900
(d) Rs. 8925 (e) None of these

12. The simple interest at $x\%$ for x years will be Rs. x on a sum of :
(a) Rs. x (b) Rs. $\left(\frac{100}{x}\right)$ (c) Rs. $100x$ (d) Rs. $\left(\frac{100}{x^2}\right)$

13. Rs. 800 becomes Rs. 956 in 3 years at a certain rate of simple interest. If the rate of interest is increased by 4%, what amount will Rs. 800 become in 3 years ?
(a) Rs. 1020.80 (b) Rs. 1025 (c) Rs. 1052
(d) Data inadequate (e) None of these (Bank P.O. 2000)

14. A certain amount earns simple interest of Rs. 1750 after 7 years. Had the interest been 2% more, how much more interest would it have earned ? (Bank P.O. 2003)
(a) Rs. 35 (b) Rs. 245 (c) Rs. 350
(d) Cannot be determined (e) None of these

15. In how many years, Rs. 150 will produce the same interest @ 8% as Rs. 800 produce in 3 years @ $4\frac{1}{2}\%$? **(R.R.B. 2001)**

(*a*) 6 (*b*) 8 (*c*) 9 (*d*) 12

16. If Rs. 64 amounts to Rs. 83.20 in 2 years, what will Rs. 86 amount to in 4 years at the same rate percent per annum ?

(*a*) Rs. 114.80 (*b*) Rs. 124.70 (*c*) Rs. 127.40 (*d*) Rs. 137.60

17. The simple interest on a certain sum of money at the rate of 5% p.a. for 8 years is Rs. 840. At what rate of interest the same amount of interest can be received on the same sum after 5 years ?

(*a*) 6% (*b*) 8% (*c*) 9% (*d*) 10%

18. The interest on a certain deposit at 4.5% p.a. is Rs. 202.50 in one year. How much will the additional interest in one year be on the same deposit at 5% p.a. ?

(*a*) Rs. 20.25 (*b*) Rs. 22.50 (*c*) Rs. 25 (*d*) Rs. 42.75

19. A sum invested at 5% simple interest per annum grows to Rs. 504 in 4 years. The same amount at 10% simple interest per annum in $2\frac{1}{2}$ years will grow to :

(*a*) Rs. 420 (*b*) Rs. 450 (*c*) Rs. 525 (*d*) Rs. 550

(C.D.S. 2003)

20. What will be the ratio of simple interest earned by certain amount at the same rate of interest for 6 years and that for 9 years ? **(Bank P.O. 1998)**

(*a*) 1 : 3 (*b*) 1 : 4 (*c*) 2 : 3

(*d*) Data inadequate (*e*) None of these

21. Nitin borrowed some money at the rate of 6% p.a. for the first three years, 9% p.a. for the next five years and 13% p.a. for the period beyond eight years. If the total interest paid by him at the end of eleven years is Rs. 8160, how much money did he borrow ? **(Bank P.O. 2000)**

(*a*) Rs. 8000 (*b*) Rs. 10,000 (*c*) Rs. 12,000

(*d*) Data inadequate (*e*) None of these

22. The simple interest on a sum of money will be Rs. 600 after 10 years. If the principal is trebled after 5 years, what will be the total interest at the end of the tenth year ?

(*a*) Rs. 600 (*b*) Rs. 900 (*c*) Rs. 1200

(*d*) Rs. 1500 (*e*) Data inadequate

23. The simple interest on Rs. 10 for 4 months at the rate of 3 paise per rupee per month is :

(*a*) Rs. 1.20 (*b*) Rs. 1.60 (*c*) Rs. 2.40 (*d*) Rs. 3.60

24. An automobile financier claims to be lending money at simple interest, but he includes the interest every six months for calculating the principal. If he is charging an interest of 10%, the effective rate of interest becomes : **(N.I.F.T. 2000)**

(*a*) 10% (*b*) 10.25% (*c*) 10.5% (*d*) None of these

25. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is : **(Section Officers', 2001)**

(*a*) Rs. 650 (*b*) Rs. 690 (*c*) Rs. 698 (*d*) Rs. 700

26. A sum of money lent out at simple interest amounts to Rs. 720 after 2 years and to Rs. 1020 after a further period of 5 years. The sum is : **(S.S.C. 2004)**

(*a*) Rs. 500 (*b*) Rs. 600 (*c*) Rs. 700 (*d*) Rs. 710

27. A sum of money amounts to Rs. 9800 after 5 years and Rs. 12005 after 8 years at the same rate of simple interest. The rate of interest per annum is : **(S.S.C. 2003)**

(*a*) 5% (*b*) 8% (*c*) 12% (*d*) 15%

28. A certain sum of money at simple interest amounts to Rs. 1012 in $2\frac{1}{2}$ years and to Rs. 1067.20 in 4 years. The rate of interest per annum is :
(*a*) 2.5% (*b*) 3% (*c*) 4% (*d*) 5%

29. In how many years will a sum of money double itself at 12% per annum ?
(*a*) 6 years 9 months (*b*) 7 years 6 months
(*c*) 8 years 3 months (*d*) 8 years 4 months

30. At what rate percent of simple interest will a sum of money double itself in 12 years ?
(*a*) $8\frac{1}{4}\%$ (*b*) $8\frac{1}{3}\%$ (*c*) $8\frac{1}{2}\%$ (*d*) $9\frac{1}{2}\%$
(S.S.C. 2000)

31. The rate at which a sum becomes four times of itself in 15 years at S.I., will be :
(*a*) 15% (*b*) $17\frac{1}{2}\%$ (*c*) 20% (*d*) 25%

32. If a sum of money at simple interest doubles in 6 years, it will become 4 times in :
(*a*) 12 years (*b*) 14 years (*c*) 16 years (*d*) 18 years

33. A sum of money trebles itself in 15 years 6 months. In how many years would it double itself ?
(*a*) 6 years 3 months (*b*) 7 years 9 months
(*c*) 8 years 3 months (*d*) 9 years 6 months.

