9. If the mean of 5 observations x, $x + 2$, $x + 4$, $x + 6$ and $x + 8$ is 11, then the mean of the last three observations is : **(C.D.S. 2003)**
(*a*) 11 (*b*) 13 (*c*) 15 (*d*) 17

10. If the mean of a, b, c is M and $ab + bc + ca = 0$, then the mean of a^2, b^2, c^2 is :
(*a*) M^2 (*b*) $3M^2$ (*c*) $6M^2$ (*d*) $9M^2$
(IITTM, 2003)

11. The average of the two-digit numbers, which remain the same when the digits interchange their positions, is : **(C.D.S. 2003)**
(*a*) 33 (*b*) 44 (*c*) 55 (*d*) 66

12. The average of first 50 natural numbers is :
(*a*) 12.25 (*b*) 21.25 (*c*) 25 (*d*) 25.5

13. The mean of $1^2, 2^2, 3^2, 4^2, 5^2, 6^2, 7^2$ is :
(*a*) 10 (*b*) 20 (*c*) 30 (*d*) 40

14. The average of all odd numbers upto 100 is :
(*a*) 49 (*b*) 49.5 (*c*) 50 (*d*) 51

15. If a, b, c, d, e are five consecutive odd numbers, their average is :
(*a*) $5(a + 4)$ (*b*) $\frac{abcde}{5}$
(*c*) $5(a + b + c + d + e)$ (*d*) None of these

16. The average of a non-zero number and its square is 5 times the number. The number is : **(S.S.C. 2003)**
(*a*) 9 (*b*) 17 (*c*) 29 (*d*) 295

17. The average of 7 consecutive numbers is 20. The largest of these numbers is :
(*a*) 20 (*b*) 22 (*c*) 23 (*d*) 24
(S.S.C. 2000)

18. The average of five consecutive odd numbers is 61. What is the difference between the highest and lowest numbers ? **(Bank P.O. 2003)**
(*a*) 2 (*b*) 5 (*c*) 8
(*d*) Cannot be determined (*e*) None of these

19. The sum of three consecutive odd numbers is 38 more than the average of these numbers. What is the first of these numbers ? **(Bank P.O. 1998)**
(*a*) 13 (*b*) 17 (*c*) 19
(*d*) Data inadequate (*e*) None of these

20. The average age of the boys in a class is 16 years and that of the girls is 15 years. The average age for the whole class is : **(S.S.C. 2003)**
(*a*) 15 years (*b*) 15.5 years (*c*) 16 years
(*d*) Cannot be computed with the given information

21. The average annual income (in Rs.) of certain agricultural workers is S and that of other workers is T. The number of agricultural workers is 11 times that of other workers. Then the average monthly income (in Rs.) of all the workers is :
(*a*) $\frac{S+T}{2}$ (*b*) $\frac{S+11T}{2}$ (*c*) $\frac{1}{11S}+T$ (*d*) $\frac{11S+T}{12}$
(S.S.C. 2004)

22. A family consists of grandparents, parents and three grandchildren. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the grandchildren is 6 years. What is the average age of the family ? **(R.R.B. 2003)**
(*a*) $28\frac{4}{7}$ years (*b*) $31\frac{5}{7}$ years (*c*) $32\frac{1}{7}$ years (*d*) None of these

23. A library has an average of 510 visitors on Sundays and 240 on other days. The average number of visitors per day in a month of 30 days beginning with a Sunday is : **(M.A.T. 2003)**

(*a*) 250 (*b*) 276 (*c*) 280 (*d*) 285

24. If the average marks of three batches of 55, 60 and 45 students respectively is 50, 55 and 60, then the average marks of all the students is : **(C.B.I. 2003)**

(*a*) 53.33 (*b*) 54.68 (*c*) 55 (*d*) None of these

25. The average weight of 16 boys in a class is 50.25 kgs and that of the remaining 8 boys is 45.15 kgs. Find the average weight of all the boys in the class. **(I.M.T. 2002)**

(*a*) 47.55 kgs (*b*) 48 kgs (*c*) 48.55 kgs (*d*) 49.25 kgs

26. A car owner buys petrol at Rs 7.50, Rs. 8 and Rs. 8.50 per litre for three successive years. What approximately is the average cost per litre of petrol if he spends Rs. 4000 each year ? **(M.A.T. 2001)**

(*a*) Rs. 7.98 (*b*) Rs. 8 (*c*) Rs. 8.50 (*d*) Rs. 9

27. The average of six numbers is x and the average of three of these is y. If the average of the remaining three is z, then : **(Hotel Management, 2001)**

(*a*) $x = y + z$ (*b*) $2x = y + z$ (*c*) $x = 2y + 2z$ (*d*) None of these

28. Out of 9 persons, 8 persons spent Rs. 30 each for their meals. The ninth one spent Rs. 20 more than the average expenditure of all the nine. The total money spent by all of them was : **(C.B.I. 1998)**

(*a*) Rs. 260 (*b*) Rs. 290 (*c*) Rs. 292.50 (*d*) Rs. 400.50

29. The average of 50 numbers is 30. If two numbers, 35 and 40 are discarded, then the average of the remaining numbers is nearly : **(R.R.B. 2002)**

(*a*) 28.32 (*b*) 28.78 (*c*) 29.27 (*d*) 29.68

30. The average of five numbers is 27. If one number is excluded, the average becomes 25. The excluded number is : **(Section Officers', 2003)**

(*a*) 25 (*b*) 27 (*c*) 30 (*d*) 35

31. The average age of 35 students in a class is 16 years. The average age of 21 students is 14. What is the average age of remaining 14 students ? **(S.B.I.P.O. 1997)**

(*a*) 15 years (*b*) 17 years (*c*) 18 years (*d*) 19 years

32. 16 children are to be divided into two groups A and B of 10 and 6 children. The average percent marks obtained by the children of group A is 75 and the average percent marks of all the 16 children is 76. What is the average percent marks of children of group B ? **(B.S.R.B. 2003)**

(*a*) $77\frac{1}{3}$ (*b*) $77\frac{2}{3}$ (*c*) $78\frac{1}{3}$ (*d*) $78\frac{2}{3}$

33. The average score of a cricketer for ten matches is 38.9 runs. If the average for the first six matches is 42, then find the average for the last four matches.

(*a*) 33.25 (*b*) 33.5 (*c*) 34.25 (*d*) 35

(IGNOU, 2003)

34. The average of six numbers is 3.95. The average of two of them is 3.4, while the average of the other two is 3.85. What is the average of the remaining two numbers ?

(*a*) 4.5 (*b*) 4.6 (*c*) 4.7 (*d*) 4.8

(Bank P.O. 2003)

35. The batting average for 40 innings of a cricket player is 50 runs. His highest score exceeds his lowest score by 172 runs. If these two innings are excluded, the average of the remaining 38 innings is 48 runs. The highest score of the player is :

(*a*) 165 runs (*b*) 170 runs (*c*) 172 runs (*d*) 174 runs

36. The average price of 10 books is Rs. 12 while the average price of 8 of these books is Rs. 11.75. Of the remaining two books, if the price of one book is 60% more than the price of the other, what is the price of each of these two books ?

(*a*) Rs. 5, Rs. 7.50 (*b*) Rs. 8, Rs. 12 (*c*) Rs. 10, Rs. 16 (*d*) Rs. 12, Rs. 14

(Assistant Grade, 1997)

37. The average of runs of a cricket player of 10 innings was 32. How many runs must he make in his next innings so as to increase his average of runs by 4 ?

(*a*) 2 (*b*) 4 (*c*) 70 (*d*) 76

(S.S.C. 2004)

38. A grocer has a sale of Rs. 6435, Rs. 6927, Rs. 6855, Rs. 7230 and Rs. 6562 for 5 consecutive months. How much sale must he have in the sixth month so that he gets an average sale of Rs. 6500 ? **(S.S.C. 2003)**

(*a*) Rs. 4991 (*b*) Rs. 5991 (*c*) Rs. 6001 (*d*) Rs. 6991

39. A company produces on an average 4000 items per month for the first 3 months. How many items it must produce on an average per month over the next 9 months, to average 4375 items per month over the whole ? **(S.S.C. 1999)**

(*a*) 4500 (*b*) 4600 (*c*) 4680 (*d*) 4710

40. In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs ? **(M.A.T. 2002)**

(*a*) 6.25 (*b*) 6.5 (*c*) 6.75 (*d*) 7

41. The average price of three items of furniture is Rs. 15000. If their prices are in the ratio 3 : 5 : 7, the price of the cheapest item is :

(*a*) Rs. 9000 (*b*) Rs. 15000 (*c*) Rs. 18000 (*d*) Rs. 21000

42. Of the four numbers, the first is twice the second, the second is one-third of the third and the third is 5 times the fourth. The average of the numbers is 24.75. The largest of these numbers is : **(Hotel Management, 1998)**

(*a*) 9 (*b*) 25 (*c*) 30 (*d*) None of these

43. Of the four numbers, whose average is 60, the first is one-fourth of the sum of the last three. The first number is : **(S.S.C. 2000)**

(*a*) 15 (*b*) 45 (*c*) 48 (*d*) 60.25

44. Of the three numbers, the first is twice the second and the second is twice the third. The average of the reciprocal of the numbers is $\frac{7}{72}$. The numbers are :

(*a*) 16, 8, 4 (*b*) 20, 10, 5 (*c*) 24, 12, 6 (*d*) 36, 18, 9

(C.B.I. 1997)

45. Of the three numbers, the average of the first and the second is greater than the average of the second and the third by 15. What is the difference between the first and the third of the three numbers ? **(S.B.I.P.O. 2000)**

(*a*) 15 (*b*) 45 (*c*) 60

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

46. The average of 8 numbers is 20. The average of first two numbers is $15\frac{1}{2}$ and that of the next three is $21\frac{1}{3}$. If the sixth number be less than the seventh and eighth numbers by 4 and 7 respectively, then the eighth number is : **(S.S.C. 2004)**

(*a*) 18 (*b*) 22 (*c*) 25 (*d*) 27

47. If the arithmetic mean of seventy-five numbers is calculated, it is 35. If each number is increased by 5, then mean of new numbers is : **(Assistant Grade, 1998)**

(*a*) 30 (*b*) 40 (*c*) 70 (*d*) 90

48. The average of ten numbers is 7. If each number is multiplied by 12, then the average of the new set of numbers is :

(*a*) 7 (*b*) 19 (*c*) 82 (*d*) 84

49. Average of ten positive numbers is $\bar{x}$. If each number is increased by 10%, then $\bar{x}$:

(*a*) remains unchanged (*b*) may decrease

(*c*) may increase (*d*) is increased by 10%

(I.M.T. 2002)

50. The mean of 50 observations was 36. It was found later that an observation 48 was wrongly taken as 23. The corrected new mean is : (S.S.C. 2003)

(*a*) 35.2 (*b*) 36.1 (*c*) 36.5 (*d*) 39.1

51. A pupil's marks were wrongly entered as 83 instead of 63. Due to that the average marks for the class got increased by half. The number of pupils in the class is :

(*a*) 10 (*b*) 20 (*c*) 40 (*d*) 73

(C.B.I. 1998)

52. The average age of 15 students of a class is 15 years. Out of these, the average age of 5 students is 14 years and that of the other 9 students is 16 years. The age of the 15th student is : (S.S.C. 2003)

(*a*) 11 years (*b*) 14 years (*c*) 15 years (*d*) $15\frac{2}{7}$ years

53. The average of 11 numbers is 10.9. If the average of the first six numbers is 10.5 and that of the last six numbers is 11.4, then the middle number is :

(*a*) 11 (*b*) 11.3 (*c*) 11.4 (*d*) 11.5

54. The average weight of three boys A, B and C is $54\frac{1}{3}$ kg, while the average weight of three boys B, D and E is 53 kg. What is the average weight of A, B, C, D and E ?

(*a*) 52.4 kg (*b*) 53.2 kg (*c*) 53.8 kg

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

(S.B.I.P.O. 2002)

55. The average temperature of the town in the first four days of a month was 58 degrees. The average for the second, third, fourth and fifth days was 60 degrees. If the temperatures of the first and fifth days were in the ratio 7 : 8, then what is the temperature on the fifth day ? (NMIMS, 2003)

(*a*) 64 degrees (*b*) 62 degrees (*c*) 56 degrees (*d*) None of these.

56. The average weight of A, B and C is 45 kg. If the average weight of A and B be 40 kg and that of B and C be 43 kg, then the weight of B is : (S.S.C. 2004)

(*a*) 17 kg (*b*) 20 kg (*c*) 26 kg (*d*) 31 kg

57. The average monthly income of P and Q is Rs. 5050. The average monthly income of Q and R is Rs. 6250 and the average monthly income of P and R is Rs. 5200. The monthly income of P is : (R.R.B. 2004)

(*a*) Rs. 3500 (*b*) Rs. 4000 (*c*) Rs. 4050 (*d*) Rs. 5000

58. The average age of 36 students in a group is 14 years. When teacher's age is included to it, the average increases by one. What is the teacher's age in years ?

(*a*) 31 (*b*) 36 (*c*) 51

(*d*) Cannot be determined (*e*) None of these (R.B.I. 2003)

59. The average monthly salary of 20 employees in an organisation is Rs. 1500. If the manager's salary is added, then the average salary increases by Rs. 100. What is the manager's monthly salary ? (R.R.B. 2002)

(*a*) Rs. 2000 (*b*) Rs. 2400 (*c*) Rs. 3600 (*d*) Rs. 4800

60. The average weight of a class of 24 students is 35 kg. If the weight of the teacher be included, the average rises by 400 g. The weight of the teacher is : **(S.S.C. 2003)**

(*a*) 45 kg (*b*) 50 kg (*c*) 53 kg (*d*) 55 kg

61. The average age of the mother and her six children is 12 years which is reduced by 5 years if the age of the mother is excluded. How old is the mother ?

(*a*) 40 years (*b*) 42 years (*c*) 48 years (*d*) 50 years

62. The captain of a cricket team of 11 members is 26 years old and the wicket keeper is 3 years older. If the ages of these two are excluded, the average age of the remaining players is one year less than the average age of the whole team. What is the average age of the team ? **(N.I.F.T. 2000)**

(*a*) 23 years (*b*) 24 years (*c*) 25 years (*d*) None of these

63. The average height of 25 boys is 1.4 m. When 5 boys leave the group, then the average height increases by 0.15 m. What is the average height of the 5 boys who leave ?

(*a*) 0.8 m (*b*) 0.9 m (*c*) 0.95 m (*d*) 1.05 m

64. The average weight of 8 persons increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. What might be the weight of the new person ?

(*a*) 76 kg (*b*) 76.5 kg (*c*) 85 kg

(*d*) Data inadequate (*e*) None of these **(Bank P.O. 2000)**

65. The average weight of 45 students in a class is 52 kg. Five of them whose average weight is 48 kg leave the class and other 5 students whose average weight is 54 kg join the class. What is the new average weight (in kg) of the class ? **(R.R.B. 2002)**

(*a*) $52\frac{1}{3}$ (*b*) $52\frac{1}{2}$ (*c*) $52\frac{2}{3}$ (*d*) None of these

66. The average age of 8 men is increased by 2 years when two of them whose ages are 21 years and 23 years are replaced by two new men. The average age of the two new men is : **(S.S.C. 2002)**

(*a*) 22 years (*b*) 24 years (*c*) 28 years (*d*) 30 years

67. The average of five consecutive numbers is *n*. If the next two numbers are also included, the average will :

(*a*) remain the same (*b*) increase by 1

(*c*) increase by 1.4 (*d*) increase by 2

68. A cricketer has a certain average for 10 innings. In the eleventh inning, he scored 108 runs, thereby increasing his average by 6 runs. His new average is :

(*a*) 48 runs (*b*) 52 runs (*c*) 55 runs (*d*) 60 runs

(A.A.O. Exam, 2003)

69. A cricketer whose bowling average is 12.4 runs per wicket takes 5 wickets for 26 runs and thereby decreases his average by 0.4. The number of wickets taken by him till the last match was : **(S.S.C. 2000)**

(*a*) 64 (*b*) 72 (*c*) 80 (*d*) 85

70. A team of 8 persons joins in a shooting competition. The best marksman scored 85 points. If he had scored 92 points, the average score for the team would have been 84. The number of points, the team scored was :

(*a*) 588 (*b*) 645 (*c*) 665 (*d*) 672

71. A motorist travels to a place 150 km away at an average speed of 50 km / hr and returns at 30 km / hr. His average speed for the whole journey in km / hr is :

(*a*) 35 (*b*) 37 (*c*) 37.5 (*d*) 40

72. The average weight of 3 men A, B and C is 84 kg. Another man D joins the group and the average now becomes 80 kg. If another man E, whose weight is 3 kg more than that of D, replaces A, then the average weight of B, C, D and E becomes 79 kg. The weight of A is : **(Bank P.O. 2003)**

(*a*) 70 kg (*b*) 72 kg (*c*) 75 kg (*d*) 80 kg

73. The average age of a husband and his wife was 23 years at the time of their marriage. After five years they have a one-year old child. The average age of the family now is :
(a) 19 years (b) 23 years (c) 28.5 years (d) 29.3 years
(Assistant Grade., 1998)

74. Three years ago, the average age of A and B was 18 years. With C joining them, the average age becomes 22 years. How old is C now ?
(a) 24 years (b) 27 years (c) 28 years (d) 30 years

75. The average age of husband, wife and their child 3 years ago was 27 years and that of wife and the child 5 years ago was 20 years. The present age of the husband is :
(a) 35 years (b) 40 years (c) 50 years (d) None of these
(Hotel Management, 2003)

76. 3 years ago, the average age of a family of 5 members was 17 years. A baby having been born, the average age of the family is the same today. The present age of the baby is **(S.S.C. 2004)**
(a) 1 year (b) $1\frac{1}{2}$ years (c) 2 years (d) 3 years

77. 10 years ago, the average age of a family of 4 members was 24 years. Two children having been born (with age difference of 2 years), the present average age of the family is the same. The present age of the youngest child is : **(S.S.C. 2003)**
(a) 1 year (b) 2 years (c) 3 years (d) 5 years

78. After replacing an old member by a new member, it was found that the average age of five members of a club is the same as it was 3 years ago. What is the difference between the ages of the replaced and the new member ?
(a) 2 years (b) 4 years (c) 8 years (d) 15 years

79. The average age of 3 children in a family is 20% of the average age of the father and the eldest child. The total age of the mother and the youngest child is 39 years. If the father's age is 26 years, what is the age of second child ?
(a) 15 years (b) 18 years (c) 20 years (d) Cannot be determined

80. The average age of a group of persons going for picnic is 16 years. Twenty new persons with an average age of 15 years join the group on the spot due to which their average age becomes 15.5 years. The number of persons initially going for picnic is :
(a) 5 (b) 10 (c) 20 (d) 30

81. A certain factory employed 600 men and 400 women and the average wage was Rs. 25.50 per day. If a woman got Rs. 5 less than a man, then what are their daily wages ?
(a) Man : Rs. 25; Woman : Rs. 20 (b) Man : Rs. 27.50, Woman : Rs. 22.50
(c) Man : Rs. 30, Woman : Rs. 25 (d) Man : Rs. 32.50, Woman : Rs. 27.50

82. The arithmetic mean of the scores of a group of students in a test was 52. The brightest 20% of them secured a mean score of 80 and the dullest 25% a mean score of 31. The mean score of remaining 55% is : **(S.S.C. 2000)**
(a) 45 (b) 50 (c) 51.4 approx. (d) 54.6 approx.

