1. B; $\dfrac{100\times2210}{100\times4+\dfrac{7\times4\times3}{2}}=500$

2. D; $\dfrac{100\times2120}{100\times4+\dfrac{4\times4\times3}{2}}=500$

3. C; $\dfrac{100\times19350}{100\times4+\dfrac{5\times4\times3}{2}}=4500$

4. D; $\dfrac{100\times2280}{100\times8+\dfrac{4\times8\times7}{2}}=250$

5. A; $\dfrac{80\times\left(100\times5+\dfrac{5\times5\times4}{2}\right)}{100}=\dfrac{80\times550}{100}$

$=440$

6. B; $\dfrac{1000\times\left(100\times5+\dfrac{4\times5\times4}{2}\right)}{100}$

$=\dfrac{1000\times540}{100}=5400$

7. D; $\dfrac{700\times\left(100\times5+\dfrac{10\times5\times4}{2}\right)}{100}$

$=\dfrac{700\times600}{100}=4200$

8. A; $\dfrac{2100}{\dfrac{10}{11}+\dfrac{100}{121}}=\dfrac{2100\times121}{(110+100)}=1210$

9. B; $\dfrac{13000}{\dfrac{25}{27}+\dfrac{625}{729}}=\dfrac{13000\times729}{1300}=7290$

10. D; $\dfrac{25500}{\dfrac{25}{26}+\dfrac{625}{676}}=\dfrac{25500\times676}{1275}=13520$

11. C; $\dfrac{24600}{\dfrac{20}{21}+\dfrac{400}{441}}=\dfrac{24600\times441}{820}=13230$

12. D; $2809\times\left(\dfrac{50}{53}+\dfrac{2500}{2809}\right)$

$=2809\times\dfrac{5150}{2809}=5150$

13. B; $8410\times\left(\dfrac{25}{29}+\dfrac{625}{841}\right)$

$=8410\times\dfrac{1350}{841}=13500$

14. D; $11449\times\left(\dfrac{100}{107}+\dfrac{10000}{11449}\right)$

$=\dfrac{11449\times20700}{11449}=20700$

15. B; $11881\times\left(\dfrac{100}{109}+\dfrac{10000}{11881}\right)$

$=\dfrac{11881\times20900}{11881}=20900$

16. D; $\dfrac{3310}{\left(\dfrac{10}{11}+\dfrac{100}{121}+\dfrac{1000}{1331}\right)}$

$=\dfrac{3310\times1331}{(1210+1100+1000)}=1331$

17. A; $\dfrac{45500}{\left(\dfrac{5}{6}+\dfrac{25}{36}+\dfrac{125}{216}\right)}$

$=\dfrac{45500\times246}{(180+150+125)}$

$=\dfrac{45500\times216}{455}=21600$

18. B; $\dfrac{25220}{\left(\dfrac{20}{21}+\dfrac{400}{441}+\dfrac{8000}{9261}\right)}$

$$= \frac{25220 \times 9261}{(8820 + 8400 + 8000)}$$

$$= \frac{25220 \times 9261}{25220} = 9261$$

19. A; $\dfrac{52725}{\left(\frac{25}{28} + \frac{625}{784} + \frac{15625}{21952}\right)}$

$$= \frac{52725 \times 21952}{(19600 + 17500 + 15625)}$$

$$= \frac{52725 \times 21952}{52725} = 21952$$

20. A; $12500 \times \left(\frac{4}{5} + \frac{16}{25} + \frac{64}{125}\right)$

$$= 12500 \times \left(\frac{100 + 80 + 64}{125}\right)$$

$$= \frac{12500 \times 244}{125} = 24400$$

21. B; $21970 \times \left(\frac{10}{13} + \frac{100}{169} + \frac{1000}{2197}\right)$

$$= 21970 \times \left(\frac{1690 + 1300 + 1000}{2197}\right)$$

$$= \frac{21970 \times 3990}{2197} = 39900$$

22. C; $29791 \times \left(\frac{25}{31} + \frac{625}{961} + \frac{15625}{29791}\right)$

$$= 29791 \times \left(\frac{24025 + 19375 + 15625}{29791}\right)$$

$$= 59025$$

23. B; $24334 \times \left(\frac{20}{23} + \frac{400}{529} + \frac{8000}{12167}\right)$

$$= 24334 \times \left(\frac{10580 + 9200 + 8000}{12167}\right)$$