34. Consider the following statements :
If a sum of money is lent at simple interest, then the
1. money gets doubled in 5 years if the rate of interest is $16\frac{2}{3}\%$.
2. money gets doubled in 5 years if the rate of interest is 20%.
3. money becomes four times in 10 years if it gets doubled in 5 years.
Of these statements,
(*a*) 1 and 3 are correct (*b*) 2 alone is correct
(*c*) 3 alone is correct (*d*) 2 and 3 are correct

35. The simple interest on a sum of money at 8% per annum for 6 years is half the sum. The sum is :
(*a*) Rs. 4800 (*b*) Rs. 6000 (*c*) Rs. 8000 (*d*) Data inadequate

36. At what rate percent per annum will the simple interest on a sum of money be $\frac{2}{5}$ of the amount in 10 years ?
(S.S.C. 2002)
(*a*) 4% (*b*) $5\frac{2}{3}\%$ (*c*) 6% (*d*) $6\frac{2}{3}\%$

37. In how much time would the simple interest on a certain sum be 0.125 times the principal at 10% per annum ?
(Assistant Grade, 1997)
(*a*) $1\frac{1}{4}$ years (*b*) $1\frac{3}{4}$ years (*c*) $2\frac{1}{4}$ years (*d*) $2\frac{3}{4}$ years

38. How long will it take a sum of money invested at 5% p.a. S.I. to increase its value by 40% ?
(*a*) 5 years (*b*) 6 years (*c*) 7 years (*d*) 8 years

39. A sum of money becomes $\frac{7}{6}$ of itself in 3 years at a certain rate of simple interest. The rate per annum is :
(S.S.C. 1999)
(*a*) $5\frac{5}{9}\%$ (*b*) $6\frac{5}{9}\%$ (*c*) 18% (*d*) 25%

40. Simple interest on a certain sum at a certain annual rate of interest is $\frac{1}{9}$ of the sum. If the numbers representing rate percent and time in years be equal, then the rate of interest is :

(*a*) $3\frac{1}{3}\%$ (*b*) 5% (*c*) $6\frac{2}{3}\%$ (*d*) 10%

41. Simple interest on a certain amount is $\frac{9}{16}$ of the principal. If the numbers representing the rate of interest in percent and time in years be equal, then time, for which the principal is lent out, is : **(R.R.B. 2003)**

(*a*) $5\frac{1}{2}$ years (*b*) $6\frac{1}{2}$ years (*c*) 7 years (*d*) $7\frac{1}{2}$ years

42. A lends Rs. 2500 to B and a certain sum to C at the same time at 7% p.a. simple interest. If after 4 years, A altogether receives Rs. 1120 as interest from B and C, then the sum lent to C is : **(S.S.C. 2003)**

(*a*) Rs. 700 (*b*) Rs. 1500 (*c*) Rs. 4000 (*d*) Rs. 6500

43. Two equal sums of money were lent at simple interest at 11% p.a. for $3\frac{1}{2}$ years and $4\frac{1}{2}$ years respectively. If the difference in interests for two periods was Rs. 412.50, then each sum is :

(*a*) Rs. 3250 (*b*) Rs. 3500 (*c*) Rs. 3750 (*d*) Rs. 4250

44. If the simple interest on a certain sum for 15 months at $7\frac{1}{2}\%$ per annum exceeds the simple interest on the same sum for 8 months at $12\frac{1}{2}\%$ per annum by Rs. 32.50, then the sum (in Rs.) is :

(*a*) Rs. 3000 (*b*) Rs. 3060 (*c*) Rs. 3120 (*d*) Rs. 3250

45. A man invests a certain sum of money at 6% p.a. simple interest and another sum at 7% p.a. simple interest. His income from interest after 2 years was Rs. 354. One-fourth of the first sum is equal to one-fifth of the second sum. The total sum invested was :

(*a*) Rs. 2600 (*b*) Rs. 2700 (*c*) Rs. 2880 (*d*) Rs. 2900

46. A borrowed some money from B at 12% p.a. S.I. for 3 years. He then added some more money to the borrowed sum and lent it to C for the same period at 14% p.a. rate of interest. If A gains Rs. 93.90 in the whole transaction, how much money did he add from his side ?

(*a*) Rs. 35 (*b*) Rs. 55 (*c*) Rs. 80 (*d*) Rs. 105

47. A person borrowed Rs. 500 @ 3% per annum S.I. and Rs. 600 @ $4\frac{1}{2}\%$ per annum on the agreement that the whole sum will be returned only when the total interest becomes Rs. 126. The number of years, after which the borrowed sum is to be returned, is :

(*a*) 2 (*b*) 3 (*c*) 4 (*d*) 5

48. A lent Rs. 5000 to B for 2 years and Rs. 3000 to C for 4 years on simple interest at the same rate of interest and received Rs. 2200 in all from both of them as interest. The rate of interest per annum is : **(C.B.I. 2003)**

(*a*) 5% (*b*) 7% (*c*) $7\frac{1}{8}\%$ (*d*) 10%

49. A sum of Rs. 725 is lent in the beginning of a year at a certain rate of interest. After 8 months, a sum of Rs. 362.50 more is lent but at the rate twice the former. At the end of the year, Rs. 33.50 is earned as interest from both the loans. What was the original rate of interest ? **(Bank P.O. 2003)**

(*a*) 3.6% (*b*) 4.5% (*c*) 5% (*d*) 6% (*e*) None of these

50. The difference between the simple interest received from two different sources on Rs. 1500 for 3 years is Rs. 13.50. The difference between their rates of interest is :

(*a*) 0.1% (*b*) 0.2% (*c*) 0.3% (*d*) 0.4% (*e*) None of these

(S.S.C. 1999)

51. Peter invested an amount of Rs. 12,000 at the rate of 10 p.c.p.a. simple interest and another amount at the rate of 20 p.c.p.a. simple interest. The total interest earned at the end of one year on the total amount invested became 14 p.c.p.a. Find the total amount invested. **(S.B.I.P.O. 1999)**

(*a*) Rs. 20,000 (*b*) Rs. 22,000 (*c*) Rs. 24,000 (*d*) Rs. 25,000 (*e*) None of these

52. What should be the least number of years in which the simple interest on Rs. 2600 at $6\frac{2}{3}\%$ will be an exact number of rupees ?

(*a*) 2 (*b*) 3 (*c*) 4 (*d*) 5

53. The rates of simple interest in two banks A and B are in the ratio 5 : 4. A person wants to deposit his total savings in two banks in such a way that he received equal half-yearly interest from both. He should deposit the savings in banks A and B in the ratio :

(*a*) 2 : 5 (*b*) 4 : 5 (*c*) 5 : 2 (*d*) 5 : 4

54. A sum was put at simple interest at a certain rate for 2 years. Had it been put at 3% higher rate, it would have fetched Rs. 72 more. The sum is :

(*a*) Rs. 1200 (*b*) Rs. 1500 (*c*) Rs. 1600 (*d*) Rs. 1800

55. If the annual rate of simple interest increases from 10% to $12\frac{1}{2}\%$, a man's yearly income increases by Rs. 1250. His principal (in Rs.) is : **(S.S.C. 2004)**

(*a*) 45,000 (*b*) 50,000 (*c*) 60,000 (*d*) 65,000

56. A moneylender finds that due to a fall in the annual rate of interest from 8% to $7\frac{3}{4}\%$, his yearly income diminishes by Rs. 61.50. His capital is : **(S.S.C. 2003)**

(*a*) Rs. 22,400 (*b*) Rs. 23,800 (*c*) Rs. 24,600 (*d*) Rs. 26,000

57. What annual payment will discharge a debt of Rs. 6450 due in 4 years at 5% simple interest ?

(*a*) Rs. 1400 (*b*) Rs. 1500 (*c*) Rs. 1550 (*d*) Rs. 1600

58. A sum of Rs. 10 is lent to be returned in 11 monthly instalments of Re. 1 each, interest being simple. The rate of interest is :