83. The average salary of all the workers in a workshop is Rs. 8000. The average salary of 7 technicians is Rs. 12000 and the average salary of the rest is Rs. 6000. The total number of workers in the workshop is : **(S.S.C. 2003)**
(a) 20 (b) 21 (c) 22 (d) 23

84. In a school with 600 students, the average age of the boys is 12 years and that of the girls is 11 years. If the average age of the school is 11 years 9 months, then the number of girls in the school is :
(a) 150 (b) 250 (c) 350 (d) 450

85. In an examination, a pupil's average marks were 63 per paper. If he had obtained 20 more marks for his Geography paper and 2 more marks for his History paper, his average per paper would have been 65. How many papers were there in the examination ?

(*a*) 8 (*b*) 9 (*c*) 10 (*d*) 11 (*e*) 12

(SCMHRD, 2001)

86. The average age of students of a class is 15.8 years. The average age of boys in the class is 16.4 years and that of the girls is 15.4 years. The ratio of the number of boys to the number of girls in the class is : (S.B.I.P.O. 2002)

(*a*) 1 : 2 (*b*) 2 : 3 (*c*) 3 : 4 (*d*) 3 : 5

ANSWERS

1. (*e*)	**2.** (*e*)	**3.** (*d*)	**4.** (*b*)	**5.** (*b*)	**6.** (*c*)	**7.** (*b*)	**8.** (*c*)	**9.** (*b*)
10. (*b*)	**11.** (*c*)	**12.** (*d*)	**13.** (*b*)	**14.** (*c*)	**15.** (*d*)	**16.** (*a*)	**17.** (*c*)	**18.** (*c*)
19. (*b*)	**20.** (*d*)	**21.** (*d*)	**22.** (*b*)	**23.** (*d*)	**24.** (*b*)	**25.** (*c*)	**26.** (*a*)	**27.** (*b*)
28. (*c*)	**29.** (*d*)	**30.** (*d*)	**31.** (*d*)	**32.** (*b*)	**33.** (*c*)	**34.** (*b*)	**35.** (*d*)	**36.** (*c*)
37. (*d*)	**38.** (*a*)	**39.** (*a*)	**40.** (*a*)	**41.** (*a*)	**42.** (*d*)	**43.** (*c*)	**44.** (*c*)	**45.** (*e*)
46. (*c*)	**47.** (*b*)	**48.** (*d*)	**49.** (*d*)	**50.** (*c*)	**51.** (*c*)	**52.** (*a*)	**53.** (*d*)	**54.** (*d*)
55. (*a*)	**56.** (*d*)	**57.** (*b*)	**58.** (*c*)	**59.** (*c*)	**60.** (*a*)	**61.** (*b*)	**62.** (*d*)	**63.** (*a*)
64. (*c*)	**65.** (*c*)	**66.** (*d*)	**67.** (*b*)	**68.** (*a*)	**69.** (*d*)	**70.** (*c*)	**71.** (*c*)	**72.** (*c*)
73. (*a*)	**74.** (*a*)	**75.** (*b*)	**76.** (*c*)	**77.** (*c*)	**78.** (*d*)	**79.** (*d*)	**80.** (*c*)	**81.** (*b*)
82. (*c*)	**83.** (*b*)	**84.** (*a*)	**85.** (*d*)	**86.** (*b*)				

SOLUTIONS

1. Average $= \left(\frac{76 + 65 + 82 + 67 + 85}{5}\right) = \left(\frac{375}{5}\right) = 75.$

2. Let Arun's weight be X kg.

According to Arun, $65 < X < 72$.

According to Arun's brother, $60 < X < 70$.

According to Arun's mother, $X < 68$.

The values satisfying all the above conditions are 66 and 67.

$\therefore$ Required average $= \left(\frac{66 + 67}{2}\right) = \left(\frac{133}{2}\right) = 66.5$ kg.

3. Average of 20 numbers = 0.

$\therefore$ Sum of 20 numbers $= (0 \times 20) = 0$.

It is quite possible that 19 of these numbers may be positive and if their sum is *a*, then 20th number is $(-a)$.

4. Average $= \left(\frac{10 + 15 + 20 + 25 + 30}{5}\right) = \frac{100}{5} = 20.$

5. Average $= \frac{3(1 + 2 + 3 + 4 + 5)}{5} = \frac{45}{5} = 9.$

6. Average $= \left(\frac{2 + 3 + 5 + 7 + 11 + 13 + 17 + 19 + 23}{9}\right) = \frac{100}{9} = 11\frac{1}{9}.$

7. Clearly, we have $\left(\frac{3+11+7+9+15+13+8+19+17+21+14+x}{12}\right) = 12$

or $137 + x = 144$ or $x = 144 - 137 = 7$.

8. We have : $\left(\frac{2+7+6+x}{4}\right) = 5$ or $15 + x = 20$ or $x = 5$.

Also, $\left(\frac{18+1+6+x+y}{5}\right) = 10$ or $25 + 5 + y = 50$ or $y = 20$.

9. We have : $\left[\frac{x+(x+2)+(x+4)+(x+6)+(x+8)}{5}\right] = 11$ or $5x + 20 = 55$ or $x = 7$.

So, the numbers are 7, 9, 11, 13, 15.

$\therefore$ Required mean $= \left(\frac{11+13+15}{3}\right) = \frac{39}{3} = 13$.

10. We have : $\left(\frac{a+b+c}{3}\right) = M$ or $(a + b + c) = 3M$.

Now, $(a + b + c)^2 = (3M)^2 = 9M^2$.

$\Leftrightarrow \quad a^2 + b^2 + c^2 + 2(ab + bc + ca) = 9M^2$

$\Leftrightarrow \quad a^2 + b^2 + c^2 = 9M^2$. $[\because (ab + bc + ca) = 0]$

$\therefore$ Required mean $= \left(\frac{a^2+b^2+c^2}{3}\right) = \frac{9M^2}{3} = 3M^2$.

11. Average $= \left(\frac{11+22+33+44+55+66+77+88+99}{9}\right)$

$= \left[\frac{(11+99)+(22+88)+(33+77)+(44+66)+55}{9}\right]$

$= \left(\frac{4\times 110+55}{9}\right) = \frac{495}{9} = 55$.

12. Sum of first n natural numbers $= \frac{n(n+1)}{2}$.

So, average of first n natural numbers $= \frac{n(n+1)}{2n} = \frac{n+1}{2}$.

$\therefore$ Required average $= \left(\frac{50+1}{2}\right) = \frac{51}{2} = 25.5$.

13. $1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$

$\therefore \quad 1^2 + 2^2 + 3^2 + \ldots + 7^2 = \left(\frac{7\times 8\times 15}{6}\right) = 140$.

So, required average $= \left(\frac{140}{7}\right) = 20$.

14. Sum of odd numbers upto 100 $= 1 + 3 + 5 + 7 + \ldots + 95 + 97 + 99$.

$= (1 + 99) + (3 + 97) + (5 + 95) + \ldots +$ upto 25 pairs

$= 100 + 100 + 100 + \ldots$ (25 times) $= 2500$.

$\therefore$ Average $= \left(\frac{2500}{50}\right) = 50$.

15. Clearly, $b = a + 2$, $c = a + 4$, $d = a + 6$ and $e = a + 8$.

$\therefore$ Average $= \dfrac{a + (a+2) + (a+4) + (a+6) + (a+8)}{5} = \left(\dfrac{5a + 20}{5}\right) = (a + 4).$

16. Let the number be x. Then,

$\dfrac{x + x^2}{2} = 5x \Leftrightarrow x^2 - 9x = 0 \Leftrightarrow x(x - 9) = 0 \Leftrightarrow x = 0$ or $x = 9$.

So, the number is 9.

17. Let the numbers be x, $x + 1$, $x + 2$, $x + 3$, $x + 4$, $x + 5$ and $x + 6$.

Then, $\dfrac{x + (x+1) + (x+2) + (x+3) + (x+4) + (x+5) + (x+6)}{7} = 20$

or $7x + 21 = 140$ or $7x = 119$ or $x = 17$.

$\therefore$ Largest number $= x + 6 = 23$.

18. Let the numbers be x, $x + 2$, $x + 4$, $x + 6$ and $x + 8$.

Then, $\dfrac{x + (x+2) + (x+4) + (x+6) + (x+8)}{5} = 61$ or $5x + 20 = 305$ or $x = 57$.

So, required difference $= (57 + 8) - 57 = 8$.

19. Let the numbers be x, $x + 2$ and $x + 4$.

Then, $(x + x + 2 + x + 4) - \dfrac{(x + x + 2 + x + 4)}{3} = 38$

or $(3x + 6) - \dfrac{(3x + 6)}{3} = 38$ or $2(3x + 6) = 114$ or $6x = 102$ or $x = 17$.

So, first number $= x = 17$.

20. Clearly, to find the average, we ought to know the number of boys, girls or students in the class, neither of which has been given.

So, the data provided is inadequate.

21. Let the number of other workers be x.

Then, number of agricultural workers $= 11x$.

Total number of workers $= 12x$.

$\therefore$ Average monthly income $= \dfrac{S \times 11x + T \times x}{12x} = \dfrac{11S + T}{12}$.

22. Required average $= \left(\dfrac{67 \times 2 + 35 \times 2 + 6 \times 3}{2 + 2 + 3}\right)$

$= \left(\dfrac{134 + 70 + 18}{7}\right) = \dfrac{222}{7} = 31\dfrac{5}{7}$ years.

23. Since the month begins with a Sunday, so there will be five Sundays in the month.

$\therefore$ Required average $= \left(\dfrac{510 \times 5 + 240 \times 25}{30}\right) = \dfrac{8550}{30} = 285.$

24. Required average $= \left(\dfrac{55 \times 50 + 60 \times 55 + 45 \times 60}{55 + 60 + 45}\right)$

$= \left(\dfrac{2750 + 3300 + 2700}{160}\right) = \dfrac{8750}{160} = 54.68.$

25. Required average $= \left(\dfrac{50.25 \times 16 + 45.15 \times 8}{16 + 8}\right)$

$= \left(\dfrac{804 + 361.20}{24}\right) = \dfrac{1165.20}{24} = 48.55.$

26. Total quantity of petrol consumed in 3 years $= \left(\frac{4000}{7.50} + \frac{4000}{8} + \frac{4000}{8.50}\right)$ litres

$= 4000\left(\frac{2}{15} + \frac{1}{8} + \frac{2}{17}\right) = \left(\frac{76700}{51}\right)$ litres.

Total amount spent = Rs. (3×4000) = Rs. 12000.

$\therefore$ Average cost = Rs. $\left(\frac{12000 \times 51}{76700}\right)$ = Rs. $\frac{6120}{767}$ = Rs. 7.98.

27. Clearly, we have : $x = \left(\frac{3y + 3z}{6}\right)$ or $2x = y + z$.

28. Let the average expenditure be Rs. x. Then,

$9x = 8 \times 30 + (x + 20)$ or $9x = x + 260$ or $8x = 260$ or $x = 32.50$.

$\therefore$ Total money spent = $9x$ = Rs. (9×32.50) = Rs 292. 50.

29. Sum of 50 numbers = $30 \times 50 = 1500$.

Sum of remaining 48 numbers = $1500 - (35 + 40) = 1425$.

$\therefore$ Required average $= \left(\frac{1425}{48}\right) = \frac{475}{16} = 29.68$.

30. Excluded number = $(27 \times 5) - (25 \times 4) = 135 - 100 = 35$.

31. Sum of the ages of 14 students = $(16 \times 35) - (14 \times 21) = 560 - 294 = 266$.

$\therefore$ Required average $= \left(\frac{266}{14}\right) = 19$ years.

32. Required average $= \frac{(76 \times 16) - (75 \times 10)}{6} = \left(\frac{1216 - 750}{6}\right) = \frac{466}{6} = \frac{233}{3} = 77\frac{2}{3}$.

33. Required average $= \frac{(38.9 \times 10) - (42 \times 6)}{4} = \frac{137}{4} = 34.25$.

34. Sum of the remaining two numbers $= (3.95 \times 6) - [(3.4 \times 2) + (3.85 \times 2)]$

$= 23.70 - (6.8 + 7.7) = 23.70 - 14.5 = 9.20$.

$\therefore$ Required average $= \left(\frac{9.2}{2}\right) = 4.6$.

35. Let the highest score be x. Then, lowest score = $(x - 172)$.

Then, $(50 \times 40) - [x + (x - 172)] = 38 \times 48$

$\Leftrightarrow$ $2x = 2000 + 172 - 1824 \Leftrightarrow 2x = 348 \Leftrightarrow x = 174$.

36. Total price of the two books = Rs. $[(12 \times 10) - (11.75 \times 8)]$

= Rs. $(120 - 94)$ = Rs. 26.

Let the price of one book be Rs. x.

Then, the price of other book = Rs. $(x + 60\%$ of $x)$ = Rs. $\left(x + \frac{3}{5}x\right)$ = Rs. $\left(\frac{8x}{5}\right)$.

So, $x + \frac{8x}{5} = 26 \Leftrightarrow 13x = 130 \Leftrightarrow x = 10$.

$\therefore$ The prices of the two books are Rs. 10 and Rs. 16.

37. Average after 11 innings = 36.

$\therefore$ Required number of runs $= (36 \times 11) - (32 \times 10)$

$= 396 - 320 = 76$.

38. Total sale for 5 months = Rs. (6435 + 6927 + 6855 + 7230 + 6562) = Rs. 34009.

$\therefore$ Required sale = Rs. $[(6500 \times 6) - 34009]$ = Rs. $(39000 - 34009)$ = Rs. 4991.

39. Required average $= \frac{(4375 \times 12) - (4000 \times 3)}{9} = \frac{52500 - 12000}{9} = \frac{40500}{9} = 4500.$

40. Required run rate $= \frac{282 - (3.2 \times 10)}{40} = \frac{250}{40} = 6.25.$

41. Let their prices be $3x$, $5x$ and $7x$.
Then, $3x + 5x + 7x = (15000 \times 3)$ or $x = 3000$.
$\therefore$ Cost of cheapest item $= 3x =$ Rs. 9000.

42. Let the fourth number be x.
Then, third number $= 5x$, second number $= \frac{5x}{3}$ and first number $= \frac{10x}{3}$.
$x + 5x + \frac{5x}{3} + \frac{10x}{3} = (24.75 \times 4)$ or $11x = 99$ or $x = 9$.
So, the numbers are 9, 45, 15 and 30.
$\therefore$ Largest number = 45.

43. Let the first number be x.
Then, sum of the four numbers $= x + 4x = 5x$.
So, $\frac{5x}{4} = 60$ or $x = \left(\frac{60 \times 4}{5}\right) = 48.$

44. Let the third number be x. Then, second number $= 2x$. First number $= 4x$.
$\therefore \frac{1}{x} + \frac{1}{2x} + \frac{1}{4x} = \left(\frac{7}{72} \times 3\right)$ or $\frac{7}{4x} = \frac{7}{24}$ or $4x = 24$ or $x = 6$.
So, the numbers are 24, 12 and 6.

45. Let the numbers be x, y and z.
Then, $\left(\frac{x+y}{2}\right) - \left(\frac{y+z}{2}\right) = 15$ or $(x + y) - (y + z) = 30$ or $x - z = 30$.

46. Let the eighth number be x. Then, sixth number $= (x - 7)$.
Seventh number $= (x - 7) + 4 = (x - 3)$.
So, $\left(2 \times 15\frac{1}{2}\right) + \left(3 \times 21\frac{1}{3}\right) + (x - 7) + (x - 3) + x = 8 \times 20$
$\Leftrightarrow \quad 31 + 64 + (3x - 10) = 160 \Leftrightarrow 3x = 75 \Leftrightarrow x = 25.$

47. A.M. of 75 numbers = 35.
Sum of 75 numbers $= (75 \times 35) = 2625$.
Total increase $= (75 \times 5) = 375$.
Increased sum $= (2625 + 375) = 3000$.
Increased average $= \frac{3000}{75} = 40.$

48. Average of 10 numbers = 7.
Sum of these 10 numbers $= (10 \times 7) = 70$.
$\therefore \quad x_1 + x_2 + \ldots + x_{10} = 70.$
$\Rightarrow \quad 12x_1 + 12x_2 + \ldots + 12x_{10} = 840$
$\Rightarrow \quad \frac{12x_1 + 12x_2 + \ldots + 12x_{10}}{10} = 84$
$\Rightarrow$ Average of new numbers is 84.

49. $\frac{x_1 + x_2 + \ldots\ldots + x_{10}}{10} = \bar{x} \quad \Rightarrow \quad x_1 + x_2 + \ldots\ldots + x_{10} = 10\bar{x}$

$$\Rightarrow \quad \frac{110}{100}x_1 + \frac{110}{100}x_2 + \ldots\ldots + \frac{110}{100}x_{10} = \frac{110}{100} \times 10\bar{x}$$

$$\Rightarrow \quad \frac{\frac{110}{100}x_1 + \frac{110}{100}x_2 + \ldots\ldots + \frac{110}{100}x_{10}}{10} = \frac{11}{10}\bar{x}$$

$\Rightarrow$ Average is increased by 10%.

50. Correct sum = $(36 \times 50 + 48 - 23) = 1825$.

$\therefore$ Correct mean = $\frac{1825}{50} = 36.5$.

51. Let there be x pupils in the class.

Total increase in marks = $\left(x \times \frac{1}{2}\right) = \frac{x}{2}$.