$$= \frac{24334 \times 27780}{12167} = 55560$$

24. C; $\dfrac{46410}{\left(\frac{10}{11} + \frac{100}{121} + \frac{1000}{1331} + \frac{10000}{14641}\right)}$

$$= \frac{46410}{\left(\frac{13310 + 12100 + 11000 + 10000}{14641}\right)}$$

$$= \frac{46410 \times 14641}{46410} = 14641$$

25. D; $12960 \times \left(\frac{5}{6} + \frac{25}{36} + \frac{125}{216} + \frac{625}{1296}\right)$

$$= 12960 \times \left(\frac{1080 + 900 + 750 + 625}{1296}\right)$$

$$= 12960 \times \left(\frac{3355}{1296}\right) = 33550$$

26. A; $7500 \div 3 = 2500$

For first year

2500 + 4% of 7500

= 2500 + 300 = 2800

For second year

2500 + 4% of 5000

= 2500 + 200 = 2700

For third year

2500 + 4% of 2500

2500 + 100 = 2600

27. A; $1500 + \left(1020 \times \frac{10}{11} + 1003 \times \frac{100}{121} + 990 \times \frac{1000}{1331}\right)$

$$1500 + \left(\frac{1020 \times 1210 + 1003 \times 1100 + 990 \times 1000}{1331}\right)$$

$$= 1500 + \left(\frac{3327500}{1331}\right) = 4000$$

28. D; $1500 + 1020 + 1003 + 990 - 4000 = 513$

CHAPTER

15 AVERAGE

1. Find the average of the first hundred natural numbers?
(1) 50.5 (2) 38.6
(3) 50.8 (4) 45.6
(5) None of these

2. Find the average of all even numbers upto 100?
(1) 51 (2) 38.6
(3) 50.8 (4) 45.6
(5) None of these

3. Find the average of first 50 even numbers?
(1) 51 (2) 72
(3) 46 (4) 49
(5) None of these

4. Find the average of all odd numbers upto 100?
(1) 51 (2) 50
(3) 46 (4) 49
(5) None of these

5. The average of certain first consecutive odd numbers is 60. Find their sum?
(1) 2551 (2) 3600
(3) 3460 (4) 2496
(5) None of these

6. The average of certain first consecutive even number is 101. Find their sum.
(1) 25000 (2) 33600
(3) 10100 (4) 24960
(5) None of these

7. The average of certain first consecutive natural numbers is 20.5. Find their sum.
(1) 282 (2) 450
(3) 518 (4) 820
(5) None of these

8. Find the average of first 20 multiplies of 3?
(1) 30.2 (2) 31.5
(3) 40.3 (4) 20.2
(5) None of these

9. Find the average of all the prime numbers between 20 and 40?
(1) 32 (2) 30
(3) 40 (4) 20
(5) None of these

10. If the average of m numbers is n^2 and that of n numbers is m^2, then the average of (m + n) numbers is—
(1) $\frac{m}{n}$ (2) m + n
(3) mn (4) m – n
(5) None of these

11. A, B, C, D and E are five consecutive odd numbers. Average of A and C is 59. What is the smallest number?
(1) 65 (2) 63
(3) 61 (4) 57
(5) None of these

12. A, B, C, D & E are five consecutive even numbers. Average of A and E is 46. What is the largest number?
(1) 52 (2) 42
(3) 50 (4) 48
(5) None of these

13. The difference between the average of three consecutive even numbers and the average of the next two consecutive even numbers is 5. What is the first even number?
(1) 10 (2) 12
(3) 14
(4) Infinite or many solutions
(5) None of these