(*a*) $9\frac{1}{11}\%$ (*b*) 10% (*c*) 11% (*d*) $21\frac{9}{11}\%$

59. A person takes a loan of Rs. 200 at 5% simple interest. He returns Rs. 100 at the end of 1 year. In order to clear his dues at the end of 2 years, he would pay :

(*a*) Rs. 105 (*b*) Rs. 110 (*c*) Rs. 115 (*d*) Rs. 115.50

60. The price of a T.V. set worth Rs. 20,000 is to be paid in 20 instalments of Rs. 1000 each. If the rate of interest be 6% per annum, and the first instalment be paid at the time of purchase, then the value of the last instalment covering the interest as well will be : **(Hotel Management, 1998)**

(*a*) Rs. 1050 (*b*) Rs. 2050 (*c*) Rs. 3000 (*d*) None of these

61. If the rate increases by 2%, the simple interest received on a sum of money increases by Rs. 108. If the time period is increased by 2 years, the simple interest on the same sum increases by Rs. 180. The sum is :
(a) Rs. 1800 (b) Rs. 3600 (c) Rs. 5400
(d) Data inadequate (e) None of these

62. 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 ? **(R.B.I. 2003)**
(a) Rs. 6400 (b) Rs. 6500 (c) Rs. 7200
(d) Rs. 7500 (e) None of these

63. A sum of Rs. 2600 is lent out in two parts in such a way that the interest on one part at 10% for 5 years is equal to that on another at 9% for 6 years. The sum lent out at 10% is :
(a) Rs. 1150 (b) Rs. 1250 (c) Rs. 1350 (d) Rs. 1450

64. A sum of Rs. 1550 was lent partly at 5% and partly at 8% p.a. simple interest. The total interest received after 3 years was Rs. 300. The ratio of the money lent at 5% to that lent at 8% is :
(a) 5 : 8 (b) 8 : 5 (c) 16 : 15 (d) 31 : 6

65. A man lends Rs. 10,000 in four parts. If he gets 8% on Rs. 2000; $7\frac{1}{2}\%$ on Rs. 4000 and $8\frac{1}{2}\%$ on Rs. 1400; what percent must he get for the remainder, if his average annual interest is 8.13% ?
(a) 7% (b) 9% (c) $9\frac{1}{4}\%$ (d) $10\frac{1}{2}\%$

66. An amount of Rs. 1,00,000 is invested in two types of shares. The first yields an interest of 9% p.a. and the second, 11% p.a. If the total interest at the end of one year is $9\frac{3}{4}\%$, then the amount invested in each share was : **(M.B.A. 2002)**
(a) Rs. 52,500; Rs. 47,500 (b) Rs. 62,500; Rs. 37,500
(c) Rs. 72,500; Rs. 27,500 (d) Rs. 82,500; Rs. 17,500

67. David invested certain amount in three different schemes A, B and C with the rate of interest 10% p.a., 12% p.a. and 15% p.a. respectively. If the total interest accrued in one year was Rs. 3200 and the amount invested in Scheme C was 150% of the amount invested in Scheme A and 240% of the amount invested in Scheme B, what was the amount invested in Scheme B ? **(Bank P.O. 2003)**
(a) Rs. 5000 (b) Rs. 6500 (c) Rs. 8000
(d) Cannot be determined (e) None of these

68. A person invested in all Rs. 2600 at 4%, 6% and 8% per annum simple interest. At the end of the year, he got the same interest in all the three cases. The money invested at 4% is : **(S.S.C. 2003)**
(a) Rs. 200 (b) Rs. 600 (c) Rs. 800 (d) Rs. 1200

69. Divide Rs. 2379 into 3 parts so that their amounts after 2, 3 and 4 years respectively may be equal, the rate of interest being 5% per annum at simple interest. The first part is : **(C.B.I. 1997)**
(a) Rs. 759 (b) Rs. 792 (c) Rs. 818 (d) Rs. 828

70. 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 :
(a) Rs. 5400 (b) Rs. 6000 (c) Rs. 6600 (d) Rs. 7200

ANSWERS

1. (c)	2. (a)	3. (b)	4. (a)	5. (b)	6. (d)	7. (d)	8. (b)	9. (c)
10. (c)	11. (d)	12. (b)	13. (c)	14. (d)	15. (c)	16. (d)	17. (b)	18. (b)
19. (c)	20. (c)	21. (a)	22. (c)	23. (a)	24. (b)	25. (c)	26. (b)	27. (c)
28. (c)	29. (d)	30. (b)	31. (c)	32. (d)	33. (b)	34. (b)	35. (d)	36. (a)
37. (a)	38. (d)	39. (a)	40. (a)	41. (d)	42. (b)	43. (c)	44. (c)	45. (b)
46. (d)	47. (b)	48. (d)	49. (e)	50. (c)	51. (a)	52. (b)	53. (b)	54. (a)
55. (b)	56. (c)	57. (b)	58. (d)	59. (c)	60. (d)	61. (d)	62. (a)	63. (c)
64. (c)	65. (b)	66. (b)	67. (a)	68. (d)	69. (d)	70. (c)		

SOLUTIONS

1. Time = 2 yrs 3 mths $= 2\frac{1}{4}$ yrs $= \frac{9}{4}$ yrs.

   $\therefore$ S.I. = Rs. $\left(4800 \times \frac{17}{2} \times \frac{9}{4} \times \frac{1}{100}\right)$ = Rs. 918.

2. Time = 9 months $= \frac{3}{4}$ year.

   $\therefore$ S.I. = Rs. $\left(16800 \times \frac{25}{4} \times \frac{3}{4} \times \frac{1}{100}\right)$ = Rs. 787.50.

3. Time = (22 + 30 + 21) days = 73 days $= \frac{1}{5}$ year.

   $\therefore$ S.I. = Rs. $\left(1820 \times \frac{15}{2} \times \frac{1}{5} \times \frac{1}{100}\right)$ = Rs. 27.30.

4. Gain in 2 yrs. = Rs. $\left[\left(5000 \times \frac{25}{4} \times \frac{2}{100}\right) - \left(\frac{5000 \times 4 \times 2}{100}\right)\right]$ = Rs. (625 − 400) = Rs. 225.

   $\therefore$ Gain in 1 year = Rs. $\left(\frac{225}{2}\right)$ = Rs. 112.50.

5. Time = $\left(\frac{100 \times 81}{450 \times 4.5}\right)$ years = 4 years.

6. S.I. = Rs. (15500 − 12500) = Rs. 3000.

   Rate = $\left(\frac{100 \times 3000}{12500 \times 4}\right)\%$ = 6%.

7. Time = 2 years 4 months $= 2\frac{1}{3}$ years $= \frac{7}{3}$ years.

   Rate = $\left(\frac{100 \times 252 \times 3}{1600 \times 7}\right)\% = 6\frac{3}{4}\%$.