$\therefore \quad \frac{x}{2} = (83 - 63) \Rightarrow \frac{x}{2} = 20 \Rightarrow x = 40.$

52. Age of the 15th student = $[15 \times 15 - (14 \times 5 + 16 \times 9)] = (225 - 214) = 11$ years.

53. Middle number = $[(10.5 \times 6 + 11.4 \times 6) - 10.9 \times 11] = (131.4 - 119.9) = 11.5$.

54. Total weight of (A + B + C) = $\left(54\frac{1}{3} \times 3\right)$ kg = 163 kg.

Total weight of (B + D + E) = (53×3) kg = 159 kg.

Adding both, we get : A + 2B + C + D + E = (163 + 159) kg = 322 kg.

So, to find the average weight of A, B, C, D and E, we ought to know B's weight, which is not given. So, the data is inadequate.

55. Sum of temperatures on 1st, 2nd, 3rd and 4th days = $(58 \times 4) = 232$ degrees ...(*i*)

Sum of temperatures on 2nd, 3rd, 4th and 5th days = $(60 \times 4) = 240$ degrees ...(*ii*)

Subtracting (*i*) from (*ii*), we get :

Temp. on 5th day − Temp. on 1st day = 8 degrees.

Let the temperatures on 1st and 5th days be $7x$ and $8x$ degrees respectively.

Then, $8x - 7x = 8$ or $x = 8$.

$\therefore$ Temperature on the 5th day = $8x = 64$ degrees.

56. Let A, B, C represent their respective weights. Then, we have :

A + B + C = $(45 \times 3) = 135$ ...(*i*)

A + B = $(40 \times 2) = 80$ ...(*ii*)

B + C = $(43 \times 2) = 86$ ...(*iii*)

Adding (*ii*) and (*iii*), we get : A + 2B + C = 166 ...(*iv*)

Subtracting (*i*) from (*iv*), we get : B = 31.

$\therefore$ B's weight = 31 kg.

57. Let P, Q and R represent their respective monthly incomes. Then, we have :

P + Q = $(5050 \times 2) = 10100$ ...(*i*)

Q + R = $(6250 \times 2) = 12500$ ...(*ii*)

P + R = $(5200 \times 2) = 10400$ ...(*iii*)

Adding (*i*), (*ii*) and (*iii*), we get : 2 (P + Q + R) = 33000 or P + Q + R = 16500 ...(*iv*)

Subtracting (*ii*) from (*iv*), we get P = 4000.

$\therefore$ P's monthly income = Rs. 4000.

58. Age of the teacher = $(37 \times 15 - 36 \times 14)$ years = 51 years.

59. Manager's monthly salary = Rs. $(1600 \times 21 - 1500 \times 20)$ = Rs. 3600.

60. Weight of the teacher = $(35.4 \times 25 - 35 \times 24)$ kg = 45 kg.

61. Age of the mother = $(12 \times 7 - 7 \times 6)$ years = 42 years.

62. Let the average age of the whole team be x years.

$\therefore \quad 11x - (26 + 29) = 9(x - 1) \Leftrightarrow 11x - 9x = 46 \Leftrightarrow 2x = 46 \Leftrightarrow x = 23.$

So, average age of the team is 23 years.

63. Sum of heights of the 5 boys = $(25 \times 1.4 - 20 \times 1.55)$ m = 4 m.

$\therefore$ Required average = $\left(\frac{4}{5}\right) = 0.8$ m.

64. Total weight increased = (8×2.5) kg = 20 kg.

Weight of new person = $(65 + 20)$ kg = 85 kg.

65. Sum of the weights of the students after replacement

$= [(52 \times 45) - (48 \times 5) + (54 \times 5)]$ kg = 2370 kg.

$\therefore$ New average = $\left(\frac{2370}{45}\right)$ kg = $53\frac{2}{3}$ kg.

66. Total age increased = (8×2) years = 16 years.

Sum of ages of two new men = $(21 + 23 + 16)$ years = 60 years.

$\therefore$ Average age of two new men = $\left(\frac{60}{2}\right)$ years = 30 years.

67. Let five consecutive numbers be x, $x + 1$, $x + 2$, $x + 3$ and $x + 4$.

Their average = $\frac{5x + 10}{5} = (x + 2)$.

Average of 7 numbers = $\frac{(5x + 10) + (x + 5) + (x + 6)}{7} = \frac{7x + 21}{7} = (x + 3)$.

So, the average increased by 1.

68. Let average for 10 innings be x. Then,

$\frac{10x + 108}{11} = x + 6 \Rightarrow 11x + 66 = 10x + 108 \Rightarrow x = 42.$

$\therefore$ New average = $(x + 6) = 48$ runs.

69. Let the number of wickets taken till the last match be x. Then,

$\frac{12.4x + 26}{x + 5} = 12 \Rightarrow 12.4x + 26 = 12x + 60 \Rightarrow 0.4x = 34 \Rightarrow x = \frac{34}{0.4} = \frac{340}{4} = 85.$

70. Let the total score be x.

$\therefore \quad \frac{x + 92 - 85}{8} = 84 \Rightarrow x + 7 = 672 \Rightarrow x = 665.$

71. Average speed = $\frac{2xy}{x + y}$ km/hr = $\left(\frac{2 \times 50 \times 30}{50 + 30}\right)$ km/hr = 37.5 km/hr.

72. Let A, B, C, D and E represent their respective weights. Then,

$A + B + C = (84 \times 3) = 252$ kg, $A + B + C + D = (80 \times 4) = 320$ kg.

$\therefore \quad D = (320 - 252)$ kg = 68 kg, $E = (68 + 3)$ kg = 71 kg.

$B + C + D + E = (79 \times 4) = 316$ kg.

Now, $(A + B + C + D) - (B + C + D + E) = (320 - 316)$ kg = 4 kg.

$\therefore \quad A - E = 4 \Rightarrow A = (4 + E) = 75$ kg.

73. Sum of the present ages of husband, wife and child = $(23 \times 2 + 5 \times 2) + 1 = 57$ years.

$\therefore$ Required average = $\left(\frac{57}{3}\right) = 19$ years.

74. Present age of (A + B) = $(18 \times 2 + 3 \times 2)$ years = 42 years.
Present age of (A + B + C) = (22×3) years = 66 years.
$\therefore$ C's age = $(66 - 42)$ years = 24 years.

75. Sum of the present ages of husband, wife and child = $(27 \times 3 + 3 \times 3)$ years = 90 years.
Sum of the present ages of wife and child = $(20 \times 2 + 5 \times 2)$ years = 50 years.
$\therefore$ Husband's present age = $(90 - 50)$ years = 40 years.

76. Total age of 5 members, 3 years ago = (17×5) years = 85 years.
Total age of 5 members now = $(85 + 3 \times 5)$ years = 100 years.
Total age of 6 members now = (17×6) years = 102 years.
$\therefore$ Age of the baby = $(102 - 100)$ years = 2 years.

77. Total age of 4 members, 10 years ago = (24×4) years = 96 years.
Total age of 4 members now = $(96 + 10 \times 4)$ years = 136 years.
Total age of 6 members now = (24×6) years = 144 years.
Sum of the ages of 2 children = $(144 - 136)$ years = 8 years.
Let the age of the younger child be x years.
Then, age of the elder child = $(x + 2)$ years.
So, $x + x + 2 = 8 \Leftrightarrow 2x = 6 \Leftrightarrow x = 3$.
$\therefore$ Age of younger child = 3 years.

78. Age decreased = (5×3) years = 15 years.
So, the required difference = 15 years.

79. Since the total or average age of all the family members is not given, the given data is inadequate. So, the age of second child cannot be determined.

80. Let the initial number of persons be x. Then,
$16x + 20 \times 15 = 15.5\,(x + 20) \Leftrightarrow 0.5x = 10 \Leftrightarrow x = 20$.

81. Let the daily wage of a man be Rs. x.
Then, daily wage of a woman = Rs. $(x - 5)$.
Now, $600x + 400\,(x - 5) = 25.50 \times (600 + 400) \Leftrightarrow 1000x = 27500 \Leftrightarrow x = 27.50$.
$\therefore$ Man's daily wages = Rs. 27.50; Woman's daily wages = $(x - 5)$ = Rs. 22.50.

82. Let the required mean score be x. Then,
$20 \times 80 + 25 \times 31 + 55 \times x = 52 \times 100$
$\Leftrightarrow 1600 + 775 + 55x = 5200 \Leftrightarrow 55x = 2825 \Leftrightarrow x = \frac{565}{11} = 51.4$.

83. Let the total number of workers be x. Then,
$8000x = (12000 \times 7) + 6000\,(x - 7) \Leftrightarrow 2000x = 42000 \Leftrightarrow x = 21$.

84. Let the number of girls be x. Then, number of boys = $(600 - x)$.
Then, $\left(11\frac{3}{4} \times 600\right) = 11x + 12\,(600 - x) \Leftrightarrow x = 7200 - 7050 \Leftrightarrow x = 150$.

85. Let the number of papers be x. Then, $63x + 20 + 2 = 65x$ or $2x = 22$ or $x = 11$.

86. Let the ratio be $k : 1$. Then,
$k \times 16.4 + 1 \times 15.4 = (k + 1) \times 15.8$
$\Leftrightarrow (16.4 - 15.8)\,k = (15.8 - 15.4) \Leftrightarrow k = \frac{0.4}{0.6} = \frac{2}{3}$.
$\therefore$ Required ratio = $\frac{2}{3} : 1 = 2 : 3$.

EXERCISE 6B

(DATA SUFFICIENCY TYPE QUESTIONS)

Directions (*Questions 1 to 10*) : ***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 given 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 even 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. The total of the present ages of A, B, C and D is 96 years. What is B's present age ?
   I. The average age of A, B and D is 20 years.
   II. The average age of C and D is 25 years.
2. What is the average age of children in the class ? **(Bank P.O. 2003)**
   I. Age of the teacher is as many years as the number of children.
   II. Average age increased by 1 year if the teacher's age is also included.
3. What is the average weight of the three new team members who are recently included in the team ?
   I. The average weight of the team increases by 20 kg.
   II. The three new men substitute earlier members whose weights are 64 kg, 75 kg and 66 kg.
4. The average age of P, Q, R and S is 30 years. How old is R ? **(R.B.I. 2003)**
   I. The sum of ages of P and R is 60 years.
   II. S is 10 years younger than R.
5. How old will C be after 10 years ?
   I. Five years ago, the average age of A and B was 15 years.
   II. Average age of A, B and C today is 20 years.
6. How many children are there in the group ? **(Bank P.O. 2000)**
   I. Average age of the children in this group is 15 years. The total age of all the children in this group is 240 years.
   II. The total age of all the children in the group and the teacher is 264 years. The age of the teacher is 9 years more than the average age of the children.
7. Deepak's marks in Hindi are 15 more than the average marks obtained by him in Hindi, Economics, Sociology and Philosophy. What are his marks in Philosophy ?
   I. The total marks obtained by him in Hindi and Philosophy together is 120.
   II. The difference between the marks obtained by him in Sociology and Economics is 120.
8. How many candidates were interviewed everyday by the panel A out of the three panels A, B and C ? **(Bank P.O. 1999)**
   I. The three panels on an average interview 15 candidates everyday.
   II. Out of a total of 45 candidates interviewed everyday by the three panels, the number of candidates interviewed by panel A is more by 2 than the candidates interviewed by panel C and is more by 1 than the candidates interviewed by panel B.

9. The average age of teacher and students in a class is 3 years more than the average age of students. What is the age of the class teacher ? **(Bank P.O. 2000)**

I. There are 11 students in the class.

II. The average age of teacher and students is 14 years.

10. What will be the average weight of the remaining class ? **(Bank P.O. 1999)**

I. Average weight of 30 children out of total 46 in the class is 22.5 kg and that of the remaining children is 29.125 kg. A child having weight more than 40 kg is excluded.

II. Average weight of a class of 46 children is 23.5 kg. A child weighing 46 kg is dropped out.

Directions (*Questions 11 to 13*) : *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.*

11. How many marks did Tarun secure in English ? **(S.B.I.P.O. 2000)**

I. The average marks obtained by Tarun in four subjects including English is 60.

II. The total marks obtained by him in English and Mathematics together is 170.

III. The total marks obtained by him in Mathematics and Science together is 180.

(*a*) I and II only (*b*) II and III only (*c*) I and III only

(*d*) All I, II and III (*e*) None of these

12. The mean temperature of Monday to Wednesday was 37°C and of Tuesday to Thursday was 34°C. What was the temperature on Thursday ?

I. The temperature on Thursday was $\frac{4}{5}$th that of Monday.

II. The mean temperature of Monday and Thursday was 40.5°C.

III. The difference between the temperature on Monday and that on Thursday was 9°C.

(*a*) I and II only (*b*) II and III only (*c*) Either I or II

(*d*) Either I, II or III (*e*) Any two of the three

13. In a cricket eleven, the average age of eleven players is 28 years. What is the age of the captain ?

I. The captain is eleven years older than the youngest player.

II. The average age of 10 players, other than the captain is 27.3 years.

III. Leaving aside the captain and the youngest player, the average ages of three groups of three players each are 25 years, 28 years and 30 years respectively.

(*a*) Any two of the three (*b*) All I, II and III

(*c*) II only or I and III only (*d*) II and III only

(*e*) None of these

Directions (*Question 14*) : *The given question is followed by three statements labelled I, II and III. You have to study the question and all the three statements given to decide whether any information provided in the statement(s) is/are redundant and can be dispensed with while answering the given question.*

14. What is the average salary of 15 employees ? **(S.B.I.P.O. 2001)**

I. Average salary of 7 clerical cadre (out of the 15 employees) is Rs. 8500.

II. Average salary of 5 officer cadre (out of the 15 employees) is Rs. 10000.

III. Average salary of the 3 sub-staff employees (out of the 15 employees) is Rs. 2500.

(*a*) None (*b*) Only I

(*c*) Only II (*d*) Only III

(*e*) Question cannot be answered even with information in all the three statements

ANSWERS

1. (*d*) 2. (*d*) 3. (*d*) 4. (*d*) 5. (*e*) 6. (*a*) 7. (*d*) 8. (*b*) 9. (*e*)
10. (*b*) 11. (*e*) 12. (*c*) 13. (*c*) 14. (*a*)

SOLUTIONS

1. $A + B + C + D = 96$ ...(*i*)
I gives, $A + B + D = (3 \times 20) \Rightarrow A + B + D = 60$ ...(*ii*)
II gives, $C + D = (2 \times 50) \Rightarrow C + D = 100$ ...(*iii*)
From (*i*), (*ii*) and (*iii*) also, we cannot find B.
∴ Correct answer is (*d*).

2. Let there be x children.
I gives, age of teacher = x years.
II gives, average age of $(x + 1)$ persons = $(x + 1)$ years.
∴ Teacher's age = $(x + 1)(x + 1) - x^2 = (x^2 + 1 + 2x) - x^2 = (1 + 2x)$.
Thus, teacher's age cannot be obtained.
∴ Correct answer is (*d*).

3. Let the number of team members be n.
I. Total increase in weight on replacement = $(20n)$ kg.
II. Total weight of new members = $[(64 + 75 + 66) + 20n]$ kg
$= (205 + 20n)$ kg.
∴ Required average $= \frac{(205 + 20n)}{3}$ kg and we need n to get the answer.
∴ Correct answer is (*d*).

4. $P + Q + R + S = (30 \times 4) \Rightarrow P + Q + R + S = 120$ ...(*i*)
I. $P + R = 60$ ...(*ii*)
II. $S = (R - 10)$ ...(*iii*)
From (*i*), (*ii*) and (*iii*), we cannot find R.
∴ Correct answer is (*d*).

5. I. $A + B = (15 \times 2) + (5 \times 2) \Rightarrow A + B = 40$ ...(*i*)
II. $A + B + C = (20 \times 3) \Rightarrow A + B + C = 60$ ...(*ii*)
From (*i*) and (*ii*), we get C = 20.
C's age after 10 years = (20 + 10) years = 30 years.
∴ Correct answer is (*e*).

6. Let there be x children in the group.
I. Average age = 15 years.
∴ Total age = $15x$ years.
∴ $15x = 240 \Leftrightarrow x = \frac{240}{15} \Leftrightarrow x = 16$.
So, there are 16 children in the group.
II. Total age of x children and 1 teacher is 264 years.
Age of teacher = (15 + 9) years = 24 years.
Total age of x children = (264 − 24) years = 240 years.
This does not give the answer.
∴ Correct answer is (*a*).

7. $H = \frac{(H+E+S+P)}{4} + 15$

$\Rightarrow 4(H - 15) = H + E + S + P \Rightarrow 3H - 60 = E + S + P$ ...(*i*)

I. $H + P = 120$ ...(*ii*)

II. $S - E = 120$ ...(*iii*)

From (*i*), (*ii*) and (*iii*), we cannot find P.

∴ Correct answer is (*d*).

8. I. Total candidates interviewed by 3 panels = $(15 \times 3) = 45$.

II. Let x candidates be interviewed by C.

Number of candidates interviewed by A = $(x + 2)$.

Number of candidates interviewed by B = $(x + 1)$.

$\therefore x + (x + 2) + (x + 1) = 45 \Leftrightarrow 3x = 42 \Leftrightarrow x = 14$.

So, the number of candidates interviewed by A is 14.

Hence, the correct answer is (*b*).

9. Average age of 11 students and 1 teacher = 14 years

⇒ Total age of (11 students and 1 teacher) = (14×12) years = 168 years.

Average age of (11 students and 1 teacher) = (Average age of 11 students) + 3

⇒ Average age of 11 students = $(14 - 3)$ years = 11 years

⇒ Total age of 11 students = (11×11) years = 121 years.

∴ Age of the teacher = $(168 - 121)$ years = 47 years.

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

∴ Correct answer is (*e*).

10. I. Total weight of 46 children = $[(22.5 \times 30) + (29.125 \times 16)]$ kg = 1141 kg.

Weight excluded is not exact. So, average of remaining class cannot be obtained.

II. Total weight of 45 children = $[(23.5 \times 46) - 46]$ kg = 1035 kg.

Average weight of 45 children = $\frac{1035}{45}$ kg = 23 kg.

∴ Data in II is sufficient to answer the question, while the data in I is not sufficient.

∴ Correct answer is (*b*).

11. I gives, total marks in 4 subjects = $(60 \times 4) = 240$.

II gives, $E + M = 170$

III gives, $M + S = 180$.

Thus, none of (*a*), (*b*), (*c*), (*d*) is true.

∴ Correct answer is (*e*).