14. The sum of the average of three consecutive odd numbers and three consecutive even numbers is 21 .If the highest even number is 16, what is the lowest odd number?
(1) 5 (2) 7
(3) 9 (4) 11
(5) None of these

15. The average of the five consecutive odd numbers is k. If the next three odd numbers are added then the new average will exceed the old average by-
(1) 2
(2) 3
(3) 4
(4) 2
(5) None of these

16. The average of six numbers is 45.5. If a new number is added then the new average becomes 47. Find the new number?
(1) 62
(2) 56
(3) 54
(4) 52
(5) None of these

17. The average of three numbers is 28. If first number is half of the second and the 3rd number is twice the second, then the third number is—
(1) 48
(2) 36
(3) 24
(4) 18
(5) None of these

18. Out of four numbers, the average of first three numbers is thrice the fourth number. If the average of the four numbers is 5, the fourth number is
(1) 4.5
(2) 5
(3) 2
(4) 4
(5) None of these

19. The average of three numbers is 77. The first number is twice the second and the second number is twice the third. The first number is
(1) 33
(2) 66
(3) 77
(4) 132
(5) None of these

20. In a group of 3 numbers, the 1st is double of 2nd and half of third. If the average of the three numbers is 56 then find the difference between the third and first number.
(1) 48
(2) 43
(3) 45
(4) 40
(5) None of these

21. The average of 8 numbers is 20. The average of first two numbers is 15.5 and the average of next three number is $21\frac{1}{3}$. If the 6th number is 4 and 7 less by the 7th and the 8th numbers respectively then what will be the 8th number?
(1) 25
(2) 22
(3) 35
(4) 30
(5) None of these

22. The average temperature from Monday to Wednesday is 37^0C while the average temperature from Tuesday to Thursday is 34^0C. The temperature of Thursday is $\frac{4}{5}$ times to that of Monday. Find the temperature of thursday?
(1) 36^0C
(2) 33^0C
(3) 37^0C
(4) 34^0C
(5) None of these

23. Of the three numbers whose average is 60, the first is one-fourth of the sum of the others. The first number is
(1) 30
(2) 36
(3) 42
(4) 45
(5) None of these

24. The average of 11 numbers is 10.9. If the average of first six numbers is 10.5 and the average of last six numbers is 11.4 then what is the middle number?
(1) 11.5
(2) 12.5
(3) 10.6
(4) 15.3
(5) None of these

25. Out of given 5 numbers, the average of first four is 26 and of the last four is 25. What will be the difference between the first and the last number?
(1) 4
(2) 2
(3) 3
(4) 1
(5) None of these

26. The average of 10 numbers is 7. If each number is multiplied by 12, then the average of the new set of numbers will be
(1) 7 (2) 19
(3) 82 (4) 84
(5) None of these

27. The average salary of 15 persons is ₹ 5,500. If the salary of one person is added, the average increases to ₹ 5,700. What is the salary of this one person?
(1) ₹ 8,700 (2) ₹ 9,500
(3) ₹ 7,800 (4) ₹ 8,500
(5) None of these

28. In a certain year, the average monthly income of a person was ₹ 3,400. For the first eight months of the year, his average monthly income was ₹ 3,160 and for the last five months, it was₹ 4,120. His income in the eighth month of the year was
(1) ₹ 3,160 (2) ₹ 5,080
(3) ₹ 15,520 (4) ₹ 5,520
(5) None of these

29. The average income of 40 persons is ₹ 4200 and that of another 35 persons is ₹ 4000. The average income of the whole group is
(1) ₹ 4,100 (2) ₹ $4,106\frac{1}{3}$
(3) ₹ $4,106\frac{2}{3}$ (4) ₹ $4,108\frac{1}{3}$
(5) None of these

30. X has twice as much money as that of Y and Y has 50% more money than that of Z. If the average money of all of them is ₹ 110, then the money, which X has, is
(1) ₹ 55 (2) ₹ 60
(3) ₹ 90 (4) ₹ 180
(5) None of these