8. Let rate = R% and time = R years. Then,

   $\left(\frac{1200 \times R \times R}{100}\right) = 432 \Leftrightarrow 12R^2 = 432 \Leftrightarrow R^2 = 36 \Leftrightarrow R = 6.$

9. Principal = Rs. $\left(\frac{100 \times 5400}{12 \times 3}\right)$ = Rs. 15000.

10. Let the present worth be Rs. x. Then, S.I. = Rs. $(132 - x)$.

$\therefore \left(\frac{x \times 5 \times 2}{100}\right) = 132 - x \Leftrightarrow 10x = 13200 - 100x \Leftrightarrow 110x = 13200 \Leftrightarrow x = 120.$

11. Principal = Rs. $\left(\frac{100 \times 4016.25}{9 \times 5}\right)$ = Rs. $\left(\frac{401625}{45}\right)$ = Rs. 8925.

12. Sum = $\left(\frac{100 \times \text{S.I.}}{\text{R} \times \text{T}}\right)$ = Rs. $\left(\frac{100 \times x}{x \times x}\right)$ = Rs. $\left(\frac{100}{x}\right)$.

13. S.I. = Rs. (956 − 800) = Rs. 156.

Rate = $\left(\frac{100 \times 156}{800 \times 3}\right)\% = 6\frac{1}{2}\%$.

New rate = $\left(6\frac{1}{2} + 4\right)\% = 10\frac{1}{2}\%$.

New S.I. = Rs. $\left(800 \times \frac{21}{2} \times \frac{3}{100}\right)$ = Rs. 252.

$\therefore$ New amount = Rs. (800 + 252) = Rs. 1052.

14. We need to know the S.I., principal and time to find the rate. Since the principal is not given, so data is inadequate.

15. P = Rs. 800, R = $4\frac{1}{2}\% = \frac{9}{2}\%$, T = 3 years. Then,

S.I. = Rs. $\left(800 \times \frac{9}{2} \times \frac{3}{100}\right)$ = Rs. 108.

Now, P = Rs. 150, S.I. = Rs. 108, R = 8%.

$\therefore$ Time = $\left(\frac{100 \times 108}{150 \times 8}\right)$ years = 9 years.

16. P = Rs. 64, S.I. = Rs. (83.20 − 64) = Rs. 19.20, T = 2 years.

So, rate = $\left(\frac{100 \times 19.20}{64 \times 2}\right)\% = 15\%$.

Now, P = Rs. 86, R = 15%, T = 4 years.

$\therefore$ S.I. = Rs. $\left(\frac{86 \times 15 \times 4}{100}\right)$ = Rs. 51.60.

17. S.I. = Rs. 840, R = 5%, T = 8 years.

Principal = Rs. $\left(\frac{100 \times 840}{5 \times 8}\right)$ = Rs. 2100.

Now, P = Rs. 2100, S.I. = Rs. 840, T = 5 years.

$\therefore$ Rate = $\left(\frac{100 \times 840}{2100 \times 5}\right)\% = 8\%$.

18. S.I. = Rs. 202.50, R = 4.5%, T = 1 year.

Principal = Rs. $\left(\frac{100 \times 202.50}{4.5 \times 1}\right)$ = Rs. 4500.

Now, P = Rs. 4500, R = 5%, T = 1 year.

S.I. = Rs. $\left(\frac{4500 \times 5 \times 1}{100}\right)$ = Rs. 225.

$\therefore$ Difference in interest = Rs. (225 − 202.50) = Rs. 22.50.

19. Let the sum be Rs. x. Then, S.I. = Rs. $(504 - x)$.

$$\therefore \left(\frac{x \times 5 \times 4}{100}\right) = 504 - x \Leftrightarrow 20x = 50400 - 100x \Leftrightarrow 120x = 50400 \Leftrightarrow x = 420.$$

Now, P = Rs. 420, R = 10%, T = $\frac{5}{2}$ years.

S.I. = Rs. $\left(\frac{420 \times 10}{100} \times \frac{5}{2}\right)$ = Rs. 105.

$\therefore$ Amount = Rs. (420 + 105) = Rs. 525.

20. Let the principal be P and rate of interest be R%.

$$\therefore \text{Required ratio} = \left[\frac{\left(\frac{P \times R \times 6}{100}\right)}{\left(\frac{P \times R \times 9}{100}\right)}\right] = \frac{6PR}{9PR} = \frac{6}{9} = 2 : 3.$$

21. Let the sum be Rs. x. Then,

$$\left(\frac{x \times 6 \times 3}{100}\right) + \left(\frac{x \times 9 \times 5}{100}\right) + \left(\frac{x \times 13 \times 3}{100}\right) = 8160$$

$$\Leftrightarrow 18x + 45x + 39x = (8160 \times 100) \Leftrightarrow 102x = 816000 \Leftrightarrow x = 8000.$$

22. Let the sum be Rs. x. Now, S.I. = Rs. 600, T = 10 years.

$$\text{Rate} = \left(\frac{100 \times 600}{x \times 10}\right)\% = \left(\frac{6000}{x}\right)\%.$$

S.I. for first 5 years = Rs. $\left(\frac{x \times 5 \times 6000}{x \times 100}\right)$ = Rs. 300.

S.I. for last 5 years = Rs. $\left(3x \times 5 \times \frac{6000}{x \times 100}\right)$ = Rs. 900.

$\therefore$ Total interest = Rs. 1200.

23. S.I. = Rs. $\left(10 \times \frac{3}{100} \times 4\right)$ = Rs. 1.20.

24. Let the sum be Rs. 100. Then,

S.I. for first 6 months = Rs. $\left(\frac{100 \times 10 \times 1}{100 \times 2}\right)$ = Rs. 5.

S.I. for last 6 months = Rs. $\left(\frac{105 \times 10 \times 1}{100 \times 2}\right)$ = Rs. 5.25.

So, amount at the end of 1 year = Rs. (100 + 5 + 5.25) = Rs. 110.25.

$\therefore$ Effective rate = (110.25 − 100) = 10.25%.

25. S.I. for 1 year = Rs. (854 − 815) = Rs. 39.

S.I. for 3 years = Rs. (39 × 3) = Rs. 117.

$\therefore$ Principal = Rs. (815 − 117) = Rs. 698.

26. S.I. for 5 years = Rs. (1020 − 720) = Rs. 300.

S.I. for 2 years = Rs. $\left(\frac{300}{5} \times 2\right)$ = Rs. 120.

$\therefore$ Principal = Rs. (720 − 120) = Rs. 600.

27. S.I. for 3 years = Rs. (12005 − 9800) = Rs. 2205.

S.I. for 5 years = Rs. $\left(\frac{2205}{3} \times 5\right)$ = Rs. 3675.

∴ Principal = Rs. (9800 − 3675) = Rs. 6125.

Hence, rate = $\left(\frac{100 \times 3675}{6125 \times 5}\right)\%$ = 12%.

28. S.I. for $1\frac{1}{2}$ years = Rs. (1067.20 − 1012) = Rs. 55.20.

S.I. for $2\frac{1}{2}$ years = Rs. $\left(55.20 \times \frac{2}{3} \times \frac{5}{2}\right)$ = Rs. 92.