12. $M + T + W = (37 \times 3) \Rightarrow M + T + W = 111$ ...(*i*)

$T + W + Th = (34 \times 3) \Rightarrow T + W + Th = 102$ ...(*ii*)

I gives, $Th = \frac{4}{5}M \Rightarrow M = \frac{5}{4}Th$

Using it in (*i*), we get :

$\frac{5}{4}Th + T + W = 111$ ...(*iii*)

On subtracting (*ii*) from (*iii*), we get : $\frac{1}{4}Th = 9 \Rightarrow Th = 36$.

Thus, I alone gives the answer.

II gives, $M + Th = (40.5 \times 2) \Rightarrow M + Th = 81$ ...(*iv*)

On subtracting (*ii*) from (*i*), we get $M - Th = 9$ ...(*v*)

From (*iv*) and (*v*), we get $Th = 36$.

Thus, II alone gives the answer.

III gives, M − Th = 9.

Clearly, III with given results, does not give the answer.

∴ Correct answer is (*c*).

13. Total age of 11 players = (28 × 11) years = 308 years.

I. C = Y + 11 ⇒ C − Y = 11 ...(*i*)

II. Total age of 10 players (excluding captain) = (27.3 × 10) years = 273 years.

∴ Age of captain = (308 − 273) years = 35 years.

Thus, C = 35. ...(*ii*)

From (*i*) and (*ii*), we get Y = 24.

III. Total age of 9 players = [(25 × 3) + (28 × 3) + (30 × 3)] years = 249 years.

∴ C + Y = (308 − 249) = 59 ...(*iii*)

From (*i*) and (*iii*), we get C = 35.

Thus, II alone gives the answer.

Also, I and III together give the answer.

∴ Correct answer is (*c*).

14. I. gives, total salary of 7 clerks = Rs. (8500 × 7) = Rs. 59500.

II. gives, total salary of 5 officers = Rs. (10000 × 5) = Rs. 50000.

III. gives, total salary of 3 sub-staff members = Rs. (2500 × 3) = Rs. 7500.

Total salary of 15 employees = Rs. (59500 + 50000 + 7500) = Rs. 117000.

∴ Average salary = Rs. $\left(\frac{117000}{15}\right)$ = Rs. 7800.

∴ All given statements are needed. Hence, none is redundant.

∴ Correct answer is (*a*).

7. PROBLEMS ON NUMBERS

In this section, questions involving a set of numbers are put in the form of a puzzle. You have to analyse the given conditions, assume the unknown numbers and form equations accordingly, which on solving yield the unknown numbers.

SOLVED EXAMPLES

Ex. 1. ***A number is as much greater than 36 as is less than 86. Find the number.***

Sol. Let the number be x. Then, $x - 36 = 86 - x \Leftrightarrow 2x = 86 + 36 = 122 \Leftrightarrow x = 61$.

Hence, the required number is 61.

Ex. 2. ***Find a number such that when 15 is subtracted from 7 times the number, the result is 10 more than twice the number.*** **(Hotel Management, 2002)**

Sol. Let the number be x. Then, $7x - 15 = 2x + 10 \Leftrightarrow 5x = 25 \Leftrightarrow x = 5$.

Hence, the required number is 5.

Ex. 3. ***The sum of a rational number and its reciprocal is $\frac{13}{6}$. Find the number.*** **(S.S.C. 2000)**

Sol. Let the number be x.

$$\text{Then, } x + \frac{1}{x} = \frac{13}{6} \Leftrightarrow \frac{x^2+1}{x} = \frac{13}{6} \Leftrightarrow 6x^2 - 13x + 6 = 0$$

$$\Leftrightarrow 6x^2 - 9x - 4x + 6 = 0 \Leftrightarrow (3x-2)(2x-3) = 0$$

$$\Leftrightarrow x = \frac{2}{3} \text{ or } x = \frac{3}{2}.$$

Hence, the required number is $\frac{2}{3}$ or $\frac{3}{2}$.

Ex. 4. ***The sum of two numbers is 184. If one-third of the one exceeds one-seventh of the other by 8, find the smaller number.***

Sol. Let the numbers be x and $(184 - x)$. Then,

$$\frac{x}{3} - \frac{(184-x)}{7} = 8 \Leftrightarrow 7x - 3(184 - x) = 168 \Leftrightarrow 10x = 720 \Leftrightarrow x = 72.$$

So, the numbers are 72 and 112. Hence, smaller number = 72.

Ex. 5. ***The difference of two numbers is 11 and one-fifth of their sum is 9. Find the numbers.***

Sol. Let the numbers be x and y. Then,

$$x - y = 11 \quad ...(i) \qquad \text{and } \frac{1}{5}(x+y) = 9 \Rightarrow x + y = 45 \quad ...(ii)$$

Adding (i) and (ii), we get : $2x = 56$ or $x = 28$. Putting $x = 28$ in (i), we get : $y = 17$.

Hence, the numbers are 28 and 17.

Ex. 6. ***If the sum of two numbers is 42 and their product is 437, then find the absolute difference between the numbers.*** **(S.S.C. 2003)**

Sol. Let the numbers be x and y. Then, $x + y = 42$ and $xy = 437$.

$$x - y = \sqrt{(x+y)^2 - 4xy} = \sqrt{(42)^2 - 4 \times 437} = \sqrt{1764 - 1748} = \sqrt{16} = 4.$$

$\therefore$ Required difference = 4.

Ex. 7. ***The sum of two numbers is 15 and the sum of their squares is 113. Find the numbers.***

Sol. Let the numbers be x and $(15 - x)$.

Then, $x^2 + (15 - x)^2 = 113 \Leftrightarrow x^2 + 225 + x^2 - 30x = 113$

$\Leftrightarrow 2x^2 - 30x + 112 = 0 \Leftrightarrow x^2 - 15x + 56 = 0$

$\Leftrightarrow (x - 7)(x - 8) = 0 \Leftrightarrow x = 7$ or $x = 8$.

So, the numbers are 7 and 8.

Ex. 8. ***The average of four consecutive even numbers is 27. Find the largest of these numbers.***

Sol. Let the four consecutive even numbers be x, $x + 2$, $x + 4$ and $x + 6$.

Then, sum of these numbers $= (27 \times 4) = 108$.

So, $x + (x + 2) + (x + 4) + (x + 6) = 108$ or $4x = 96$ or $x = 24$.

$\therefore$ Largest number $= (x + 6) = 30$.

Ex. 9. ***The sum of the squares of three consecutive odd numbers is 2531. Find the numbers.***

Sol. Let the numbers be x, $x + 2$ and $x + 4$.

Then, $x^2 + (x + 2)^2 + (x + 4)^2 = 2531 \Leftrightarrow 3x^2 + 12x - 2511 = 0$

$\Leftrightarrow x^2 + 4x - 837 = 0 \Leftrightarrow (x - 27)(x + 31) = 0 \Leftrightarrow x = 27$.

Hence, the required numbers are 27, 29 and 31.

Ex. 10. ***Of two numbers, 4 times the smaller one is less than 3 times the larger one by 5. If the sum of the numbers is larger than 6 times their difference by 6, find the two numbers.***

Sol. Let the numbers be x and y, such that $x > y$.

Then, $3x - 4y = 5$ ...(*i*) and $(x + y) - 6(x - y) = 6 \Rightarrow -5x + 7y = 6$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x = 59$ and $y = 43$.

Hence, the required numbers are 59 and 43.

Ex. 11. ***The ratio between a two-digit number and the sum of the digits of that number is 4 : 1. If the digit in the unit's place is 3 more than the digit in the ten's place, what is the number ?***

Sol. Let the ten's digit be x. Then, unit's digit $= (x + 3)$.

Sum of the digits $= x + (x + 3) = 2x + 3$. Number $= 10x + (x + 3) = 11x + 3$.

$$\therefore \frac{11x + 3}{2x + 3} = \frac{4}{1} \Leftrightarrow 11x + 3 = 4(2x + 3) \Leftrightarrow 3x = 9 \Leftrightarrow x = 3.$$

Hence, required number $= 11x + 3 = 36$.

Ex. 12. ***A number consists of two digits. The sum of the digits is 9. If 63 is subtracted from the number, its digits are interchanged. Find the number.***

Sol. Let the ten's digit be x. Then, unit's digit $= (9 - x)$.

Number $= 10x + (9 - x) = 9x + 9$.

Number obtained by reversing the digits $= 10(9 - x) + x = 90 - 9x$.

$\therefore (9x + 9) - 63 = 90 - 9x \Leftrightarrow 18x = 144 \Leftrightarrow x = 8$.

So, ten's digit = 8 and unit's digit = 1.

Hence, the required number is 81.

Ex. 13. ***A fraction becomes $\frac{2}{3}$ when 1 is added to both, its numerator and denominator. And, it becomes $\frac{1}{2}$ when 1 is subtracted from both the numerator and denominator. Find the fraction.***

Sol. Let the required fraction be $\frac{x}{y}$. Then,

$$\frac{x+1}{y+1} = \frac{2}{3} \Rightarrow 3x - 2y = -1 \quad ...(i) \text{ and } \frac{x-1}{y-1} = \frac{1}{2} \Rightarrow 2x - y = 1 \quad ...(ii)$$

Solving (*i*) and (*ii*), we get : $x = 3, y = 5$.

$\therefore$ Required fraction $= \frac{3}{5}$.

Ex. 14. ***50 is divided into two parts such that the sum of their reciprocals is $\frac{1}{12}$. Find the two parts.***

Sol. Let the two parts be x and $(50 - x)$.

$$\text{Then, } \frac{1}{x} + \frac{1}{50-x} = \frac{1}{12} \Leftrightarrow \frac{50-x+x}{x(50-x)} = \frac{1}{12} \Rightarrow x^2 - 50x + 600 = 0$$

$$\Rightarrow (x-30)(x-20) = 0 \Rightarrow x = 30 \text{ or } x = 20.$$

So, the parts are 30 and 20.

Ex. 15. ***If three numbers are added in pairs, the sums equal 10, 19 and 21. Find the numbers.*** **(S.S.C. 2000)**

Sol. Let the numbers be x, y and z. Then,

$x + y = 10 \quad ...(i) \quad y + z = 19 \quad ...(ii) \quad x + z = 21 \quad ...(iii)$

Adding (*i*), (*ii*) and (*iii*), we get : $2(x + y + z) = 50$ or $(x + y + z) = 25$.

Thus, $x = (25 - 19) = 6$; $y = (25 - 21) = 4$; $z = (25 - 10) = 15$.

Hence, the required numbers are 6, 4 and 15.

EXERCISE 7A

(OBJECTIVE TYPE QUESTIONS)

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

1. The difference between a number and its three-fifth is 50. What is the number ?
   (*a*) 75 (*b*) 100 (*c*) 125 (*d*) None of these
   (Bank P.O. 2003)
2. If a number is decreased by 4 and divided by 6, the result is 8. What would be the result if 2 is subtracted from the number and then it is divided by 5 ?
   (*a*) $9\frac{2}{3}$ (*b*) 10 (*c*) $10\frac{1}{5}$ (*d*) $11\frac{1}{5}$ (*e*) None of these
   (Bank P.O. 2000)
3. If one-third of one-fourth of a number is 15, then three-tenth of that number is :
   (*a*) 35 (*b*) 36 (*c*) 45 (*d*) 54
   (N.I.F.T. 2003)
4. A number is doubled and 9 is added. If the resultant is trebled, it becomes 75. What is that number ? **(S.S.C. 1999)**
   (*a*) 3.5 (*b*) 6 (*c*) 8 (*d*) None of these
5. Three-fourth of a number is 60 more than its one-third. The number is :
   (*a*) 84 (*b*) 108 (*c*) 144 (*d*) None of these
6. When 24 is subtracted from a number, it reduces to its four-seventh. What is the sum of the digits of that number ?
   (*a*) 1 (*b*) 9 (*c*) 11
   (*d*) Data inadequate (*e*) None of these

7. Find the number which when multiplied by 15 is increased by 196. **(L.I.C. 2003)**
(*a*) 14 (*b*) 20 (*c*) 26 (*d*) 28

8. If a number, when divided by 4, is reduced by 21, the number is :
(*a*) 18 (*b*) 20 (*c*) 28 (*d*) 38

9. A number whose fifth part increased by 4 is equal to its fourth part diminished by 10, is :
(*a*) 240 (*b*) 260 (*c*) 270 (*d*) 280

10. The difference of two numbers is 20% of the larger number. If the smaller number is 12, the larger one is :
(*a*) 15 (*b*) 16 (*c*) 18 (*d*) 20

11. If one-seventh of a number exceeds its eleventh part by 100, then the number is :
(*a*) 770 (*b*) 1100 (*c*) 1825 (*d*) 1925

12. If the sum of one-half and one-fifth of a number exceeds one-third of that number by $7\frac{1}{3}$, the number is : **(C.B.I. 1998)**
(*a*) 15 (*b*) 18 (*c*) 20 (*d*) 30

13. If doubling a number and adding 20 to the result gives the same answer as multiplying the number by 8 and taking away 4 from the product, the number is :
(*a*) 2 (*b*) 3 (*c*) 4 (*d*) 6
(S.S.C. 2000)

14. If 50 is subtracted from two-third of a number, the result is equal to sum of 40 and one-fourth of that number. What is the number ? **(R.R.B. 2002)**
(*a*) 174 (*b*) 216 (*c*) 246 (*d*) 336

15. If the sum of a number and its square is 182, what is the number ?
(*a*) 15 (*b*) 26 (*c*) 28 (*d*) 91 (*e*) None of these
(Bank P.O. 1999)

16. Twenty times a positive integer is less than its square by 96. What is the integer ?
(*a*) 20 (*b*) 24 (*c*) 30
(*d*) Cannot be determined (*e*) None of these **(Bank P.O. 2003)**

17. Thrice the square of a natural number decreased by 4 times the number is equal to 50 more than the number. The number is : **(S.S.C. 2003)**
(*a*) 4 (*b*) 5 (*c*) 6 (*d*) 10

18. The sum of a number and its reciprocal is one-eighth of 34. What is the product of the number and its square root ? **(Hotel Management, 2001)**
(*a*) 8 (*b*) 27 (*c*) 32 (*d*) None of these

19. Two-third of a positive number and $\frac{25}{216}$ of its reciprocal are equal. The number is :
(*a*) $\frac{5}{12}$ (*b*) $\frac{12}{5}$ (*c*) $\frac{25}{144}$ (*d*) $\frac{144}{25}$
(S.S.C. 1999)

20. Find a positive number which when increased by 17 is equal to 60 times the reciprocal of the number. **(I.M.T. 2002)**
(*a*) 3 (*b*) 10 (*c*) 17 (*d*) 20

21. A positive number when decreased by 4 is equal to 21 times the reciprocal of the number. The number is :
(*a*) 3 (*b*) 5 (*c*) 7 (*d*) 9

22. The sum of a positive number and its reciprocal is thrice the difference of the number and its reciprocal. The number is :

(*a*) $\sqrt{2}$ (*b*) $\frac{1}{\sqrt{2}}$ (*c*) $\sqrt{3}$ (*d*) $\frac{1}{\sqrt{3}}$

23. The product of two natural numbers is 17. Then, the sum of the reciprocals of their squares is : (S.S.C. 1999)

(*a*) $\frac{1}{289}$ (*b*) $\frac{289}{290}$ (*c*) $\frac{290}{289}$ (*d*) 289

24. If $2\frac{1}{2}$ is added to a number and the sum multiplied by $4\frac{1}{2}$ and 3 is added to the product and then dividing the sum by $1\frac{1}{5}$, the quotient becomes 25. What is the number ? (R.R.B. 2002)

(*a*) $2\frac{1}{2}$ (*b*) $3\frac{1}{2}$ (*c*) $4\frac{1}{2}$ (*d*) $5\frac{1}{2}$

25. Three numbers are in the ratio 4 : 5 : 6 and their average is 25. The largest number is :

(*a*) 30 (*b*) 32 (*c*) 36 (*d*) 42

26. Three numbers are in the ratio of 3 : 4 : 6 and their product is 1944. The largest of these numbers is :

(*a*) 6 (*b*) 12 (*c*) 18 (*d*) None of these

27. Two numbers are such that the square of one is 224 less than 8 times the square of the other. If the numbers be in the ratio of 3 : 4, the numbers are :

(*a*) 6, 8 (*b*) 9, 12 (*c*) 12, 16 (*d*) None of these

28. Two numbers are such that the ratio between them is 4 : 7. If each is increased by 4, the ratio becomes 3 : 5. The larger number is :

(*a*) 36 (*b*) 48 (*c*) 56 (*d*) 64

29. The sum of three numbers is 264. If the first number be twice the second and third number be one-third of the first, then the second number is : (R.R.B. 2004)

(*a*) 48 (*b*) 54 (*c*) 72 (*d*) 84

30. The sum of two numbers is 22. Five times one number is equal to 6 times the other. The bigger of the two numbers is : (C.B.I. 1998)

(*a*) 10 (*b*) 12 (*c*) 15 (*d*) 16

31. One-fifth of a number is equal to $\frac{5}{8}$ of another number. If 35 is added to the first number, it becomes four times of the second number. The second number is :

(*a*) 25 (*b*) 40 (*c*) 70 (*d*) 125

(Bank P.O. 1999)

32. The sum of two numbers is 25 and their difference is 13. Find their product.

(*a*) 104 (*b*) 114 (*c*) 315 (*d*) 325

(L.I.C. 2003)

33. If the sum of two numbers is 33 and their difference is 15, the smaller number is :

(*a*) 9 (*b*) 12 (*c*) 15 (*d*) 18

(C.B.I. 1997)

34. The sum of two numbers is 40 and their difference is 4. The ratio of the numbers is :

(*a*) 11 : 9 (*b*) 11 : 18 (*c*) 21 : 19 (*d*) 22 : 9

(S.S.C. 2000)

35. The product of two numbers is 192 and the sum of these two numbers is 28. What is the smaller of these two numbers ? **(Bank P.O. 1999)**

(*a*) 12 (*b*) 14 (*c*) 16 (*d*) 18 (*e*) None of these

36. The difference between two integers is 5. Their product is 500. Find the numbers.

(*a*) 15, 20 (*b*) 20, 25 (*c*) 30, 25 (*d*) 21, 26

(Hotel Management, 2003)

37. Two numbers differ by 5. If their product is 336, then the sum of the two numbers is :

(*a*) 21 (*b*) 28 (*c*) 37 (*d*) 51

(S.S.C. 1999)