31. 13 chairs and 5 tables were bought for ₹ 8280. If the cost of a table be ₹ 1227, what is the average cost of a chair?
(1) ₹ 165 (2) ₹ 175
(3) ₹ 185 (4) ₹ 225
(5) None of these

32. A man bought 13 shirts of ₹ 50 each, 15 pants of ₹ 60 each and 12 pairs of shoes at ₹ 65 a pair. Find the average value of all the article.
(1) ₹ 38.25 (2) ₹ 48.25
(3) ₹ 58.25 (4) ₹ 68.25
(5) None of these

33. The average salary of the entire staff in a office is ₹ 120 per month. The average salary of officers is ₹ 460 and that of non-officers is ₹ 110. If the number of officers is 15, then find the number of non-officers in the office.
(1) 610 (2) 510
(3) 410
(4) Can't be determined
(5) None of these

34. The average of marks obtained by 120 candidates in a certain examination is 35. If the average marks of passed candidates is 39 and that of the failed candidates is 15, what is the number of candidates who passed the examination?
(1) 100 (2) 120
(3) 140 (4) 160
(5) None of these

35. In a class, the average of boys and girls is A. The ratio of boys and girls is 3:1. If the average of the marks obtained by boys is A+1 then find the average of marks obtained by girls?
(1) A+3 (2) A+1
(3) A+2 (4) A-3
(5) None of these

36. The average weight of 24 students is 35kgs. If the weight of teacher is added the average increased by 400 gms. What is the weight of the teacher?
(1) 45 (2) 36
(3) 54 (4) 63
(5) None of these

37. The average weight of 8 people increases by 1.5 kg. if a man whose weight is 65kgs is replaced by another man. What is the weight of the new man?
(1) 77 kgs (2) 73 kgs
(3) 75 kgs (4) 74 kgs
(5) None of these

38. The average age of 24 boys and their teacher is 15 years. When the teacher's age is excluded, the average age decreases by 1 year. The age of the teacher is—
(1) 38 years (2) 39 years
(3) 40 years (4) 41 years
(5) None of these

39. The average age of 12 players of a team is 25 years. If the captain's age is included, the average age increases by 1 year. The age of the captain is
(1) 25 yrs (2) 38 yrs
(3) 36 yrs (4) 46 yrs
(5) None of these

40. The average weight of 50 balls is 5 gm. If the weight of the bag be included the average weight increases by 0.05 gm. What is the weight of the bag in gms?
(1) 5.05 (2) 6.05
(3) 7.05 (4) 7.55
(5) None of these

41. The average weight of 8 persons is increased by 2.5 kg when one of them who weighs 56 kg is replaced by a new man. The weight of the new man is
(1) 73 kg (2) 72 kg
(3) 75 kg (4) 80 kg
(5) None of these

42. If the average weight of 6 students is 50 kg; that of 2 students is 51 kg; and that of 2 students is 55 kg, then the average weight of all ten students is
(1) 61 kg (2) 51.5 kg
(3) 52 kg (4) 51.2 kg
(5) None of these

43. The average age of 8 members of a group is 40 years. Among them the age of 1 member is 55 yrs. After his retirement a new member whose age is 39 years comes in his place . What is the effect on the average age of group?
(1) 2 years (2) 0 years
(3) 3 years (4) 5 years
(5) None of these

44. The average age of 3 friends is 23. If the age of 4th friend is added, their average age remains 23. What is the age of the 4th friend?
(1) 22 yrs. (2) 23yrs
(3) 24 yrs (4) 25 yrs
(5) None of these

45. There are 600 students in a school whose average age is 18 yrs. If 50 students leave the school their average age decreases by 0.6 yrs. Find the average of those 50 students?
(1) 24.6 yrs. (2) 23.5 yrs.
(3) 22.6 yrs. (4) 25.3 yrs.
(5) None of these

46. In a class the average age of 24 students and their teacher is 15 years. If the age of the teacher is left out their average age decreases by 1. Find the age of the teacher?
(1) 39 (2) 30
(3) 45 (4) 40
(5) None of these