∴ Principal = Rs. (1012 − 92) = Rs. 920.

Hence, rate = $\left(\frac{100 \times 92 \times 2}{920 \times 5}\right)\%$ = 4%.

29. Let sum = x. Then, S.I. = x.

∴ Time = $\left(\frac{100 \times \text{S.I.}}{\text{P} \times \text{R}}\right) = \left(\frac{100 \times x}{x \times 12}\right)$ years = $8\frac{1}{3}$ years = 8 years 4 months.

30. Let sum = x. Then, S.I. = x.

∴ Rate = $\left(\frac{100 \times \text{S.I.}}{\text{P} \times \text{T}}\right) = \left(\frac{100 \times x}{x \times 12}\right)\% = \frac{25}{3}\% = 8\frac{1}{3}\%$.

31. Let sum = x. Then, S.I. = $3x$.

∴ Rate = $\left(\frac{100 \times \text{S.I.}}{\text{P} \times \text{T}}\right) = \left(\frac{100 \times 3x}{x \times 15}\right)\%$ = 20%.

32. Let sum = x. Then, S.I. = x.

∴ Rate = $\left(\frac{100 \times x}{x \times 6}\right)\% = \frac{50}{3}\%$.

Now, sum = x, S.I. = $3x$, Rate = $\frac{50}{3}\%$.

∴ Time = $\frac{100 \times 3x}{x \times \frac{50}{3}}$ = 18 years.

33. Let sum = x. Then, S.I. = $2x$, Time = $15\frac{1}{2}$ years = $\frac{31}{2}$ years.

∴ Rate = $\left(\frac{100 \times 2x}{x \times \frac{31}{2}}\right)\% = \frac{400}{31}\%$.

Now, sum = x, S.I. = x, Rate = $\frac{400}{31}\%$.

∴ Time = $\frac{100 \times x}{x \times \frac{400}{31}} = \frac{31}{4}$ years = 7 years 9 months.

34. Let sum be x. Then, S.I. = x.

1. Time = $\frac{100 \times x}{x \times \frac{50}{3}}$ = 6 years (False)

2. Time $= \dfrac{100 \times x}{x \times 20} = 5$ years (True)

3. Suppose sum = x. Then, S.I. = x and Time = 5 years.

Rate $= \left(\dfrac{100 \times x}{x \times 5}\right)\% = 20\%$

Now, sum = x, S.I. = $3x$ and Rate = 20%.

$\therefore$ Time $= \left(\dfrac{100 \times 3x}{x \times 20}\right)$ years = 15 years (False)

So, 2 alone is correct.

35. Let sum = x. Then, S.I. $= \dfrac{x}{2}$.

$\therefore \quad \dfrac{x}{2} = \dfrac{x \times 8 \times 6}{100}$. Clearly, data is inadequate.

36. Let sum = x. Then, S.I. $= \dfrac{2x}{5}$. Time = 10 years.

$\therefore$ Rate $= \left(\dfrac{100 \times 2x}{x \times 5 \times 10}\right)\% = 4\%$.

37. Let sum = x. Then, S.I. $= 0.125x = \dfrac{1}{8}x$, R = 10%.

$\therefore$ Time $= \left(\dfrac{100 \times x}{x \times 8 \times 10}\right)$ years $= \dfrac{5}{4}$ years $= 1\dfrac{1}{4}$ years.

38. Let the sum be x. Then, S.I. = 40% of $x = \dfrac{2x}{5}$; Rate = 5%.

$\therefore$ Time $= \left(100 \times \dfrac{2x}{5} \times \dfrac{1}{x \times 5}\right) = 8$ years.

39. Let sum = x. Then, amount $= \dfrac{7x}{6}$.

S.I. $= \left(\dfrac{7x}{6} - x\right) = \dfrac{x}{6}$; Time = 3 years.

$\therefore$ Rate $= \left(\dfrac{100 \times x}{x \times 6 \times 3}\right)\% = \dfrac{50}{9}\% = 5\dfrac{5}{9}\%$.

40. Let sum = x. Then, S.I. $= \dfrac{x}{9}$.

Let rate = R% and time = R years.

$\therefore \quad \left(\dfrac{x \times R \times R}{100}\right) = \dfrac{x}{9} \Leftrightarrow R^2 = \dfrac{100}{9} \Leftrightarrow R = \dfrac{10}{3} = 3\dfrac{1}{3}$.

Hence, rate $= 3\dfrac{1}{3}\%$.

41. Let sum = x. Then, S.I. $= \dfrac{9}{16}x$.

Let rate = R% and time = R years.

$\therefore \quad \left(\dfrac{x \times R \times R}{100}\right) = \dfrac{9x}{16} \Leftrightarrow R^2 = \dfrac{900}{16} \Leftrightarrow R = \dfrac{30}{4} = 7\dfrac{1}{2}$.

Hence, time $= 7\dfrac{1}{2}$ years.

42. Let the sum lent to C be Rs. x. Then, $\left(\frac{2500 \times 7 \times 4}{100}\right) + \left(\frac{x \times 7 \times 4}{100}\right) = 1120$

$\Leftrightarrow \quad \frac{7}{25}x = (1120 - 700) \Rightarrow x = \left(\frac{420 \times 25}{7}\right) = 1500.$

43. Let each sum be Rs. x. Then, $\left(\frac{x \times 11 \times 9}{100 \times 2}\right) - \left(\frac{x \times 11 \times 7}{100 \times 2}\right) = 412.50$

$\Leftrightarrow \quad (99x - 77x) = 82500 \quad \Leftrightarrow \quad 22x = 82500 \quad \Leftrightarrow \quad x = 3750.$

44. Let the sum be Rs. x. Then, $\left(x \times \frac{15}{2} \times \frac{5}{4} \times \frac{1}{100}\right) - \left(x \times \frac{25}{2} \times \frac{2}{3} \times \frac{1}{100}\right) = 32.50$

$\Leftrightarrow \quad \frac{75x}{8} - \frac{25x}{3} = 3250 \quad \Leftrightarrow \quad 25x = (3250 \times 24) \quad \Leftrightarrow \quad x = \left(\frac{3250 \times 24}{25}\right) = 3120.$

45. Let the sums be x and y.

$$\frac{x \times 6 \times 2}{100} + \frac{y \times 7 \times 2}{100} = 354 \text{ or } 6x + 7y = 17700. \quad \ldots(i)$$

Also, $\frac{x}{4} = \frac{y}{5}$ or $5x - 4y = 0$ $\ldots(ii)$

Solving (i) and (ii), we get : $x = 1200$ and $y = 1500$.

$\therefore$ Total sum = Rs. 2700.