38. Two different natural numbers are such that their product is less than their sum. One of the numbers must be :

(*a*) 1 (*b*) 2 (*c*) 3 (*d*) None of these

39. The product of two numbers is 9375 and the quotient, when the larger one is divided by the smaller, is 15. The sum of the numbers is : **(S.S.C. 2004)**

(*a*) 380 (*b*) 395 (*c*) 400 (*d*) 425

40. The difference between two numbers is 1365. When the larger number is divided by the smaller one, the quotient is 6 and the remainder is 15. The smaller number is :

(*a*) 240 (*b*) 270 (*c*) 295 (*d*) 360

41. The sum of two numbers is 40 and their product is 375. What will be the sum of their reciprocals ? **(S.S.C. 1999)**

(*a*) $\frac{1}{40}$ (*b*) $\frac{8}{75}$ (*c*) $\frac{75}{4}$ (*d*) $\frac{75}{8}$

42. The sum of two positive integers multiplied by the bigger number is 204, and their difference multiplied by the smaller number is 35. The numbers are :

(*a*) 12, 5 (*b*) 13, 4 (*c*) 14, 3 (*d*) 24, 10

43. If the sum and difference of two numbers are 20 and 8 respectively, then the difference of their squares is : **(S.S.C. 2000)**

(*a*) 12 (*b*) 28 (*c*) 160 (*d*) 180

44. The product of two numbers is 120 and the sum of their squares is 289. The sum of the numbers is : **(R.R.B. 2004)**

(*a*) 20 (*b*) 23 (*c*) 169 (*d*) None of these

45. The product of two numbers is 45 and the sum of their squares is 106. The numbers are : **(R.R.B. 2002)**

(*a*) 3 and 5 (*b*) 5 and 9 (*c*) 5 and 19 (*d*) 45 and 1

46. The sum of the squares of two numbers is 3341 and the difference of their squares is 891. The numbers are :

(*a*) 25, 36 (*b*) 25, 46 (*c*) 35, 46 (*d*) None of these

47. The difference between two positive integers is 3. If the sum of their squares is 369, then the sum of the numbers is : **(S.S.C. 2003)**

(*a*) 25 (*b*) 27 (*c*) 33 (*d*) 81

48. If the sum of two numbers is 22 and the sum of their squares is 404, then the product of the numbers is : **(S.S.C. 2000)**

(*a*) 40 (*b*) 44 (*c*) 80 (*d*) 88

49. The difference between the squares of two numbers is 256000 and the sum of the numbers is 1000. The numbers are :

(*a*) 600, 400 (*b*) 628, 372 (*c*) 640, 360 (*d*) None of these

50. If the difference of two numbers is 3 and the difference of their squares is 39, then the larger number is :

(*a*) 8 (*b*) 9 (*c*) 12 (*d*) 13

51. The sum of three consecutive numbers is 87. The greatest among these three numbers is : **(Hotel Management, 2003)**

(*a*) 26 (*b*) 28 (*c*) 29 (*d*) 30

52. Three times the first of three consecutive odd integers is 3 more than twice the third. The third integer is : **(M.B.A. 1998)**

(*a*) 9 (*b*) 11 (*c*) 13 (*d*) 15

53. The sum of four consecutive even integers is 1284. The greatest of them is :

(*a*) 320 (*b*) 322 (*c*) 324 (*d*) 326

(S.S.C. 2002)

54. The sum of three consecutive odd numbers is 20 more than the first of these numbers. What is the middle number ? **(S.B.I.P.O. 1997)**

(*a*) 7 (*b*) 9 (*c*) 11

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

55. The product of three consecutive even numbers when divided by 8 is 720. The product of their square roots is : **(Hotel Management, 2001)**

(*a*) $12\sqrt{10}$ (*b*) $24\sqrt{10}$ (*c*) 120 (*d*) None of these

56. The sum of three consecutive multiples of 3 is 72. What is the largest number ?

(*a*) 21 (*b*) 24 (*c*) 27 (*d*) 36

(S.S.C. 1999)

57. What is the sum of two consecutive even numbers, the difference of whose squares is 84 ? **(S.S.C. 2003)**

(*a*) 34 (*b*) 38 (*c*) 42 (*d*) 46

58. The sum of the squares of three consecutive natural numbers is 2030. What is the middle number ? **(S.S.C. 2000)**

(*a*) 25 (*b*) 26 (*c*) 27 (*d*) 28

59. There are two numbers such that the sum of twice the first and thrice the second is 39, while the sum of thrice the first and twice the second is 36. The larger of the two is :

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

60. In a two-digit number, the digit in the unit's place is four times the digit in ten's place and sum of the digits is equal to 10. What is the number ? **(Bank P.O. 1999)**

(*a*) 14 (*b*) 41 (*c*) 82

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

61. A number of two digits has 3 for its unit's digit, and the sum of digits is $\frac{1}{7}$ of the number itself. The number is : **(L.I.C. 2003)**

(*a*) 43 (*b*) 53 (*c*) 63 (*d*) 73.

62. A two-digit number exceeds the sum of the digits of that number by 18. If the digit at the unit's place is double the digit in the ten's place, what is the number ?

(*a*) 24 (*b*) 42 (*c*) 48 (*d*) Data inadequate

63. The sum of the digits of a two-digit number is 15 and the difference between the digits is 3. What is the two-digit number ? **(B.S.R.B. 2003)**

(*a*) 69 (*b*) 78 (*c*) 96

(*d*) Cannot be determined (*e*) None of these

64. In a two-digit number, if it is known that its unit's digit exceeds its ten's digit by 2 and that the product of the given number and the sum of its digits is equal to 144, then the number is : **(C.B.I. 2003)**

(*a*) 24 (*b*) 26 (*c*) 42 (*d*) 46

65. A number consists of two digits. If the digits interchange places and the new number is added to the original number, then the resulting number will be divisible by :

(a) 3 (b) 5 (c) 9 (d) 11

(S.S.C. 2003)

66. The sum of the digits of a two-digit number is 9 less than the number. Which of the following digits is at unit's place of the number ?

(a) 1 (b) 2 (c) 4 (d) Data inadequate

67. The difference between a two-digit number and the number obtained by interchanging the positions of its digits is 36. What is the difference between the two digits of that number ? **(Bank P.O. 2003)**

(a) 3 (b) 4 (c) 9

(d) Cannot be determined (e) None of these

68. The difference between a two-digit number and the number obtained by interchanging the two digits is 63. Which is the smaller of the two numbers ? **(Bank P.O. 2003)**

(a) 29 (b) 70 (c) 92

(d) Cannot be determined (e) None of these.

69. The sum of the digits of a two-digit number is $\frac{1}{5}$ of the difference between the number and the number obtained by interchanging the positions of the digits. What is definitely the difference between the digits of that number ? **(Bank P.O. 2000)**

(a) 5 (b) 7 (c) 9

(d) Data inadequate (e) None of these

70. If the digit in the unit's place of a two-digit number is halved and the digit in the ten's place is doubled, the number thus obtained is equal to the number obtained by interchanging the digits. Which of the following is definitely true ? **(Bank P.O. 2003)**

(a) Sum of the digits is a two-digit number.

(b) Digit in the unit's place is twice the digit in the ten's place.

(c) Digits in the unit's place and the ten's place are equal.

(d) Digit in the unit's place is half of the digit in the ten's place.

(e) None of these

71. If the number obtained on interchanging the digits of a two-digit number is 18 more than the original number and the sum of the digits is 8, then what is the original number ? **(S.B.I.P.O. 2002)**

(a) 26 (b) 35 (c) 53

(d) Cannot be determined (e) None of these

72. The difference between a two-digit number and the number obtained by interchanging the digits is 36. What is the difference between the sum and the difference of the digits of the number if the ratio between the digits of the number is 1 : 2 ? **(M.A.T. 1999)**

(a) 4 (b) 8 (c) 16 (d) None of these

73. A number consists of 3 digits whose sum is 10. The middle digit is equal to the sum of the other two and the number will be increased by 99 if its digits are reversed. The number is : **(Hotel Management, 2003)**

(a) 145 (b) 253 (c) 370 (d) 352

74. A two-digit number becomes five-sixth of itself when its digits are reversed. The two digits differ by one. The number is :

(a) 45 (b) 54 (c) 56 (d) 65

75. A number consists of two digits such that the digit in the ten's place is less by 2 than the digit in the unit's place. Three times the number added to $\frac{6}{7}$ times the number obtained by reversing the digits equals 108. The sum of the digits in the number is :

(*a*) 6 (*b*) 7 (*c*) 8 (*d*) 9

(S.S.C. 2003)

76. The digit in the unit's place of a number is equal to the digit in the ten's place of half of that number and the digit in the ten's place of that number is less than the digit in unit's place of half of the number by 1. If the sum of the digits of the number is 7, then what is the number ? **(S.B.I.P.O. 2001)**

(*a*) 34 (*b*) 52 (*c*) 162

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

77. In a two-digit number, the digit in the unit's place is more than twice the digit in ten's place by 1. If the digits in the unit's place and the ten's place are interchanged, difference between the newly formed number and the original number is less than the original number by 1. What is the original number ? **(Bank P.O. 1999)**

(*a*) 25 (*b*) 37 (*c*) 49 (*d*) 52 (*e*) 73

78. A certain number of two digits is three times the sum of its digits and if 45 be added to it, the digits are reversed. The number is : **(L.I.C.A.A.O. 2003)**

(*a*) 23 (*b*) 27 (*c*) 32 (*d*) 72

79. A two-digit number is such that the product of the digits is 8. When 18 is added to the number, then the digits are reversed. The number is : **(M.B.A. 2003)**

(*a*) 18 (*b*) 24 (*c*) 42 (*d*) 81

80. The product of two fractions is $\frac{14}{15}$ and their quotient is $\frac{35}{24}$. The greater fraction is :

(*a*) $\frac{4}{5}$ (*b*) $\frac{7}{6}$ (*c*) $\frac{7}{4}$ (*d*) $\frac{7}{3}$

(S.S.C. 2002)

81. In a pair of fractions, fraction A is twice the fraction B and the product of two fractions is $\frac{2}{25}$. What is the value of fraction A ? **(Bank P.O. 1999)**

(*a*) $\frac{1}{5}$ (*b*) $\frac{1}{25}$ (*c*) $\frac{2}{5}$ (*d*) Data inadequate

82. The sum of the numerator and denominator of a fraction is 11. If 1 is added to the numerator and 2 is subtracted from the denominator, it becomes $\frac{2}{3}$. The fraction is :

(*a*) $\frac{5}{6}$ (*b*) $\frac{6}{5}$ (*c*) $\frac{3}{8}$ (*d*) $\frac{8}{3}$

83. The denominator of a fraction is 3 more than the numerator. If the numerator as well as the denominator is increased by 4, the fraction becomes $\frac{4}{5}$. What was the original fraction ? **(S.B.I.P.O. 1999)**

(*a*) $\frac{8}{11}$ (*b*) $\frac{5}{8}$ (*c*) $\frac{10}{13}$ (*d*) $\frac{7}{10}$

84. The difference between the numerator and the denominator of a fraction is 5. If 5 is added to its denominator, the fraction is decreased by $1\frac{1}{4}$. Find the value of the fraction.

(*a*) $\frac{1}{6}$ (*b*) $2\frac{1}{4}$ (*c*) $3\frac{1}{4}$ (*d*) 6

(M.B.A. 1997)

85. The numerator and denominator of a fraction are in the ratio of 2 : 3. If 6 is subtracted from the numerator, the result is a fraction that has a value $\frac{2}{3}$ of the original fraction. The numerator of the original fraction is : **(S.S.C. 1999)**

(*a*) 6 (*b*) 18 (*c*) 27 (*d*) 36

86. If 1 is added to the denominator of a fraction, the fraction becomes $\frac{1}{2}$. If 1 is added to the numerator of the fraction, the fraction becomes 1. The fraction is : **(C.B.I. 1997)**

(*a*) $\frac{1}{3}$ (*b*) $\frac{2}{3}$ (*c*) $\frac{3}{4}$ (*d*) $\frac{3}{2}$

87. If the numerator of a fraction is increased by 2 and the denominator is increased by 3, the fraction becomes $\frac{7}{9}$ and if both the numerator as well as the denominator are decreased by 1, the fraction becomes $\frac{4}{5}$. What is the original fraction ?

(*a*) $\frac{5}{6}$ (*b*) $\frac{9}{11}$ (*c*) $\frac{13}{16}$ (*d*) $\frac{17}{21}$

(S.B.I.P.O. 1999)

88. When the numerator of a fraction increases by 4, the fraction increases by $\frac{2}{3}$. The denominator of the fraction is :

(*a*) 2 (*b*) 3 (*c*) 4 (*d*) 6

89. 54 is to be divided into two parts such that the sum of 10 times the first and 22 times the second is 780. The bigger part is :

(*a*) 24 (*b*) 34 (*c*) 30 (*d*) 32

90. 243 has been divided into three parts such that half of the first part, one-third of the second part and one-fourth of the third part are equal. The largest part is :

(*a*) 74 (*b*) 86 (*c*) 92 (*d*) 108

91. The sum of four numbers is 64. If you add 3 to the first number, 3 is subtracted from the second number, the third is multiplied by 3 and the fourth is divided by 3, then all the results are equal. What is the difference between the largest and the smallest of the original numbers ? **(S.B.I.P.O. 2000)**

(*a*) 21 (*b*) 27 (*c*) 32

(*d*) Cannot be determined (*e*) None of these

92. The sum of the squares of three numbers is 138, while the sum of their products taken two at a time is 131. Their sum is : **(Hotel Management, 1999)**

(*a*) 20 (*b*) 30 (*c*) 40 (*d*) None of these

93. The sum of three numbers is 136. If the ratio between first and second be 2 : 3 and that between second and third is 5 : 3, then the second number is :

(*a*) 40 (*b*) 48 (*c*) 60 (*d*) 72

94. Of the three numbers, the sum of the first two is 45; the sum of the second and the third is 55 and the sum of the third and thrice the first is 90. The third number is :

(*a*) 20 (*b*) 25 (*c*) 30 (*d*) 3

ANSWERS

1. (*c*)	**2.** (*b*)	**3.** (*d*)	**4.** (*c*)	**5.** (*c*)	**6.** (*c*)	**7.** (*a*)	**8.** (*c*)	**9.** (*d*)
10. (*a*)	**11.** (*d*)	**12.** (*c*)	**13.** (*c*)	**14.** (*b*)	**15.** (*e*)	**16.** (*b*)	**17.** (*b*)	**18.** (*a*)
19. (*a*)	**20.** (*a*)	**21.** (*c*)	**22.** (*a*)	**23.** (*c*)	**24.** (*b*)	**25.** (*a*)	**26.** (*c*)	**27.** (*a*)
28. (*c*)	**29.** (*c*)	**30.** (*b*)	**31.** (*b*)	**32.** (*b*)	**33.** (*a*)	**34.** (*a*)	**35.** (*a*)	**36.** (*b*)

15. Let the number be x.
Then, $x + x^2 = 182 \Leftrightarrow x^2 + x - 182 = 0 \Leftrightarrow (x + 14)(x - 13) = 0 \Leftrightarrow x = 13$.

16. Let the integer be x.
Then, $x^2 - 20x = 96 \Leftrightarrow x^2 - 20x - 96 = 0 \Leftrightarrow (x + 4)(x - 24) = 0 \Leftrightarrow x = 24$.

17. Let the number be x.
Then, $3x^2 - 4x = x + 50 \Leftrightarrow 3x^2 - 5x - 50 = 0 \Leftrightarrow (3x + 10)(x - 5) = 0 \Leftrightarrow x = 5$.

18. Let the number be x. Then, $x + \frac{1}{x} = \frac{34}{8} \Leftrightarrow \frac{x^2+1}{x} = \frac{34}{8} \Leftrightarrow 8x^2 - 34x + 8 = 0$

$\Leftrightarrow 4x^2 - 17x + 4 = 0 \Leftrightarrow (4x - 1)(x - 4) = 0 \Leftrightarrow x = 4$.

$\left[\text{neglecting } x = \frac{1}{4}, \text{ as } x \text{ is a natural no.}\right]$

$\therefore$ Required number $= 4 \times \sqrt{4} = 4 \times 2 = 8$.

19. Let the number be x.

Then, $\frac{2}{3}x = \frac{25}{216} \times \frac{1}{x} \Leftrightarrow x^2 = \frac{25}{216} \times \frac{3}{2} = \frac{25}{144} \Leftrightarrow x = \sqrt{\frac{25}{144}} = \frac{5}{12}$.

20. Let the number be x.

Then, $x + 17 = \frac{60}{x} \Leftrightarrow x^2 + 17x - 60 = 0 \Leftrightarrow (x + 20)(x - 3) = 0 \Leftrightarrow x = 3$.

21. Let the number be x.

Then, $x - 4 = \frac{21}{x} \Leftrightarrow x^2 - 4x - 21 = 0 \Leftrightarrow (x - 7)(x + 3) = 0 \Leftrightarrow x = 7$.

22. Let the number be x. Then, $x + \frac{1}{x} = 3\left(x - \frac{1}{x}\right) \Leftrightarrow \frac{x^2+1}{x} = 3\left(\frac{x^2-1}{x}\right)$

$\Leftrightarrow x^2 + 1 = 3x^2 - 3 \Leftrightarrow 2x^2 = 4 \Leftrightarrow x^2 = 2 \Leftrightarrow x = \sqrt{2}$.

23. Let the numbers be a and b. Then, $ab = 17 \Rightarrow a = 1$ and $b = 17$.

So, $\frac{1}{a^2} + \frac{1}{b^2} = \frac{a^2+b^2}{a^2b^2} = \frac{1^2 + (17)^2}{(1 \times 17)^2} = \frac{290}{289}$.

24. Let the number be x. Then,

$$\frac{4\frac{1}{2}\left(x + 2\frac{1}{2}\right) + 3}{1\frac{1}{5}} = 25 \Leftrightarrow \frac{\frac{9}{2}\left(x + \frac{5}{2}\right) + 3}{\frac{6}{5}} = 25$$

$$\Leftrightarrow \frac{9x}{2} + \frac{45}{4} + 3 = 25 \times \frac{6}{5} = 30 \Leftrightarrow \frac{9x}{2} = 30 - \frac{57}{4} \Leftrightarrow \frac{9x}{2} = \frac{63}{4}$$

$$\Leftrightarrow x = \left(\frac{63}{4} \times \frac{2}{9}\right) = \frac{7}{2} = 3\frac{1}{2}.$$

25. Let the numbers be $4x$, $5x$ and $6x$. Then, $\frac{4x + 5x + 6x}{3} = 25 \Leftrightarrow 5x = 25 \Leftrightarrow x = 5$.