47. In a class the average age of 40 students is 15. If 10 new students are included then the average age of the students increases by 0.2 years find the average age of the new students?
(1) 16 yrs (2) 15 yrs
(3) 14 yrs (4) 13 yrs
(5) None of these

48. In a committee the average age of 8 people increases by 0.2 yrs when two people whose age were 35 years and 45 years are replaced by two women. Find the average age of the two women?
(1) 48 yrs (2) 45 yrs
(3) 44 yrs (4) 43 yrs
(5) None of these

49. The average age of 11 players of a cricket team is increased by 2 months when two of them aged 18 years and 20 years are replaced by two new players. The average age of the new players is
(1) 19 years 1 month
(2) 19 years 6 months
(3) 19 years 11 months
(4) 19 years 5 months
(5) None of these

50. The average age of 30 boys in a class is 15 years. One boy aged 20 years, left the class, but two new boys came in his place the difference of whose ages was 5 years. If the average age of all the boys now in the class still remains 15 years, the age of the younger newcomer is
(1) 20 years (2) 15 years
(3) 10 years (4) 8 years
(5) None of these

51. The average age of 40 students of a class is 18 years. When 20 new students are admitted to the same class, the average age of the students of the class is increased by 6 months. The average age of newly admitted students is
(1) 19 years
(2) 19 years 6 months
(3) 20 years
(4) 20 years 6 months
(5) None of these

52. In a school, the average age of students is 6 years, and the average age of 12 teachers is 40 years. If the average age of the combined group of all the teachers and students is 7 years, then the number of students is
(1) 396 (2) 400
(3) 408 (4) 416
(5) None of these

53. The average marks of a student in four subjects is 75. If the student obtained 80 marks in the 5^{th} subject then the new average is
(1) 80 (2) 76
(3) 92 (4) 95
(5) None of these

54. In an exam, the average was found to be 50 marks. After deducting computational errors the marks of the 100 candidates had to be changed from 90 to 60 each and the average came down to 45 marks. The total number of candidates who took the exam were
(1) 300 (2) 600
(3) 200 (4) 150
(5) None of these

55. The average of the marks obtained in mathematics by 5 students is 50. Later it was realised that the marks obtained by one student was read as 84 though it was originally 48. Find the correct average.
(1) 42.8 (2) 75.3
(3) 65.4 (4) 47.4
(5) None of these

56. 16 children are to be divided into two groups A and B consisting of 10 and 6 children. The average per cent 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 ?
(1) $78\frac{2}{3}$ (2) $77\frac{1}{3}$
(3) $78\frac{1}{3}$ (4) $77\frac{2}{3}$
(5) None of these

57. The average weight of A, B and C is 84 kgs. If D joins, the average weight now is 80 kgs. If another person E who is 3 kgs heavier than D replaces A then the average weight of B, C, D and E becomes 79 kgs. What is the weight of A?
(1) 70 kg (2) 75 kg
(3) 65 kg (4) 55 kg
(5) None of these

58. A batsman has a certain average in 11 innings. In the 12^{th} innings, he scores 90 runs and his average decreases by 5. After the 12^{th} innings what is his average?
(1) 145
(2) 130
(3) 135
(4) 140
(5) None of these

59. The average of runs of a cricket player of 10 innings was 32. How many runs must he score in his next innings so as to increase his average of runs by 4?
(1) 76
(2) 70
(3) 75
(4) 72
(5) None of these

60. A cricketer gives 12.4 runs per wicket. He gives 26 runs and takes 5 wicket in a match after which his average becomes 12 per wicket. How many wickets had been taken till the last match?
(1) 85
(2) 90
(3) 65
(4) 72
(5) None of these

61. A batsman has an average of 30 runs in his 42 innings. The difference between his maximum and minimum score is 100. If these two innings are removed his average for 40 innings comes down to 28. What is his maximum score?
(1) 125
(2) 130
(3) 175
(4) 140
(5) None of these