46. Let the money added be Rs. x. Then, $\frac{(830 + x) \times 14 \times 3}{100} - \frac{830 \times 12 \times 3}{100} = 93.90$

$\Leftrightarrow \quad 830 \times 42 + 42x - 830 \times 36 = 9390 \quad \Leftrightarrow \quad 42x + 830 \times (42 - 36) = 9390$

$\Leftrightarrow \quad 42x = 9390 - 4980 \quad \Leftrightarrow \quad x = \frac{4410}{42} = 105.$

$\therefore$ Money added = Rs. 105.

47. Let the time be x years. Then, $\left(\frac{500 \times 3 \times x}{100}\right) + \left(\frac{600 \times 9 \times x}{100 \times 2}\right) = 126$

$\Leftrightarrow \quad 15x + 27x = 126 \quad \Leftrightarrow \quad 42x = 126 \quad \Leftrightarrow \quad x = 3.$

$\therefore$ Required time = 3 years.

48. Let the rate be R% p.a. Then, $\left(\frac{5000 \times R \times 2}{100}\right) + \left(\frac{3000 \times R \times 4}{100}\right) = 2200$

$\Leftrightarrow \quad 100R + 120R = 2200 \quad \Leftrightarrow \quad R = \left(\frac{2200}{220}\right) = 10.$

$\therefore$ Rate = 10%.

49. Let the original rate be R%. Then, new rate = (2R)%.

$\therefore \quad \left(\frac{725 \times R \times 1}{100}\right) + \left(\frac{362.50 \times 2R \times 1}{100 \times 3}\right) = 33.50$

$\Leftrightarrow \quad (2175 + 725)\, R = 33.50 \times 100 \times 3 = 10050$

$\Leftrightarrow \quad R = \frac{10050}{2900} = 3.46.$

$\therefore$ Original rate = 3.46%.

50. $\left(\frac{1500 \times R_1 \times 3}{100}\right) - \left(\frac{1500 \times R_2 \times 3}{100}\right) = 13.50$

$\Leftrightarrow \quad 4500\,(R_1 - R_2) = 1350 \quad \Leftrightarrow \quad R_1 - R_2 = \frac{1350}{4500} = 0.3\%.$

51. Let the second amount be Rs. x. Then,

$$\left(\frac{12000\times10\times1}{100}\right)+\left(\frac{x\times20\times1}{100}\right)=\left[\frac{(12000+x)\times14\times1}{100}\right]$$

$\Leftrightarrow$ $12000 + 20x = 168000 + 14x$ $\Leftrightarrow$ $6x = 48000$ $\Leftrightarrow$ $x = 8000$.

$\therefore$ Total investment = Rs. (12000 + 8000) = Rs. 20000.

52. S.I. = Rs. $\left(2600\times\frac{20}{3}\times\frac{1}{100}\times T\right)$ = Rs. $\left(\frac{520}{3}\times T\right)$,

which is an exact number of rupees when T = 3.

53. Let the savings be X and Y and the rates of simple interest be $5x$ and $4x$ respectively.

Then, $X\times5x\times\frac{1}{2}\times\frac{1}{100}=Y\times4x\times\frac{1}{2}\times\frac{1}{100}$ or $\frac{X}{Y}=\frac{4}{5}$, *i.e.*, X : Y = 4 : 5.

54. Let the sum be Rs. x and original rate be R%. Then, $\frac{x\times(R+3)\times2}{100}-\frac{x\times R\times2}{100}=72$

$\Leftrightarrow$ $2Rx + 6x - 2Rx = 7200$ $\Leftrightarrow$ $x = 1200$.

55. Let the sum be Rs. x. Then, $\left(x\times\frac{25}{2}\times\frac{1}{100}\right)-\left(\frac{x\times10\times1}{100}\right)=1250$

$\Leftrightarrow$ $25x - 20x = 250000$ $\Leftrightarrow$ $5x = 250000$ $\Leftrightarrow$ $x = 50000$.

56. Let the capital be Rs. x. Then, $\left(\frac{x\times8\times1}{100}\right)-\left(x\times\frac{31}{4}\times\frac{1}{100}\right)=61.50$

$\Leftrightarrow$ $32x - 31x = 6150 \times 4$ $\Leftrightarrow$ $x = 24600$.

57. Let the annual instalment be Rs. x. Then,

$$\left[x+\left(\frac{x\times3\times5}{100}\right)\right]+\left[x+\left(\frac{x\times2\times5}{100}\right)\right]+\left[x+\left(\frac{x\times1\times5}{100}\right)\right]+x=6450$$

$\Leftrightarrow$ $\frac{23x}{20}+\frac{22x}{20}+\frac{21x}{20}+x=6450$ $\Leftrightarrow$ $86x = 6450\times20$ $\Leftrightarrow$ $x = 1500$.

58. Rs. 10 + S.I. on Rs. 10 for 11 months

= Rs. 11 + S.I. on Re. 1 for (1 + 2 + 3 + 4 + ... + 10) months

$\Rightarrow$ Rs. 10 + S.I. on Re. 1 for 110 months = Rs. 11 + S.I. on Re. 1 for 55 months

$\Rightarrow$ S.I. on Re. 1 for 55 months = Re. 1.

$\therefore$ Rate = $\left(\frac{100\times12}{1\times55}\right)\% = 21\frac{9}{11}\%$.

59. Amount to be paid = Rs. $\left(100+\frac{200\times5\times1}{100}+\frac{100\times5\times1}{100}\right)$ = Rs. 115.

60. Money paid in cash = Rs. 1000.

Balance payment = Rs. (20000 − 1000) = Rs. 19000.

61. Let the sum be Rs. x, rate be R% p.a. and time be T years.

Then, $\left[\frac{x\times(R+2)\times T}{100}\right]-\left(\frac{x\times R\times T}{100}\right)=108$ $\Leftrightarrow$ $2xT = 10800$ ...(*i*)

And, $\left[\frac{x\times R\times(T+2)}{100}\right]-\left(\frac{x\times R\times T}{100}\right)=180$ $\Leftrightarrow$ $2xR = 18000$ ...(*ii*)

Clearly, from (*i*) and (*ii*), we cannot find the value of x.

So, the data is inadequate.

62. Let the sum invested in Scheme A be Rs. x and that in Scheme B be Rs. $(13900 - x)$.

Then, $\left(\frac{x \times 14 \times 2}{100}\right) + \left[\frac{(13900 - x) \times 11 \times 2}{100}\right] = 3508$

$\Leftrightarrow \quad 28x - 22x = 350800 - (13900 \times 22) \quad \Leftrightarrow \quad 6x = 45000 \quad \Leftrightarrow \quad x = 7500.$

So, sum invested in Scheme B = Rs. $(13900 - 7500)$ = Rs. 6400.

63. Let the sum lent at 10% be Rs. x and that lent at 9% be Rs. $(2600 - x)$. Then,

$$\left(\frac{x \times 10 \times 5}{100}\right) = \frac{(2600 - x) \times 9 \times 6}{100}$$

$\Leftrightarrow \quad 50x = (2600 \times 54) - 54x \quad \Rightarrow \quad x = \left(\frac{2600 \times 54}{104}\right) = 1350.$

$\therefore$ Sum lent at 10% = Rs. 1350.