$\therefore$ Largest number $= 6x = 30$.

26. Let the numbers be $3x$, $4x$ and $6x$.
Then, $3x \times 4x \times 6x = 1944 \Leftrightarrow 72x^3 = 1944 \Leftrightarrow x^3 = 27 \Leftrightarrow x = 3$.
$\therefore$ Largest number $= 6x = 18$.

27. Let the numbers be $3x$ and $4x$. Then,
$(4x)^2 = 8 \times (3x)^2 - 224 \Leftrightarrow 16x^2 = 72x^2 - 224 \Leftrightarrow 56x^2 = 224 \Leftrightarrow x^2 = 4 \Leftrightarrow x = 2$.
So, the numbers are 6 and 8.

37. (*c*)	**38.** (*a*)	**39.** (*c*)	**40.** (*b*)	**41.** (*b*)	**42.** (*a*)	**43.** (*c*)	**44.** (*b*)	**45.** (*b*)
46. (*c*)	**47.** (*b*)	**48.** (*a*)	**49.** (*b*)	**50.** (*a*)	**51.** (*d*)	**52.** (*d*)	**53.** (*c*)	**54.** (*b*)
55. (*b*)	**56.** (*c*)	**57.** (*c*)	**58.** (*b*)	**59.** (*c*)	**60.** (*e*)	**61.** (*c*)	**62.** (*a*)	**63.** (*d*)
64. (*a*)	**65.** (*d*)	**66.** (*d*)	**67.** (*b*)	**68.** (*d*)	**69.** (*d*)	**70.** (*b*)	**71.** (*b*)	**72.** (*b*)
73. (*b*)	**74.** (*b*)	**75.** (*a*)	**76.** (*b*)	**77.** (*b*)	**78.** (*b*)	**79.** (*b*)	**80.** (*b*)	**81.** (*c*)
82. (*c*)	**83.** (*a*)	**84.** (*b*)	**85.** (*b*)	**86.** (*b*)	**87.** (*a*)	**88.** (*d*)	**89.** (*b*)	**90.** (*d*)
91. (*c*)	**92.** (*a*)	**93.** (*c*)	**94.** (*c*)					

SOLUTIONS

1. Let the number be x. Then, $x - \frac{3}{5}x = 50 \Leftrightarrow \frac{2}{5}x = 50 \Leftrightarrow x = \left(\frac{50 \times 5}{2}\right) = 125.$

2. Let the number be x. Then, $\frac{x-4}{6} = 8 \Leftrightarrow x - 4 = 48 \Leftrightarrow x = 52.$

   $\therefore \quad \frac{x-2}{5} = \frac{52-2}{5} = \frac{50}{5} = 10.$

3. Let the number be x. Then, $\frac{1}{3}$ of $\frac{1}{4}$ of $x = 15 \Leftrightarrow x = 15 \times 12 = 180.$

   So, required number $= \left(\frac{3}{10} \times 180\right) = 54.$

4. Let the number be x. Then, $3(2x + 9) = 75 \Leftrightarrow 2x + 9 = 25 \Leftrightarrow 2x = 16 \Leftrightarrow x = 8.$

5. Let the number be x. Then, $\frac{3}{4}x - \frac{1}{3}x = 60 \Leftrightarrow \frac{5x}{12} = 60 \Leftrightarrow x = \left(\frac{60 \times 12}{5}\right) = 144.$

6. Let the number be x. Then,

   $x - 24 = \frac{4}{7}x \Leftrightarrow x - \frac{4}{7}x = 24 \Leftrightarrow \frac{3}{7}x = 24 \Leftrightarrow x = \left(\frac{24 \times 7}{3}\right) = 56.$

   $\therefore$ Sum of the digits $= (5 + 6) = 11.$

7. Let the number be x. Then, $15x - x = 196 \Leftrightarrow 14x = 196 \Leftrightarrow x = 14.$

8. Let the number be x. Then, $\frac{x}{4} = x - 21 \Leftrightarrow x = 4x - 84 \Leftrightarrow 3x = 84 \Leftrightarrow x = 28.$

9. Let the number be x. Then, $\left(\frac{1}{5}x + 4\right) = \left(\frac{1}{4}x - 10\right) \Leftrightarrow \frac{x}{20} = 14 \Leftrightarrow x = 14 \times 20 = 280.$

10. Let the larger number be x.

    Then, $x - 12 = 20\%$ of $x \Leftrightarrow x - \frac{x}{5} = 12 \Leftrightarrow \frac{4x}{5} = 12 \Leftrightarrow x = \left(\frac{12 \times 5}{4}\right) = 15.$

11. Let the number be x. Then, $\frac{1}{7}x - \frac{1}{11}x = 100 \Leftrightarrow \frac{4x}{77} = 100 \Leftrightarrow x = \frac{7700}{4} = 1925.$

12. Let the number be x.

    Then, $\left(\frac{1}{2}x + \frac{1}{5}x\right) - \frac{1}{3}x = \frac{22}{3} \Leftrightarrow \frac{11x}{30} = \frac{22}{3} \Leftrightarrow x = \left(\frac{22 \times 30}{3 \times 11}\right) = 20.$

13. Let the number be x. Then, $2x + 20 = 8x - 4 \Leftrightarrow 6x = 24 \Leftrightarrow x = 4.$

14. Let the number be x.

    Then, $\frac{2}{3}x - 50 = \frac{1}{4}x + 40 \Leftrightarrow \frac{2}{3}x - \frac{1}{4}x = 90 \Leftrightarrow \frac{5x}{12} = 90 \Leftrightarrow x = \left(\frac{90 \times 12}{5}\right) = 216.$

28. Let the numbers be $4x$ and $7x$. Then, $\frac{4x+4}{7x+4} = \frac{3}{5} \Leftrightarrow 5(4x+4) = 3(7x+4) \Leftrightarrow x = 8.$

$\therefore$ Larger number $= 7x = 56.$

29. Let the second number be x. Then, first number $= 2x$ and third number $= \frac{2x}{3}$.

$\therefore \quad 2x + x + \frac{2x}{3} = 264 \Leftrightarrow \frac{11x}{3} = 264 \Leftrightarrow x = \left(\frac{264 \times 3}{11}\right) = 72.$

30. Let the numbers be x and $(22 - x)$. Then, $5x = 6(22 - x) \Leftrightarrow 11x = 132 \Leftrightarrow x = 12.$
So, the numbers are 12 and 10.

31. Let the numbers be x and y. Then, $\frac{1}{5}x = \frac{5}{8}y \Leftrightarrow y = \frac{8}{25}x.$

Now, $x + 35 = 4y \Leftrightarrow x + 35 = \frac{32}{25}x \Leftrightarrow \frac{7}{25}x = 35 \Leftrightarrow x = \left(\frac{35 \times 25}{7}\right) = 125.$

$\therefore$ Second number $= y = \frac{8}{25}x = \left(\frac{8}{25} \times 125\right) = 40.$

32. Let the numbers be x and y. Then, $x + y = 25$ and $x - y = 13$.
$4xy = (x+y)^2 - (x-y)^2 = (25)^2 - (13)^2 = 625 - 169 = 456 \Rightarrow xy = 114.$

33. Let the numbers be x and y.
Then, $x + y = 33$ ...(*i*) and $x - y = 15$ ...(*ii*)
Solving (*i*) and (*ii*), we get : $x = 24$, $y = 9$.
$\therefore$ Smaller number $= 9$.

34. Let the numbers be x and y. Then,

$\frac{x+y}{x-y} = \frac{40}{4} = 10 \Leftrightarrow (x+y) = 10(x-y) \Leftrightarrow 9x = 11y \Leftrightarrow \frac{x}{y} = \frac{11}{9}.$

35. Let the numbers be x and $(28 - x)$. Then,
$x(28 - x) = 192 \Leftrightarrow x^2 - 28x + 192 = 0 \Leftrightarrow (x - 16)(x - 12) = 0$
$\Leftrightarrow x = 16$ or $x = 12.$
So, the numbers are 16 and 12.

36. Let the integers be x and $(x + 5)$. Then,
$x(x+5) = 500 \Leftrightarrow x^2 + 5x - 500 = 0 \Leftrightarrow (x+25)(x-20) = 0 \Leftrightarrow x = 20.$
So, the numbers are 20 and 25.

37. Let the numbers be x and y. Then, $x - y = 5$ and $xy = 336$.
$(x+y)^2 = (x-y)^2 + 4xy = 25 + 4 \times 336 = 1369 \Rightarrow x + y = \sqrt{1369} = 37.$

38. Since $1.x < 1 + x$, so one of the numbers is 1.

39. Let the numbers be x and y. Then, $xy = 9375$ and $\frac{x}{y} = 15$.

$\frac{xy}{(x/y)} = \frac{9375}{15} \Leftrightarrow y^2 = 625 \Leftrightarrow y = 25 \Rightarrow x = 15y = (15 \times 25) = 375.$

$\therefore$ Sum of the numbers $= 375 + 25 = 400.$

40. Let the numbers be x and $(x + 1365)$.
Then, $x + 1365 = 6x + 15 \Leftrightarrow 5x = 1350 \Leftrightarrow x = 270.$

41. Let the numbers be x and y. Then, $x + y = 40$ and $xy = 375$.

$\therefore \quad \frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy} = \frac{40}{375} = \frac{8}{75}.$

42. Let the numbers be x and y such that $x > y$. Then,
$x(x + y) = 204 \Rightarrow x^2 + xy = 204$ ...(*i*) and $y(x - y) = 35 \Rightarrow xy - y^2 = 35$ ...(*ii*)
Subtracting (*ii*) from (*i*), we get : $x^2 + y^2 = 169$.
The only triplet satisfying this condition is (12, 5, 13). Thus, $x = 12$, $y = 5$.

43. Let the numbers be x and y. Then, $x + y = 20$ and $x - y = 8$.
$\therefore\ x^2 - y^2 = (x + y)(x - y) = 20 \times 8 = 160$.

44. Let the numbers be x and y. Then, $xy = 120$ and $x^2 + y^2 = 289$.
$\therefore\ (x + y)^2 = x^2 + y^2 + 2xy = 289 + 240 = 529$.
$\therefore\ x + y = \sqrt{529} = 23$.

45. Let the numbers be x and y. Then, $xy = 45$ and $x^2 + y^2 = 106$.
$(x + y) = \sqrt{(x^2 + y^2) + 2xy} = \sqrt{106 + 90} = \sqrt{196} \Rightarrow x + y = 14$ ...(*i*)
$(x - y) = \sqrt{(x^2 + y^2) - 2xy} = \sqrt{106 - 90} = \sqrt{16} \Rightarrow x - y = 4$ ...(*ii*)
Solving (*i*) and (*ii*), we get : $x = 9$ and $y = 5$.

46. Let the numbers be x and y. Then,
$x^2 + y^2 = 3341$ ...(*i*) and $x^2 - y^2 = 891$ ...(*ii*)
Adding (*i*) and (*ii*), we get : $2x^2 = 4232$ or $x^2 = 2116$ or $x = 46$.
Subtracting (*ii*) from (*i*), we get : $2y^2 = 2450$ or $y^2 = 1225$ or $y = 35$.
So, the numbers are 35 and 46.

47. Let the numbers be x and $(x + 3)$. Then,
$x^2 + (x + 3)^2 = 369 \Leftrightarrow x^2 + x^2 + 9 + 6x = 369$
$\Leftrightarrow 2x^2 + 6x - 360 = 0 \Leftrightarrow x^2 + 3x - 180 = 0 \Leftrightarrow (x + 15)(x - 12) = 0 \Leftrightarrow x = 12$.
So, the numbers are 12 and 15.
$\therefore$ Required sum = (12 + 15) = 27.

48. Let the numbers be x and y. Then, $(x + y) = 22$ and $x^2 + y^2 = 404$.
Now, $2xy = (x + y)^2 - (x^2 + y^2) = (22)^2 - 404 = 484 - 404 = 80 \Rightarrow xy = 40$.

49. Let the numbers be x and y. Then, $x^2 - y^2 = 256000$ and $x + y = 1000$.
On dividing, we get : $x - y = 256$.
Solving $x + y = 1000$ and $x - y = 256$, we get : $x = 628$ and $y = 372$.

50. Let the numbers be x and y. Then, $x^2 - y^2 = 39$ and $x - y = 3$.
On dividing, we get : $x + y = 13$.
Solving $x + y = 13$ and $x - y = 3$, we get : $x = 8$ and $y = 5$.
$\therefore$ Larger number = 8.

51. Let the numbers be x, $x + 1$ and $x + 2$.
Then, $x + (x + 1) + (x + 2) = 87 \Leftrightarrow 3x = 84 \Leftrightarrow x = 28$.
$\therefore$ Greatest number = $(x + 2) = 30$.

52. Let the three integers be x, $x + 2$ and $x + 4$. Then, $3x = 2(x + 4) + 3 \Leftrightarrow x = 11$.
$\therefore$ Third integer = $x + 4 = 15$.

53. Let the four integers be x, $x + 2$, $x + 4$ and $x + 6$.
Then, $x + (x + 2) + (x + 4) + (x + 6) = 1284 \Leftrightarrow 4x = 1272 \Leftrightarrow x = 318$.
$\therefore$ Greatest integer = $x + 6 = 324$.

54. Let the numbers be x, $x + 2$ and $x + 4$.
Then, $x + (x + 2) + (x + 4) = x + 20 \Leftrightarrow 2x = 14 \Leftrightarrow x = 7$.
$\therefore$ Middle number = $x + 2 = 9$.

55. Let the numbers be x, $x + 2$ and $x + 4$.

Then, $\frac{x(x+2)(x+4)}{8} = 720 \Rightarrow x(x+2)(x+4) = 5760$.

$\therefore \sqrt{x} \times \sqrt{(x+2)} \times \sqrt{(x+4)} = \sqrt{x(x+2)(x+4)} = \sqrt{5760} = 24\sqrt{10}$.

56. Let the numbers be $3x$, $3x + 3$ and $3x + 6$.

Then, $3x + (3x + 3) + (3x + 6) = 72 \Leftrightarrow 9x = 63 \Leftrightarrow x = 7$.

$\therefore$ Largest number $= 3x + 6 = 27$.

57. Let the numbers be x and $x + 2$.

Then, $(x + 2)^2 - x^2 = 84 \Leftrightarrow 4x + 4 = 84 \Leftrightarrow 4x = 80 \Leftrightarrow x = 20$.

$\therefore$ Required sum $= x + (x + 2) = 2x + 2 = 42$.

58. Let the numbers be x, $x + 1$ and $x + 2$.

Then, $x^2 + (x + 1)^2 + (x + 2)^2 = 2030 \Leftrightarrow 3x^2 + 6x - 2025 = 0$

$\Leftrightarrow x^2 + 2x - 675 = 0 \Leftrightarrow (x + 27)(x - 25) = 0 \Leftrightarrow x = 25$.

$\therefore$ Middle number $= (x + 1) = 26$.

59. Let the numbers be x and y. Then, $2x + 3y = 39$ ...(*i*) and $3x + 2y = 36$ ...(*ii*)

On solving (*i*) and (*ii*), we get : $x = 6$ and $y = 9$.

$\therefore$ Larger number $= 9$.

60. Let the ten's digits be x. Then, unit's digit $= 4x$.

$\therefore x + 4x = 10 \Leftrightarrow 5x = 10 \Leftrightarrow x = 2$.

So, ten's digit $= 2$, unit's digit $= 8$.

Hence, the required number is 28.

61. Let the ten's digit be x. Then, number $= 10x + 3$ and sum of digits $= (x + 3)$.

So, $(x + 3) = \frac{1}{7}(10x + 3) \Leftrightarrow 7x + 21 = 10x + 3 \Leftrightarrow 3x = 18 \Leftrightarrow x = 6$.

Hence, the number is 63.

62. Let the ten's digit be x. Then, unit's digit $= 2x$.

Number $= 10x + 2x = 12x$; Sum of digits $= x + 2x = 3x$.

$\therefore 12x - 3x = 18 \Leftrightarrow 9x = 18 \Leftrightarrow x = 2$.

Hence, required number $= 12x = 24$.

63. Let the ten's digit be x and unit's digit be y.

Then, $x + y = 15$ and $x - y = 3$ or $y - x = 3$.

Solving $x + y = 15$ and $x - y = 3$, we get : $x = 9$, $y = 6$.

Solving $x + y = 15$ and $y - x = 3$, we get : $x = 6$, $y = 9$.

So, the number is either 96 or 69. Hence, the number cannot be determined.

64. Let the ten's digit be x. Then, unit's digit $= x + 2$.

Number $= 10x + (x + 2) = 11x + 2$; Sum of digits $= x + (x + 2) = 2x + 2$.

$\therefore (11x + 2)(2x + 2) = 144 \Leftrightarrow 22x^2 + 26x - 140 = 0 \Leftrightarrow 11x^2 + 13x - 70 = 0$

$\Leftrightarrow (x - 2)(11x + 35) = 0 \Leftrightarrow x = 2$.

Hence, required number $= 11x + 2 = 24$.

65. Let the ten's digit be x and unit's digit be y. Then, number $= 10x + y$.

Number obtained by interchanging the digits $= 10y + x$.

$\therefore (10x + y) + (10y + x) = 11(x + y)$, which is divisible by 11.

66. Let the ten's digit be x and unit's digit be y. Then, $(10x + y) - (x + y) = 9$ or $x = 1$.

From this data, we cannot find y, the unit's digit. So, the data is inadequate.

67. Let the ten's digit be x and unit's digit be y.
Then, $(10x + y) - (10y + x) = 36 \Leftrightarrow 9(x - y) = 36 \Leftrightarrow x - y = 4$.

68. Let the ten's digit be x and unit's digit be y.
Then, $(10x + y) - (10y + x) = 63 \Leftrightarrow 9(x - y) = 63 \Leftrightarrow x - y = 7$.
Thus, none of the numbers can be determined.

69. Let the ten's digit be x and unit's digit be y.
Then, $x + y = \frac{1}{5}[(10x + y) - (10y + x)] \Leftrightarrow 5x + 5y = 9x - 9y \Leftrightarrow 4x = 14y$.
Thus, the value of $(x - y)$ cannot be determined from the given data.

