6. AVERAGE

IMPORTANT FACTS AND FORMULAE

1. Average $= \left(\dfrac{\text{Sum of observations}}{\text{Number of observations}}\right)$.
2. Suppose a man covers a certain distance at x kmph and an equal distance at y kmph. Then, the average speed during the whole journey is $\left(\dfrac{2xy}{x+y}\right)$ kmph.

SOLVED EXAMPLES

Ex. 1. ***Find the average of all prime numbers between 30 and 50.***

Sol. There are five prime numbers between 30 and 50.

They are 31, 37, 41, 43 and 47.

$\therefore$ Required average $= \left(\dfrac{31+37+41+43+47}{5}\right) = \dfrac{199}{5} = 39.8.$

Ex. 2. ***Find the average of first 40 natural numbers.***

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

So, sum of first 40 natural numbers $= \dfrac{40 \times 41}{2} = 820.$

$\therefore$ Required average $= \dfrac{820}{40} = 20.5.$

Ex. 3. ***Find the average of first 20 multiples of 7.***

Sol. Required average $= \dfrac{7(1+2+3+\ldots..+20)}{20} = \left(\dfrac{7 \times 20 \times 21}{20 \times 2}\right) = \left(\dfrac{147}{2}\right) = 73.5.$

Ex. 4. ***The average of four consecutive even numbers is 27. Find the largest of these numbers.***

Sol. Let the numbers be x, $x + 2$, $x + 4$ and $x + 6$. Then,

$$\frac{x+(x+2)+(x+4)+(x+6)}{4} = 27 \Rightarrow \frac{4x+12}{4} = 27 \Rightarrow x + 3 = 27 \Rightarrow x = 24.$$

$\therefore$ Largest number $= (x + 6) = 24 + 6 = 30.$

Ex. 5. ***There are two sections A and B of a class, consisting of 36 and 44 students respectively. If the average weight of section A is 40 kg and that of section B is 35 kg, find the average weight of the whole class.***

Sol. Total weight of $(36 + 44)$ students $= (36 \times 40 + 44 \times 35)$ kg $= 2980$ kg.

$\therefore$ Average weight of the whole class $= \left(\dfrac{2980}{80}\right)$ kg $= 37.25$ kg.

Ex. 6. ***Nine persons went to a hotel for taking their meals. Eight of them spent Rs. 12 each on their meals and the ninth spent Rs. 8 more than the average expenditure of all the nine. What was the total money spent by them ?***

Sol. Let the average expenditure of all the nine be Rs. x.

Then, $12 \times 8 + (x + 8) = 9x$ or $8x = 104$ or $x = 13$.

$\therefore$ Total money spent $= 9x =$ Rs. $(9 \times 13) =$ Rs. 117.

Ex. 7. ***Of the three numbers, second is twice the first and is also thrice the third. If the average of the three numbers is 44, find the largest number.***

Sol. Let the third number be x. Then, second number $= 3x$. First number $= \frac{3x}{2}$.

$\therefore \quad x + 3x + \frac{3x}{2} = (44 \times 3)$ or $\frac{11x}{2} = 44 \times 3$ or $x = 24$.

So, largest number = 2nd number $= 3x = 72$.

Ex. 8. ***The average of 25 results is 18. The average of first twelve of them is 14 and that of last twelve is 17. Find the thirteenth result.***

Sol. Clearly, thirteenth result = (sum of 25 results) – (sum of 24 results)

$= (18 \times 25) - [(14 \times 12) + (17 \times 12)]$

$= 450 - (168 + 204) = 450 - 372 = 78.$

Ex. 9. ***The average of 11 results is 60. If the average of first six results is 58 and that of the last six is 63, find the sixth result.***

Sol. Sixth result $= (58 \times 6 + 63 \times 6 - 60 \times 11) = 66$.

Ex. 10. ***The average weight of A, B, C is 45 kg. If the average weight of A and B be 40 kg and that of B and C be 43 kg, find the weight of B.***

Sol. Let A, B and C represent their individual weights. Then,

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

$A + B = (40 \times 2)$ kg $= 80$ kg and $B + C = (43 \times 2)$ kg $= 86$ kg.

$\therefore \quad B = (A + B) + (B + C) - (A + B + C) = (80 + 86 - 135)$ kg $= 31$ kg.

Ex. 11. ***The average age of a class of 39 students is 15 years. If the age of the teacher be included, then the average increases by 3 months. Find the age of the teacher.***

Sol. Total age of 39 persons $= (39 \times 15)$ years $= 585$ years.

Average age of 40 persons = 15 years 3 months $= \frac{61}{4}$ years.

Total age of 40 persons $= \left(\frac{61}{4} \times 40\right)$ years $= 610$ years.

$\therefore$ Age of the teacher $= (610 - 585)$ years $= 25$ years.

Ex. 12. ***The average weight of 10 oarsmen in a boat is increased by 1.8 kg when one of the crew, who weighs 53 kg is replaced by a new man. Find the weight of the new man.***

Sol. Total weight increased $= (1.8 \times 10)$ kg $= 18$ kg.