64. Let the sum lent at 5% be Rs. x and that lent at 8% be Rs. $(1550 - x)$. Then,

$$\left(\frac{x \times 5 \times 3}{100}\right) + \left[\frac{(1550 - x) \times 8 \times 3}{100}\right] = 300$$

$\Leftrightarrow \quad 15x - 24x + (1550 \times 24) = 30000 \quad \Leftrightarrow \quad 9x = 7200 \quad \Leftrightarrow \quad x = 800.$

$\therefore$ Required ratio = 800 : 750 = 16 : 15.

65. Let the required rate be R. Then,

$$\left(\frac{20000 \times 8 \times 1}{100}\right) + \left(4000 \times \frac{15}{2} \times \frac{1}{100}\right) + \left(1400 \times \frac{17}{2} \times \frac{1}{100}\right) + \left(2600 \times R \times \frac{1}{100}\right) = \left(\frac{813}{10000} \times 10000\right)$$

$\Leftrightarrow \quad 160 + 300 + 119 + 26R = 813 \quad \Leftrightarrow \quad R = 9.$

66. Let the sum invested at 9% be Rs. x and that invested at 11% be Rs. $(100000 - x)$.

Then, $\left(\frac{x \times 9 \times 1}{100}\right) + \left[\frac{(100000 - x) \times 11 \times 1}{100}\right] = \left(100000 \times \frac{39}{4} \times \frac{1}{100}\right)$

$\Leftrightarrow \quad \frac{9x + 1100000 - 11x}{100} = \frac{39000}{4} = 9750$

$\Leftrightarrow \quad 2x = (1100000 - 975000) = 125000 \quad \Leftrightarrow \quad x = 62500.$

$\therefore$ Sum invested at 9% = Rs. 62500.

Sum invested at 11% = Rs. (100000 – 62500) = Rs. 37500.

67. Let x, y and z be the amounts invested in schemes A, B and C respectively. Then,

$$\left(\frac{x \times 10 \times 1}{100}\right) + \left(\frac{y \times 12 \times 1}{100}\right) + \left(\frac{z \times 15 \times 1}{100}\right) = 3200$$

$\Leftrightarrow \quad 10x + 12y + 15z = 320000 \quad ...(i)$

Now, $z = 240\%$ of $y = \frac{12}{5}y \quad ...(ii)$

And, $z = 150\%$ of $x = \frac{3}{2}x \Rightarrow x = \frac{2}{3}z = \left(\frac{2}{3} \times \frac{12}{5}\right)y = \frac{8}{5}y \quad ...(iii)$

From (i), (ii) and (iii), we have :

$16y + 12y + 36y = 320000 \quad \Leftrightarrow \quad 64y = 320000 \quad \Leftrightarrow \quad y = 5000.$

$\therefore$ Sum invested in Scheme B = Rs. 5000.

68. Let the parts be x, y and $[2600 - (x + y)]$. Then,

$$\frac{x \times 4 \times 1}{100} = \frac{y \times 6 \times 1}{100} = \frac{[2600 - (x + y)] \times 8 \times 1}{100}$$

$\therefore \quad \frac{y}{x} = \frac{4}{6} = \frac{2}{3}$ or $y = \frac{2}{3}x$.

So, $\frac{x \times 4 \times 1}{100} = \frac{\left(2600 - \frac{5}{3}x\right) \times 8}{100}$

$\Leftrightarrow \quad 4x = \frac{(7800 - 5x) \times 8}{3} \quad \Leftrightarrow \quad 52x = (7800 \times 8) \Leftrightarrow \quad x = \left(\frac{7800 \times 8}{52}\right) = 1200.$

$\therefore$ Money invested at 4% = Rs. 1200.

69. Let the parts be x, y and $[2379 - (x + y)]$.

$$x + \left(x \times 2 \times \frac{5}{100}\right) = y + \left(y \times 3 \times \frac{5}{100}\right) = z + \left(z \times 4 \times \frac{5}{100}\right)$$

$$\Rightarrow \frac{11x}{10} = \frac{23y}{20} = \frac{6z}{5} = k \quad \Rightarrow \quad x = \frac{10k}{11},\ y = \frac{20k}{23},\ z = \frac{5k}{6}$$

But $x + y + z = 2379$

$$\Rightarrow \frac{10k}{11} + \frac{20k}{23} + \frac{5k}{6} = 2379 \quad \Rightarrow \quad 1380k + 1320k + 1265k = 2379 \times 11 \times 23 \times 6$$

$$\Rightarrow k = \frac{2379 \times 11 \times 23 \times 6}{3965} = \frac{3 \times 11 \times 23 \times 6}{5}$$

$$\therefore \quad x = \left(\frac{10}{11} \times \frac{3 \times 11 \times 23 \times 6}{5}\right) = 828.$$

Hence, the first part is Rs. 828.

70. Let total capital be Rs. x Then, $\left(\frac{x}{3} \times \frac{7}{100} \times 1\right) + \left(\frac{x}{4} \times \frac{8}{100} \times 1\right) + \left(\frac{5x}{12} \times \frac{10}{100} \times 1\right) = 561$

$$\Leftrightarrow \quad \frac{7x}{300} + \frac{x}{50} + \frac{x}{24} = 561 \quad \Leftrightarrow \quad 51x = (561 \times 600) \quad \Leftrightarrow \quad x = \left(\frac{561 \times 600}{51}\right) = 6600.$$

71. Let the sum be Rs. 100 be invested for 1 year. Then,

$$\text{S.I.} = \text{Rs.}\left[\left(\frac{40 \times 15 \times 1}{100}\right) + \left(\frac{30 \times 10 \times 1}{100}\right) + \left(\frac{30 \times 18 \times 1}{100}\right)\right] = \text{Rs. } 14.40.$$

$\therefore$ Effective rate = 14.4%.

EXERCISE 21B

(DATA SUFFICIENCY TYPE QUESTIONS)

Directions (*Questions 1 to 6*) : ***Each of the questions given below consists of a statement and/or a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statement(s) is/are sufficient to answer the question. Read both the statements and***

Give answer (a) if the data in Statement I alone are sufficient to answer the question, while the data in Statement II alone are not sufficient to answer the question;

Give answer (b) if the data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question;

Give answer (c) if the data either in Statement I or in Statement II alone are sufficient to answer the question;

Give answer (d) if the data in both Statements I and II together are not sufficient to answer the question;

Give answer (e) if the data in both Statements I and II together are necessary to answer the question.