70. Let the ten's digit be x and unit's digit be y.
Then, $10 \times 2x + \frac{1}{2}y = 10y + x \Leftrightarrow 20x - x = 10y - \frac{y}{2} \Leftrightarrow 19x = \frac{19}{2}y \Leftrightarrow y = 2x$.
Thus, the unit's digit is twice the ten's digit.

71. Let ten's digit = x. Then, unit's digit = $(8 - x)$.
$\therefore [10(8 - x) + x] - [10x + (8 - x)] = 18 \Leftrightarrow 18x = 54 \Leftrightarrow x = 3$.
So, ten's digit = 3 and unit's digit = 5. Hence, original number = 35.

72. Since the number is greater than the number obtained on reversing the digits, so the ten's digit is greater than the unit's digit.
Let the ten's and unit's digits be $2x$ and x respectively.
Then, $(10 \times 2x + x) - (10x + 2x) = 36 \Leftrightarrow 9x = 36 \Leftrightarrow x = 4$.
$\therefore$ Required difference $= (2x + x) - (2x - x) = 2x = 8$.

73. Let the middle digit be x. Then, $2x = 10$ or $x = 5$. So, the number is either 253 or 352.
Since the number increases on reversing the digits, so the hundred's digit is smaller than the unit's digit. Hence, required number = 253.

74. Since the number reduces on reversing the digits, so ten's digit is greater than the unit's digit.
Let the unit's digit be x. Then, ten's digit = $(x + 1)$.
$\therefore 10x + (x + 1) = \frac{5}{6}[10(x + 1) + x] \Leftrightarrow 66x + 6 = 55x + 50 \Leftrightarrow 11x = 44 \Leftrightarrow x = 4$.
Hence, required number = 54.

75. Let the unit's digit be x. Then, ten's digit = $(x - 2)$.
$\therefore 3[10(x - 2) + x] + \frac{6}{7}[10x + (x - 2)] = 108$
$\Leftrightarrow 231x - 420 + 66x - 12 = 756 \Leftrightarrow 297x = 1188 \Leftrightarrow x = 4$.
Hence, sum of the digits $= x + (x - 2) = 2x - 2 = 6$.

76. Let the ten's digit be x and unit's digit be y. Then, $\frac{10x + y}{2} = 10y + (x + 1)$
$\Leftrightarrow 10x + y = 20y + 2x + 2 \Leftrightarrow 8x - 19y = 2$ ...(*i*) and $x + y = 7$ ...(*ii*)
Solving, (*i*) and (*ii*), we get : $x = 5$, $y = 2$. Hence, required number = 52.

77. Let the ten's digit be x. Then, unit's digit = $2x + 1$.
$[10x + (2x + 1)] - [\{10(2x + 1) + x\} - \{10x + (2x + 1)\}] = 1$
$\Leftrightarrow (12x + 1) - (9x + 9) = 1 \Leftrightarrow 3x = 9 \Leftrightarrow x = 3$.
So, ten's digit = 3 and unit's digit = 7. Hence, original number = 37.

78. Let the ten's digit be x and unit's digit be y.
Then, $10x + y = 3(x + y) \Rightarrow 7x - 2y = 0$ ..(*i*)
$10x + y + 45 = 10y + x \Rightarrow y - x = 5$ ...(*ii*)
Solving (*i*) and (*ii*), we get : $x = 2$ and $y = 7$.
$\therefore$ Required number = 27.

79. Let the ten's and unit's digit be x and $\frac{8}{x}$ respectively.

Then, $\left(10x + \frac{8}{x}\right) + 18 = 10 \times \frac{8}{x} + x \Leftrightarrow 10x^2 + 8 + 18x = 80 + x^2$

$\Leftrightarrow \quad 9x^2 + 18x - 72 = 0 \Leftrightarrow x^2 + 2x - 8 = 0 \Leftrightarrow (x + 4)(x - 2) = 0 \Leftrightarrow x = 2.$

So, ten's digit = 2 and unit's digit = 4. Hence, required number = 24.

80. Let the two fractions be a and b. Then, $ab = \frac{14}{15}$ and $\frac{a}{b} = \frac{35}{24}$.

$\frac{ab}{(a/b)} = \left(\frac{14}{15} \times \frac{24}{35}\right) \Leftrightarrow b^2 = \frac{16}{25} \Leftrightarrow b = \frac{4}{5}$. $ab = \frac{14}{15} \Rightarrow a = \left(\frac{14}{15} \times \frac{5}{4}\right) = \frac{7}{6}$.

Since $a > b$, so greater fraction is $\frac{7}{6}$.

81. $A = 2B \Rightarrow B = \frac{1}{2}A$. So, $AB = \frac{2}{25} \Rightarrow \frac{1}{2}A^2 = \frac{2}{25} \Rightarrow A^2 = \frac{4}{25} \Rightarrow A = \frac{2}{5}$.

82. Let the fraction be $\frac{x}{y}$. Then, $x + y = 11$. ...(*i*)

$\frac{x+1}{y-2} = \frac{2}{3} \Rightarrow 3(x + 1) = 2(y - 2) \Rightarrow 3x - 2y = -7$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x = 3$ and $y = 8$. So, the fraction is $\frac{3}{8}$.

83. Let the numerator be x. Then, denominator = $x + 3$.

Now, $\frac{x+4}{(x+3)+4} = \frac{4}{5} \Leftrightarrow 5(x + 4) = 4(x + 7) \Leftrightarrow x = 8.$

$\therefore$ The fraction is $\frac{8}{11}$.

84. Let the denominator be x. Then, numerator = $x + 5$.

Now, $\frac{x+5}{x} - \frac{x+5}{x+5} = \frac{5}{4} \Leftrightarrow \frac{x+5}{x} = \frac{5}{4} + 1 = \frac{9}{4} = 2\frac{1}{4}$.

So, the fraction is $2\frac{1}{4}$.

85. Let the fraction be $\frac{2x}{3x}$. Then, $\frac{2x-6}{3x} = \frac{2}{3} \times \frac{2x}{3x} \Leftrightarrow \frac{2x-6}{3x} = \frac{4x}{9x} \Leftrightarrow 18x^2 - 54x = 12x^2$

$\Leftrightarrow 6x^2 = 54x \Leftrightarrow x = 9.$

Hence, numerator of the original fraction = $2x = 18$.

86. Let the fraction be $\frac{x}{y}$. Then,

$\frac{x}{y+1} = \frac{1}{2} \Leftrightarrow 2x - y = 1$ ...(*i*) and $\frac{x+1}{y} = 1 \Leftrightarrow x - y = -1$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x = 2$, $y = 3$. Hence, the required fraction is $\frac{2}{3}$.

87. Let the fraction be $\frac{x}{y}$. Then,

$\frac{x+2}{y+3} = \frac{7}{9} \Leftrightarrow 9x - 7y = 3$ ...(*i*) and $\frac{x-1}{y-1} = \frac{4}{5} \Leftrightarrow 5x - 4y = 1$ ...(*ii*)

Solving (*i*) and (*ii*), we get : $x = 5$, $y = 6$. Hence, the original fraction is $\frac{5}{6}$.

88. Let the fraction be $\frac{x}{y}$. Then, $\frac{x+4}{y} - \frac{x}{y} = \frac{2}{3} \Leftrightarrow \frac{4}{y} = \frac{2}{3} \Leftrightarrow y = \left(\frac{4 \times 3}{2}\right) = 6.$

$\therefore$ Denominator = 6.

89. Let the two parts be $(54 - x)$ and x.

Then, $10(54 - x) + 22x = 780 \Leftrightarrow 12x = 240 \Leftrightarrow x = 20.$

$\therefore$ Bigger part = $(54 - x) = 34$.

90. Let the three parts be A, B and C.

Let $\frac{A}{2} = \frac{B}{3} = \frac{C}{4} = x$. Then, $A = 2x$, $B = 3x$ and $C = 4x$. So, $A : B : C = 2 : 3 : 4$.

$\therefore$ Largest part = $\left(243 \times \frac{4}{9}\right) = 108.$

91. Let the four numbers be A, B, C and D. Let $A + 3 = B - 3 = 3C = \frac{D}{3} = x$.

Then, $A = x - 3$, $B = x + 3$, $C = \frac{x}{3}$ and $D = 3x$.

$A + B + C + D = 64 \Rightarrow (x - 3) + (x + 3) + \frac{x}{3} + 3x = 64$

$\Rightarrow 5x + \frac{x}{3} = 64 \Rightarrow 16x = 192 \Rightarrow x = 12.$

Thus, the numbers are 9, 15, 4 and 36.

$\therefore$ Required difference = $(36 - 4) = 32$.

92. Let the numbers be a, b and c. Then, $a^2 + b^2 + c^2 = 138$ and $(ab + bc + ca) = 131$.

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca) = 138 + 2 \times 131 = 400$

$\Rightarrow (a + b + c) = \sqrt{400} = 20.$

93. $A : B = 2 : 3$ and $B : C = 5 : 3 = \frac{3}{5} \times 5 : \frac{3}{5} \times 3 = 3 : \frac{9}{5}$.

So, $A : B : C = 2 : 3 : \frac{9}{5} = 10 : 15 : 9$.

$\therefore$ Second number = $\left(136 \times \frac{15}{34}\right) = 60.$

94. Let the numbers be x, y and z. Then, $x + y = 45$, $y + z = 55$ and $3x + z = 90$

$\Rightarrow y = 45 - x$, $z = 55 - y = 55 - (45 - x) = 10 + x$.

$\therefore 3x + 10 + x = 90$ or $x = 20$.

$y = (45 - 20) = 25$ and $z = (10 + 20) = 30$.

$\therefore$ Third number = 30.

EXERCISE 7B

(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 even 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 two-digit number ? **(S.B.I.P.O. 2003)**
   I. The difference between the two digits is 9.
   II. The sum of the digits is equal to the difference between the two digits.
2. What is the difference between the digits of a two-digit number ? **(Bank P.O. 1999)**
   I. The sum of the digits of that number is 8.
   II. One-fifth of that number is 15 less than half of 44.
3. What is the ratio between the two numbers ?
   I. The sum of two numbers is twice their difference.
   II. The smaller number is 6.
4. What is the two-digit number whose first digit is *a* and the second digit is *b* ? The number is greater than 9. **(M.A.T. 2000)**
   I. The number is a multiple of 51.
   II. The sum of the digits *a* and *b* is 6.
5. The difference between the digits of a two-digit number is 4. What is the digit in the unit's place ?
   I. The difference between the number and the number obtained by interchanging the positions of the digits is 36.
   II. The sum of the digits of that number is 12.
6. What is the number ? **(Bank P.O. 2000)**
   I. The sum of the two digits is 8. The ratio of the two digits is 1 : 3.
   II. The product of two digits of a number is 12. The quotient of two digits is 3.

Directions ***(Questions 7 to 10) : 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 given question.***

7. What is the two-digit number ? **(M.B.A. 2002)**
   I. Sum of the digits is 7.
   II. Difference between the number and the number obtained by interchanging the digits is 9.
   III. Digit in the ten's place is bigger than the digit in the unit's place by 1.
   (*a*) I and II only (*b*) II and III only (*c*) I and III only
   (*d*) All I, II and III (*e*) None of these
8. What is the sum of the digits of the two-digit number ?
   I. The ratio between the ten's digit and unit's digit of the number is 3 : 2.
   II. The number obtained on reversing the order of its digits is 18 less than the original number.
   III. The product of the digits is 24.
   (*a*) Any two of the three (*b*) I only or II and III only (*c*) All I, II and III
   (*d*) I and II only (*e*) None of these

9. What will be the sum of two numbers ? (S.B.I.P.O. 2000)

I. Among the two numbers, the bigger number is greater than the smaller number by 6.

II. 40% of the smaller number is equal to 30% of the bigger number.

III. The ratio between half of the bigger number and one-third of the smaller number is 2 : 1.

(*a*) I and II only (*b*) II and III only (*c*) All I, II and III

(*d*) Any two of the three (*e*) None of these

10. What is the two-digit number ? (R.B.I. 2002)

I. The difference between the two-digit number and the number formed by interchanging the digits is 27.

II. The difference between the two digits is 3.

III. The digit at unit's place is less than that at ten's place by 3.

(*a*) I and II only (*b*) I and III only (*c*) All I, II and III

(*d*) I, and either II or III (*e*) Even with all I, II and III, answer cannot be given.

ANSWERS

1. (*e*) 2. (*e*) 3. (*a*) 4. (*e*) 5. (*b*) 6. (*b*) 7. (*e*) 8. (*a*)
9. (*a*) 10. (*c*)

SOLUTIONS

1. Let the tens and unit digits be x and y respectively. Then,

I. $x - y = 9$.

II. $x + y = x - y$.

From I and II, we get $x - y = 9$ and $x + y = 9$.

On solving, we get $x = 9$ and $y = 0$.

∴ Required number is 90.

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

∴ Correct answer is (*e*).

2. Let the tens and unit digits be x and y respectively. Then,

I. $x + y = 8$ ...(*i*)

II. $\left(\frac{1}{2} \times 44\right) - \frac{1}{5}(10x + y) = 15 \Rightarrow 10x + y = 35$ ...(*ii*)

On solving (*i*) and (*ii*), we get $x = 3$ and $y = 5$.

Thus, I and II together give the answer.

∴ Correct answer is (*e*).

3. Let the two numbers be x and y.

I gives, $x + y = 2(x - y) \Leftrightarrow x = 3y \Leftrightarrow \frac{x}{y} = \frac{3}{1} \Leftrightarrow x : y = 3 : 1$.

Thus, I only gives the answer.

II does not give the answer.

∴ Correct answer is (*a*).

4. Number = $10b + a$.

I. $10b + a = 51 \times c$, where $c = 1, 2, 3$ etc. ...(*i*)

II. $a + b = 6$ ...(*ii*)

Taking $c = 1$, we get $10b + (6 - b) = 51 \Leftrightarrow 9b = 45 \Leftrightarrow b = 5$.

$\therefore$ $a = 1$, $b = 5$. So, number = 51.

Thus, I and II together give the answer.

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

5. Let the ten's digit be x and unit's digit be y.

Then, $x - y = \pm 4$ ...(*i*)

I. $(10x + y) - (10y + x) = 36 \Leftrightarrow x - y = 4$ ...(*ii*)

II. $x + y = 12$ ...(*iii*)

Thus, (*i*) and (*iii*) together give the answer.

$\therefore$ II alone gives the answer and I alone does not give the answer.

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

6. Let the tens and units digit be x and y respectively. Then,

I. $x + y = 8$ and $\frac{x}{y} = \frac{1}{3}$.

II. $xy = 12$ and $\frac{x}{y} = \frac{3}{1}$.

$\therefore$ II gives, $x^2 = 36 \Leftrightarrow x = 6$. So, $3y = 6 \Leftrightarrow y = 2$.

Thus, II alone gives the number. Clearly, I alone does not give the answer.

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

7. Let the tens and units digit be x and y respectively.

I. $x + y = 7$.

II. $(10x + y) - (10y + x) = 9 \Rightarrow x - y = 1$.

III. $x - y = 1$.

Thus, I and II as well as I and III give the answer.

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

8. I. Let the tens and units digit be $3x$ and $2x$ respectively.

II. $(30x + 2x) - (20x + 3x) = 18 \Leftrightarrow x = 2$.

III. $3x \times 2x = 24 \Leftrightarrow x^2 = 4 \Leftrightarrow x = 2$.

Thus, any two of the three will give the answer.

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

9. Let the required numbers be x and y, where $x > y$.

I. $x - y = 6$ ...(*i*)

II. $\frac{30}{100}x = \frac{40}{100}y \Leftrightarrow 3x - 4y = 0$ ...(*ii*)

III. $\frac{\frac{1}{2}x}{\frac{1}{3}y} = \frac{2}{1} \Leftrightarrow \frac{3x}{2y} = \frac{2}{1} \Leftrightarrow \frac{x}{y} = \frac{4}{3}$.

Thus, I and II only give the answer.

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

10. Let the tens and units digit be x and y respectively.

I. $(10x + y) - (10y + x) = 27 \Leftrightarrow x - y = 3$.

II. $x - y = 3$.

III. $x - y = 3$.

Thus, even all the given three statements together do not give the answer.

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

8. PROBLEMS ON AGES

SOLVED EXAMPLES

Ex. 1. ***Rajeev's age after 15 years will be 5 times his age 5 years back. What is the present age of Rajeev ?*** **(Hotel Management, 2002)**

Sol. Let Rajeev's present age be x years. Then,

Rajeev's age after 15 years = $(x + 15)$ years.

Rajeev's age 5 years back = $(x - 5)$ years.

$\therefore \quad x + 15 = 5(x - 5) \Leftrightarrow x + 15 = 5x - 25 \Leftrightarrow 4x = 40 \Leftrightarrow x = 10.$

Hence, Rajeev's present age = 10 years.

Ex. 2. ***The ages of two persons differ by 16 years. If 6 years ago, the elder one be 3 times as old as the younger one, find their present ages.*** **(A.A.O. Exam, 2003)**

Sol. Let the age of the younger person be x years.

Then, age of the elder person = $(x + 16)$ years.

$\therefore \quad 3(x - 6) = (x + 16 - 6) \Leftrightarrow 3x - 18 = x + 10 \Leftrightarrow 2x = 28 \Leftrightarrow x = 14.$

Hence, their present ages are 14 years and 30 years.

Ex. 3. ***The product of the ages of Ankit and Nikita is 240. If twice the age of Nikita is more than Ankit's age by 4 years, what is Nikita's age ?*** **(S.B.I.P.O. 1999)**

Sol. Let Ankit's age be x years. Then, Nikita's age = $\frac{240}{x}$ years.

$$\therefore \quad 2 \times \frac{240}{x} - x = 4 \Leftrightarrow 480 - x^2 = 4x \Leftrightarrow x^2 + 4x - 480 = 0$$

$$\Leftrightarrow (x + 24)(x - 20) = 0 \Leftrightarrow x = 20.$$

Hence, Nikita's age = $\left(\frac{240}{20}\right)$ years = 12 years.

Ex. 4. ***The present age of a father is 3 years more than three times the age of his son. Three years hence, father's age will be 10 years more than twice the age of the son. Find the present age of the father.*** **(S.S.C. 2003)**

Sol. Let the son's present age be x years. Then, father's present age = $(3x + 3)$ years.

$\therefore \quad (3x + 3 + 3) = 2(x + 3) + 10 \Leftrightarrow 3x + 6 = 2x + 16 \Leftrightarrow x = 10.$

Hence, father's present age = $(3x + 3) = (3 \times 10 + 3)$ years = 33 years.