$\therefore$ Weight of the new man $= (53 + 18)$ kg $= 71$ kg.

Ex. 13. ***There were 35 students in a hostel. Due to the admission of 7 new students, the expenses of the mess were increased by Rs. 42 per day while the average expenditure per head diminished by Re 1. What was the original expenditure of the mess ?***

Sol. Let the original average expenditure be Rs. x. Then,

$42(x - 1) - 35x = 42 \Leftrightarrow 7x = 84 \Rightarrow x = 12.$

$\therefore$ Original expenditure = Rs. $(35 \times 12) =$ Rs. 420.

Ex. 14. ***A batsman makes a score of 87 runs in the 17th inning and thus increases his average by 3. Find his average after 17th inning.***

Sol. Let the average after 17th inning = x.

Then, average after 16th inning = $(x - 3)$.

$\therefore$ $16(x - 3) + 87 = 17x$ or $x = (87 - 48) = 39$.

Ex. 15. ***Distance between two stations A and B is 778 km. A train covers the journey from A to B at 84 km per hour and returns back to A with a uniform speed of 56 km per hour. Find the average speed of the train during the whole journey.***

Sol. Required average speed $= \left(\frac{2xy}{x+y}\right)$ km/hr $= \frac{2 \times 84 \times 56}{(84+56)}$ km/hr

$= \left(\frac{2 \times 84 \times 56}{140}\right)$ km/hr $= 67.2$ km/hr.

EXERCISE 6A

(OBJECTIVE TYPE QUESTIONS)

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

1. David obtained 76, 65, 82, 67 and 85 marks (out of 100) in English, Mathematics, Physics, Chemistry and Biology. What are his average marks ? **(Bank P.O. 2003)**

   (a) 65 (b) 69 (c) 72

   (d) 76 (e) None of these

2. In Arun's opinion, his weight is greater than 65 kg but less than 72 kg. His brother does not agree with Arun and he thinks that Arun's weight is greater than 60 kg but less than 70 kg. His mother's view is that his weight cannot be greater than 68 kg. If all of them are correct in their estimation, what is the average of different probable weights of Arun ? **(S.B.I.P.O. 2000)**

   (a) 67 kg (b) 68 kg (c) 69 kg

   (d) Data inadequate (e) None of these

3. The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero ? **(Hotel Management, 2002)**

   (a) 0 (b) 1 (c) 10 (d) 19

4. Find the average of all the numbers between 6 and 34 which are divisible by 5.

   (a) 18 (b) 20 (c) 24 (d) 30 **(C.B.I. 1997)**

5. The average of first five multiples of 3 is : **(Assistant Grade, 1998)**

   (a) 3 (b) 9 (c) 12 (d) 15

6. The average of the first nine prime numbers is : **(C.B.I. 2003)**

   (a) 9 (b) 11 (c) $11\frac{1}{9}$ (d) $11\frac{2}{9}$

7. A student was asked to find the arithmetic mean of the numbers 3, 11, 7, 9, 15, 13, 8, 19, 17, 21, 14 and x. He found the mean to be 12. What should be the number in place of x ? **(Section Officers', 2003)**

   (a) 3 (b) 7 (c) 17 (d) 31

8. The average of 2, 7, 6 and x is 5 and the average of 18, 1, 6, x and y is 10. What is the value of y ?

   (a) 5 (b) 10 (c) 20 (d) 30

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

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

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

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

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

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

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

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

$= 100 + 100 + 100 + ...$ (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,

$$\frac{x + x^2}{2} = 5x \iff x^2 - 9x = 0 \iff x(x - 9) = 0 \iff x = 0 \text{ or } x = 9.$$

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

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

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 $= 4x$.

$\therefore \quad \frac{1}{x} + \frac{1}{2x} + \frac{1}{4x} = \left(\frac{7}{72} \times 3\right)$ 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 $= (10 \times 7) = 70$.

$\therefore \quad x_1 + x_2 + \ldots\ldots + x_{10} = 70.$

$\Rightarrow \quad 12x_1 + 12x_2 + \ldots\ldots + 12x_{10} = 840$

$\Rightarrow \quad \frac{12x_1 + 12x_2 + \ldots\ldots + 12x_{10}}{10} = 84$

$\Rightarrow$ Average of new numbers is 84.

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

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

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

$\Rightarrow$ 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 = $\left(x \times \frac{1}{2}\right) = \frac{x}{2}$.

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

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 × 15 − 36 × 14) years = 51 years.

59. Manager's monthly salary = Rs. (1600 × 21 − 1500 × 20) = Rs. 3600.

60. Weight of the teacher = (35.4 × 25 − 35 × 24) kg = 45 kg.

61. Age of the mother = (12 × 7 − 7 × 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 × 1.4 − 20 × 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 × 45) − (48 × 5) + (54 × 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 × 3) = 252 kg, A + B + C + D = (80 × 4) = 320 kg.

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

B + C + D + E = (79 × 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 = $(x + 1)$.

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

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 :

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

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*).