1. What is the rate of simple interest ? (Bank P.O. 2003)
   I. The total interest earned was Rs. 4000.
   II. The sum was invested for 4 years.
2. The simple interest on a sum of money is Rs. 50. What is the sum ? (R.B.I. 2003)
   I. The interest rate is 10% p.a.
   II. The sum earned simple interest in 10 years.
3. How much money did X invest ?
   I. An increase in the rate of interest from $4\frac{7}{8}\%$ to $5\frac{1}{8}\%$ per annum increases his yearly income by Rs. 25.
   II. The sum invested gets doubled, when invested at 8% p.a. for $12\frac{1}{2}$ years.
4. What percentage of simple interest per annum did Anand pay to Deepak ?
   I. Anand borrowed Rs. 8000 from Deepak for four years.
   II. Anand returned Rs. 8800 to Deepak at the end of two years and settled the loan.
   (I.B.P.S. 2002)
5. A man borrowed a total sum of Rs. 24000 from two moneylenders. For one loan, he paid interest @ $7\frac{1}{2}\%$ p.a. and for the other 9% p.a. How much money did he borrow at each rate ?
   I. The sum of the interests after one year was Rs. 2025.
   II. The interest on one sum was twice that on the other.
6. What is the sum which earned interest ? (NABARD, 2002)
   I. The total simple interest was Rs. 7000 after 7 years.
   II. The total of sum and simple interest was double of the sum after 5 years.

Directions (*Questions 7-8*) : *Each of the questions given below consists of a question followed by three statements. You have to study the question and the statements and decide which of the statement(s) is/are necessary to answer the question.*

7. What is the principal sum ?
   I. The sum amounts to Rs. 690 in 3 years at S.I.
   II. The sum amounts to Rs. 750 in 5 years at S.I.
   III. The rate of interest is 5% p.a.
   (*a*) I and III only (*b*) II and III only
   (*c*) I and II only (*d*) I and III only, or II and III only
   (*e*) Any two of the three
8. In how many years will a sum of money put at simple interest treble itself ?
   I. The interest earned in 4 years is half the sum.
   II. The rate of interest is $12\frac{1}{2}\%$.
   III. The sum doubles itself in 8 years at simple interest.
   (*a*) Any one of the three (*b*) Any two of the three
   (*c*) All I, II and III (*d*) II and III only
   (*e*) I and II only

ANSWERS

1. (*d*) 2. (*c*) 3. (*a*) 4. (*e*) 5. (*c*) 6. (*e*) 7. (*e*) 8. (*a*)

SOLUTIONS

1. We know that, $R = \left(\frac{100 \times S.I.}{P \times T}\right)$

Now, I gives, S.I. = Rs. 4000.

II gives, T = 4 years.

But, P is unknown. So, we cannot find R.

So, given data is insufficient to get R.

∴ Correct answer is (*d*).

2. Given : S.I. = Rs. 50.

I gives, R = 10% p.a.

II gives, T = 10 years.

$\therefore$ Sum = $\left(\frac{100 \times S.I.}{T \times R}\right)$ = Rs. $\left(\frac{100 \times 50}{10 \times 10}\right)$ = Rs. 50.

Thus, I and II together give the answer.

∴ Correct answer is (*e*).

3. Suppose X invests Rs. x.

I gives : $R_1 = \frac{39}{8}\%$, $R_2 = \frac{41}{8}\%$.

Increase in S.I. = Rs. 25.

$$\rightarrow \left(\frac{x \times 1 \times \frac{41}{8}}{100}\right) - \left(\frac{x \times 1 \times \frac{39}{8}}{100}\right) = 25$$

$$\Rightarrow (41x - 39x) = (25 \times 800) \Rightarrow x = \left(\frac{25 \times 800}{2}\right) = 10000.$$

Thus, I only gives the answer.

II gives, S.I. = Rs. x, R = 8% and T = $\frac{25}{2}$ years.

$$P = \frac{100 \times S.I.}{R \times T} = \left(\frac{100 \times x}{8 \times 25} \times 2\right)$$

Thus, P is not obtained.

∴ I alone is sufficient to get the answer and II is not sufficient to get the answe

∴ Correct answer is (*a*).

4. Let the rate be R% p.a.

I gives, P = Rs. 8000 and T = 4 years.

II gives, S.I. = Rs. (8800 − 8000) = Rs. 800.

$$\therefore R = \frac{100 \times S.I.}{P \times T} = \left(\frac{100 \times 800}{8000 \times 4}\right)\% = 2\frac{1}{2}\% \text{ p.a.}$$

Thus, I and II both are needed to get the answer.

∴ Correct answer is (*e*).

5. Suppose he borrowed Rs. x at $7\frac{1}{2}\%$ p.a. and Rs. $(24000 - x)$ at 9% p.a.

I gives, total interest = Rs. 2025.

$\therefore \quad \left(x \times 1 \times \frac{15}{2} \times \frac{1}{100}\right) + \left\{(24000 - x) \times 1 \times \frac{9}{100}\right\} = 2025.$

This gives x.

II gives Interest on Rs. $(24000 - x)$ = 2 × (interest on Rs. x)

$\Rightarrow \quad (24000 - x) \times \frac{9}{100} \times 1 = \left(2 \times x \times \frac{15}{2} \times \frac{1}{100}\right)$

This gives x.

Thus, data in I as well as well as in II are sufficient to answer the question.

$\therefore$ Correct answer is (*c*).

6. Let the sum be Rs. x.

I gives, S.I. = Rs. 7000 and T = 7 years.

II gives, Sum + S.I. for 5 years = 2 × Sum $\Rightarrow$ Sum = S.I. for 5 years

Now, S.I. for 7 years = Rs. 7000

$\therefore$ S.I. for 1 year = Rs. $\frac{7000}{7}$ = Rs. 1000.

S.I. for 5 years = Rs. (1000 × 5) = Rs. 5000.

Thus, I and II both are needed to get the answer.

$\therefore$ Correct answer is (*e*).

7. Clearly, any of the three will give us the answer.

$\therefore$ Correct answer is (*e*).

8. Let sum be Rs. x. Then, S.I. = Rs. $(3x - x)$ = Rs. $2x$, T = ?

I gives : When T = 4, then S.I. = Rs. $\frac{x}{2}$.

$\therefore \quad R = \frac{100 \times \text{S.I.}}{P \times T} = \left(100 \times \frac{x}{2} \times \frac{1}{x} \times \frac{1}{4}\right) = 12\frac{1}{2}\%$ p.a.

Now, Sum = Rs. x, S.I. = Rs. $2x$, R = $\frac{25}{2}\%$ p.a., T = ?

$\therefore \quad T = \frac{100 \times \text{S.I.}}{P \times R} = \left(\frac{100 \times 2x}{x \times 25} \times 2\right) = 16$ years.

Thus, I only gives the answer.

II gives, R = $\frac{25}{2}\%$ p.a.

$\therefore \quad T = \frac{100 \times \text{S.I.}}{P \times R} = \left(\frac{100 \times 2x}{x \times 25} \times 2\right) = 16$ years.

Thus, II only also gives the answer.

III gives, R = 5% p.a.

$\therefore \quad T = \frac{100 \times \text{S.I.}}{P \times R} = \left(\frac{100 \times 2x}{x \times 5}\right) = 40$ years.

Thus, III only also gives the answer.

$\therefore$ Correct answer is (*a*).