Ex. 5. ***Rohit was 4 times as old as his son 8 years ago. After 8 years, Rohit will be twice as old as his son. What are their present ages ?***

Sol. Let son's age 8 years ago be x years. Then, Rohit's age 8 years ago = $4x$ years.

Son's age after 8 years = $(x + 8) + 8 = (x + 16)$ years.

Rohit's age after 8 years = $(4x + 8) + 8 = (4x + 16)$ years.

$\therefore \quad 2(x + 16) = 4x + 16 \Leftrightarrow 2x = 16 \Leftrightarrow x = 8.$

Hence, son's present age = $(x + 8) = 16$ years.

Rohit's present age = $(4x + 8) = 40$ years.

Ex. 6. ***One year ago, the ratio of Gaurav's and Sachin's age was 6 : 7 respectively. Four years hence, this ratio would become 7 : 8. How old is Sachin ?***

(NABARD, 2002)

Sol. Let Gaurav's and Sachin's ages one year ago be $6x$ and $7x$ years respectively. Then,

Gaurav's age 4 years hence $= (6x + 1) + 4 = (6x + 5)$ years.

Sachin's age 4 years hence $= (7x + 1) + 4 = (7x + 5)$ years.

$$\therefore \quad \frac{6x+5}{7x+5} = \frac{7}{8} \Leftrightarrow 8(6x+5) = 7(7x+5) \Leftrightarrow 48x + 40 = 49x + 35 \Leftrightarrow x = 5.$$

Hence, Sachin's present age $= (7x + 1) = 36$ years.

Ex. 7. ***Abhay's age after six years will be three-seventh of his father's age. Ten years ago, the ratio of their ages was 1 : 5. What is Abhay's father's age at present ?***

Sol. Let the ages of Abhay and his father 10 years ago be x and $5x$ years respectively. Then,

Abhay's age after 6 years $= (x + 10) + 6 = (x + 16)$ years.

Father's age after 6 years $= (5x + 10) + 6 = (5x + 16)$ years.

$$\therefore \quad (x+16) = \frac{3}{7}(5x+16) \Leftrightarrow 7(x+16) = 3(5x+16) \Leftrightarrow 7x + 112 = 15x + 48$$

$$\Leftrightarrow 8x = 64 \Leftrightarrow x = 8.$$

Hence, Abhay's father's present age $= (5x + 10) = 50$ years.

EXERCISE 8A

(OBJECTIVE TYPE QUESTIONS)

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

1. Sachin is younger than Rahul by 4 years. If their ages are in the respective ratio of 7 : 9, how old is Sachin ? **(Bank P.O. 2003)**
   (*a*) 16 years (*b*) 18 years (*c*) 28 years
   (*d*) Cannot be determined (*e*) None of these
2. The ratio between the present ages of P and Q is 6 : 7. If Q is 4 years old than P, what will be the ratio of the ages of P and Q after 4 years ? **(S.B.I.P.O. 1998)**
   (*a*) 3 : 4 (*b*) 3 : 5 (*c*) 4 : 3
   (*d*) Data inadequate (*e*) None of these
3. The ratio between the present ages of P and Q is 5 : 7 respectively. If the difference between Q's present age and P's age after 6 years is 2, what is the total of P's and Q's present ages ? **(Bank P.O. 1999)**
   (*a*) 48 years (*b*) 52 years (*c*) 56 years
   (*d*) Cannot be determined (*e*) None of these
4. At present, the ratio between the ages of Arun and Deepak is 4 : 3. After 6 years, Arun's age will be 26 years. What is the age of Deepak at present ? **(R.R.B. 2003)**
   (*a*) 12 years (*b*) 15 years (*c*) $19\frac{1}{2}$ years (*d*) 21 years
5. Present ages of X and Y are in the ratio 5 : 6 respectively. Seven years hence this ratio will become 6 : 7 respectively. What is X's present age in years ? **(Bank P.O. 2003)**
   (*a*) 35 (*b*) 42 (*c*) 49
   (*d*) Cannot be determined (*e*) None of these
6. Present ages of Sameer and Anand are in the ratio of 5 : 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years ? **(R.B.I. 2003)**
   (*a*) 24 (*b*) 27 (*c*) 40
   (*d*) Cannot be determined (*e*) None of these

7. Six years ago, the ratio of the ages of Kunal and Sagar was 6 : 5. Four years hence, the ratio of their ages will be 11 : 10. What is Sagar's age at present ? **(Bank P.O. 2004)**
(*a*) 16 years (*b*) 18 years (*c*) 20 years
(*d*) Cannot be determined (*e*) None of these

8. The total of the ages of Jayant, Prem and Saransh is 93 years. Ten years ago, the ratio of their ages was 2 : 3 : 4. What is the present age of Saransh ?
(*a*) 24 years (*b*) 32 years (*c*) 34 years (*d*) 38 years

9. The ratio of the present ages of two brothers is 1 : 2 and 5 years back, the ratio was 1 : 3. What will be the ratio of their ages after 5 years ? **(S.S.C. 2002)**
(*a*) 1 : 4 (*b*) 2 : 3 (*c*) 3 : 5 (*d*) 5 : 6

10. Hitesh is 40 years old and Ronnie is 60 years old. How many years ago was the ratio of their ages 3 : 5 ?
(*a*) 5 years (*b*) 10 years (*c*) 20 years (*d*) 37 years

11. The ratio of the father's age to his son's age is 7 : 3. The product of their ages is 756. The ratio of their ages after 6 years will be :
(*a*) 5 : 2 (*b*) 2 : 1 (*c*) 11 : 7 (*d*) 13 : 9

12. The present ages of three persons are in proportions 4 : 7 : 9. Eight years ago, the sum of their ages was 56. Find their present ages (in years). **(I.M.T. 2002)**
(*a*) 8, 20, 28 (*b*) 16, 28, 36 (*c*) 20, 35, 45 (*d*) None of these

13. The ratio of the ages of a man and his wife is 4 : 3. After 4 years, this ratio will be 9 : 7. If at the time of marriage, the ratio was 5 : 3, then how many years ago were they married ?
(*a*) 8 years (*b*) 10 years (*c*) 12 years (*d*) 15 years

14. The ratio between the school ages of Neelam and Shaan is 5 : 6 respectively. If the ratio between the one-third age of Neelam and half of Shaan's age is 5 : 9, then what is the school age of Shaan ? **(Bank P.O. 2002)**
(*a*) 25 years (*b*) 30 years (*c*) 36 years
(*d*) Cannot be determined (*e*) None of these

15. The ratio between the present ages of A and B is 5 : 3 respectively. The ratio between A's age 4 years ago and B's age 4 years hence is 1 : 1. What is the ratio between A's age 4 years hence and B's age 4 years ago ? **(SIDBI, 2000)**
(*a*) 1 : 3 (*b*) 2 : 1 (*c*) 3 : 1 (*d*) 4 : 1 (*e*) None of these

16. Ten years ago, A was half of B in age. If the ratio of their present ages is 3 : 4, what will be the total of their present ages ?
(*a*) 20 years (*b*) 30 years (*c*) 45 years (*d*) None of these

17. A is two years older than B who is twice as old as C. If the total of the ages of A, B and C be 27, then how old is B ? **(Hotel Management, 2003)**
(*a*) 7 (*b*) 8 (*c*) 9 (*d*) 10 (*e*) 11

18. A man is 24 years older than his son. In two years, his age will be twice the age of his son. The present age of the son is : **(R.R.B. 2003)**
(*a*) 14 years (*b*) 18 years (*c*) 20 years (*d*) 22 years

19. Eighteen years ago, a father was three times as old as his son. Now the father is only twice as old as his son. Then the sum of the present ages of the son and the father is : **(S.S.C. 2003)**
(*a*) 54 (*b*) 72 (*c*) 105 (*d*) 108

20. A person's present age is two-fifth of the age of his mother. After 8 years, he will be one-half of the age of his mother. How old is the mother at present ?
(*a*) 32 years (*b*) 36 years (*c*) 40 years (*d*) 48 years
(IGNOU, 2003)

21. Tanya's grandfather was 8 times older to her 16 years ago. He would be 3 times of her age 8 years from now. Eight years ago, what was the ratio of Tanya's age to that of her grandfather ? **(S.S.C. 2003)**

(*a*) 1 : 2 (*b*) 1 : 5 (*c*) 3 : 8 (*d*) None of these

22. The age of father 10 years ago was thrice the age of his son. Ten years hence, father's age will be twice that of his son. The ratio of their present ages is :

(*a*) 5 : 2 (*b*) 7 : 3 (*c*) 9 : 2 (*d*) 13 : 4

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

23. Four years ago, the father's age was three times the age of his son. The total of the ages of the father and the son after four years, will be 64 years. What is the father's age at present ?

(*a*) 32 years (*b*) 36 years (*c*) 44 years

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

24. One year ago, Promila was four times as old as her daughter Sakshi. Six years hence, Promila's age will exceed her daughter's age by 9 years. The ratio of the present ages of Promila and her daughter is :

(*a*) 9 : 2 (*b*) 11 : 3 (*c*) 12 : 5 (*d*) 13 : 4

25. The sum of the present ages of a father and his son is 60 years. Six years ago, father's age was five times the age of the son. After 6 years, son's age will be :

(*a*) 12 years (*b*) 14 years (*c*) 18 years (*d*) 20 years

(R.R.B. 2000)

26. The total age of A and B is 12 years more than the total age of B and C. C is how many years younger than A ? **(SIDBI, 2000)**

(*a*) 12 (*b*) 24 (*c*) C is elder than A

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

27. Q is as much younger than R as he is older than T. If the sum of the ages of R and T is 50 years, what is definitely the difference between R and Q's age ?

(*a*) 1 year (*b*) 2 years (*c*) 25 years

(*d*) Data inadequate (*e*) None of these **(Bank P.O. 1999)**

28. The age of a man is three times the sum of the ages of his two sons. Five years hence, his age will be double of the sum of the ages of his sons. The father's present age is :

(*a*) 40 years (*b*) 45 years (*c*) 50 years (*d*) 55 years

29. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages was 34. The ages of the son and the father are respectively :

(*a*) 6 and 39 (*b*) 7 and 38 (*c*) 9 and 36 (*d*) 11 and 34

30. Rajan got married 8 years ago. His present age is $\frac{6}{5}$ times his age at the time of his marriage. Rajan's sister was 10 years younger to him at the time of his marriage. The age of Rajan's sister is : **(U.P.S.C. 2003)**

(*a*) 32 years (*b*) 36 years (*c*) 38 years (*d*) 40 years

31. The sum of the ages of 5 children born at the intervals of 3 years each is 50 years. What is the age of the youngest child ? **(S.S.C. 2000)**

(*a*) 4 years (*b*) 8 years (*c*) 10 years (*d*) None of these

32. Father is aged three times more than his son Ronit. After 8 years, he would be two and a half times of Ronit's age. After further 8 years, how many times would he be of Ronit's age ? **(C.B.I. 1998)**

(*a*) 2 times (*b*) $2\frac{1}{2}$ times (*c*) $2\frac{3}{4}$ times (*d*) 3 times

33. The difference between the ages of two persons is 10 years. Fifteen years ago, the elder one was twice as old as the younger one. The present age of the elder person is :

(*a*) 25 years (*b*) 35 years (*c*) 45 years (*d*) 55 years

34. A father said to his son, "I was as old as you are at present at the time of your birth." If the father's age is 38 years now, the son's age five years back was :

(*a*) 14 years (*b*) 19 years (*c*) 33 years (*d*) 38 years

(Assistant Grade, 1998)

35. In 10 years, A will be twice as old as B was 10 years ago. If A is now 9 years older than B, the present age of B is :

(*a*) 19 years (*b*) 29 years (*c*) 39 years (*d*) 49 years

36. Sneh's age is $\frac{1}{6}$th of her father's age. Sneh's father's age will be twice of Vimal's age after 10 years. If Vimal's eighth birthday was celebrated two years before, then what is Sneh's present age ?

(*a*) $6\frac{2}{3}$ years (*b*) 24 years (*c*) 30 years (*d*) None of these

37. If 6 years are subtracted from the present age of Gagan and the remainder is divided by 18, then the present age of his grandson Anup is obtained. If Anup is 2 years younger to Madan whose age is 5 years, then what is Gagan's present age ?

(*a*) 48 years (*b*) 60 years (*c*) 84 years (*d*) 96 years

38. Ayesha's father was 38 years of age when she was born while her mother was 36 years old when her brother four years younger to her was born. What is the difference between the ages of her parents ? **(Hotel Management, 2002)**

(*a*) 2 years (*b*) 4 years (*c*) 6 years (*d*) 8 years

39. My brother is 3 years elder to me. My father was 28 years of age when my sister was born while my mother was 26 years of age when I was born. If my sister was 4 years of age when my brother was born, then, what was the age of my father and mother respectively when my brother was born ?

(*a*) 32 yrs, 23 yrs (*b*) 32 yrs, 29 yrs (*c*) 35 yrs, 29 yrs (*d*) 35 yrs, 33 yrs

40. A person was asked to state his age in years. His reply was, "Take my age three years hence, multiply it by 3 and then subtract three times my age three years ago and you will know how old I am." What was the age of the person ? **(S.S.C. 2004)**

(*a*) 18 years (*b*) 20 years (*c*) 24 years (*d*) 32 years

ANSWERS

1. (*e*)	2. (*e*)	3. (*a*)	4. (*b*)	5. (*a*)	6. (*a*)	7. (*a*)	8. (*d*)
9. (*c*)	10. (*b*)	11. (*b*)	12. (*b*)	13. (*c*)	14. (*d*)	15. (*c*)	16. (*d*)
17. (*d*)	18. (*d*)	19. (*d*)	20. (*c*)	21. (*d*)	22. (*b*)	23. (*e*)	24. (*d*)
25. (*d*)	26. (*a*)	27. (*d*)	28. (*b*)	29. (*a*)	30. (*c*)	31. (*a*)	32. (*a*)
33. (*b*)	34 (*b*)	35. (*c*)	36. (*d*)	37. (*b*)	38. (*c*)	39. (*a*)	40. (*a*)

SOLUTIONS

1. Let Rahul's age be x years. Then, Sachin's age = $(x - 7)$ years.

$$\therefore \frac{x-7}{x} = \frac{7}{9} \Leftrightarrow 9x - 63 = 7x \Leftrightarrow 2x = 63 \Leftrightarrow x = 31.5.$$

Hence, Sachin's age = $(x - 7) = 24.5$ years.

2. Let P's age and Q's age be $6x$ years and $7x$ years respectively.
Then, $7x - 6x = 4 \Leftrightarrow x = 4$.
$\therefore$ Required ratio $= (6x + 4) : (7x + 4) = 28 : 32 = 7 : 8$.

3. Let the present ages of P and Q be $5x$ years and $7x$ years respectively.
Then, $7x - (5x + 6) = 2 \Leftrightarrow 2x = 8 \Leftrightarrow x = 4$.
$\therefore$ Required sum $= 5x + 7x = 12x = 48$ years.

4. Let the present ages of Arun and Deepak be $4x$ years and $3x$ years respectively. Then,
$4x + 6 = 26 \Leftrightarrow 4x = 20 \Leftrightarrow x = 5$.
$\therefore$ Deepak's age $= 3x = 15$ years.

5. Let the present ages of X and Y be $5x$ years and $6x$ years respectively.
Then, $\dfrac{5x+7}{6x+7} = \dfrac{6}{7} \Leftrightarrow 7(5x+7) = 6(6x+7) \Leftrightarrow x = 7$.
$\therefore$ X's present age $= 5x = 35$ years.

6. Let the present ages of Sameer and Anand be $5x$ years and $4x$ years respectively.
Then, $\dfrac{5x+3}{4x+3} = \dfrac{11}{9} \Leftrightarrow 9(5x+3) = 11(4x+3) \Leftrightarrow x = 6$.
$\therefore$ Anand's present age $= 4x = 24$ years.

7. Let the ages of Kunal and Sagar 6 years ago be $6x$ and $5x$ years respectively.
Then, $\dfrac{(6x+6)+4}{(5x+6)+4} = \dfrac{11}{10} \Leftrightarrow 10(6x+10) = 11(5x+10) \Leftrightarrow 5x = 10 \Leftrightarrow x = 2$.
$\therefore$ Sagar's present age $= (5x + 6) = 16$ years.

8. Let the ages of Jayant, Prem and Saransh 10 years ago be $2x$, $3x$ and $4x$ years respectively.
Then, $(2x + 10) + (3x + 10) + (4x + 10) = 93 \Leftrightarrow 9x = 63 \Leftrightarrow x = 7$.
$\therefore$ Saransh's present age $= (4x + 10) = 38$ years.

9. Let the present ages of the two brothers be x years and $2x$ years respectively.
Then, $\dfrac{x-5}{2x-5} = \dfrac{1}{3} \Leftrightarrow 3(x-5) = (2x-5) \Leftrightarrow x = 10$.
$\therefore$ Required ratio $= (x + 5) : (2x + 5) = 15 : 25 = 3 : 5$.

10. Suppose, the ratio was $3 : 5$, x years ago.
Then, $\dfrac{40-x}{60-x} = \dfrac{3}{5} \Leftrightarrow 5(40-x) = 3(60-x) \Leftrightarrow 2x = 20 \Leftrightarrow x = 10$.

11. Let the present ages of the father and son be $7x$ and $3x$ years respectively.
Then, $7x \times 3x = 756 \Leftrightarrow 21x^2 = 756 \Leftrightarrow x^2 = 36 \Leftrightarrow x = 6$.
$\therefore$ Required ratio $= (7x + 6) : (3x + 6) = 48 : 24 = 2 : 1$.

12. Let their present ages be $4x$, $7x$ and $9x$ years respectively.
Then, $(4x - 8) + (7x - 8) + (9x - 8) = 56 \Leftrightarrow 20x = 80 \Leftrightarrow x = 4$.
$\therefore$ Their present ages are 16 years, 28 years and 36 years respectively.

13. Let the present ages of the man and his wife be $4x$ and $3x$ years respectively.
Then, $\dfrac{4x+4}{3x+4} = \dfrac{9}{7} \Leftrightarrow 7(4x+4) = 9(3x+4) \Leftrightarrow x = 8$.
So, their present ages are 32 years and 24 years respectively.
Suppose they were married z years ago.
Then, $\dfrac{32-z}{24-z} = \dfrac{5}{3} \Leftrightarrow 3(32-z) = 5(24-z) \Leftrightarrow 2z = 24 \Leftrightarrow z = 12$.