62. Five years ago the average age of husband and wife was 23 years.Today the average age of husband, wife and child is 20 yrs. How old is the child?
(1) 3 yrs
(2) 4 yrs
(3) 12 yrs
(4) 2 yrs
(5) None of these

63. 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-
(1) 3 years
(2) 2 years
(3) $1\frac{1}{2}$ years
(4) 1 year
(5) None of these

64. The average age of a husband and wife, who were married 7 years ago, was 25 years at the time of their marriage. Now, the average age of the family, including husband, wife and a child, born during the interval, is 22 years. What is the present age of the child ?
(1) 4 yrs
(2) 3 yrs
(3) 2 yrs
(4) 6 yrs
(5) None of these

65. The average age of mother, father and son was 42 yrs. at the time of the marriage of the son. After one year an infant was born in the family and after 6 yrs of marriage the average age of the family became 36 years. What was the age of the bride at the time of marriage?
(1) 25 years
(2) 31 years
(3) 22 years
(4) 24 years
(5) None of these

66. In a class 20% students failed, 60% students secured average marks and the remaining students scored above average marks. How many students are there in the class?
(1) 25
(2) 20
(3) 30
(4) Can't be determined
(5) None of these

67. A train travels from A to B at the rate of 20 km per hour and from B to A at the rate of 30 km/hr. What is the average rate for the whole journey?
(1) 25 km/hr
(2) 20 km/hr
(3) 22 km/hr
(4) 24 km/hr
(5) None of these

68. There were 35 students in a hostel. If the number of students increases by 7, the expenses of the mess increase by ₹ 42 per day while the average expenditure per head decreases by Re 1. Find the original expenditure of the mess.
(1) ₹ 420
(2) ₹ 520
(3) ₹ 450
(4) ₹ 550
(5) None of these

1.1; Important formulae:-

Average of x natural number $= \frac{x+1}{2}$	Average of x even number $= x + 1$	Average of x odd number $= x$	Sum of all natural numbers upto $x = \frac{x(x+1)}{2}$

Where x is the 1st number
Average of first hundred natural numbers =

$$\frac{\text{1st number + last number}}{2}$$

∴ Average of 100 natural numbers

$$= \frac{1+100}{2} = \frac{101}{2} = 50.5$$

2.1; Average of all even number

$$= \frac{\text{1st number + last number}}{2}$$

$$= \frac{2+100}{2} = \frac{102}{2} = 51$$

(Where 2 is the 1st and 100 is the last even number)

3.1; Average of 'n' even numbers
$= n + 1 = 50 + 1 = 51$

4.2; Average of all numbers

$$= \frac{\text{1st number + last number}}{2}$$

$$= \frac{1+99}{2} = \frac{100}{2} = 50$$

(Where 1 is the 1st and 99 is the last odd number)

5. 2; $(60)^2 = 3600$

$$\text{Concept} = \frac{1+5+3}{3} = \frac{9}{3} = 3$$

(We can see that if the average is 3, the sum of numbers is 9 *i.e.* 3^2. Hence if the average is 60, the sum will be $(60)^2$.
Remember in case of odd numbers the average and the number of the odd numbers are same.)

6.3; Average of 'n' even number $= n + 1$
$101 = n + 1$
$n = 100$
Sum of all even number upto 100
$= 100 \times 101 = 10100$
In case of even numbers the average is one more than the number of even numbers.

7.4; Sum of all the natural numbers

$$\text{upto } x = \frac{x(x+1)}{2}$$

∴ Average of all the natural numbers

$$= \frac{(x+1)}{2} \Rightarrow 20.5 = \frac{(x+1)}{2}$$

$$41 = x + 1$$

$$x = 40$$

Now, putting the value of x in $\frac{x(x+1)}{2}$

$$\text{we get, } \frac{40(40+1)}{2} = \frac{40 \times 41}{2} = 20 \times 41 = 820$$

8.2; 3 , 6, 9, ..., 60
Now, take 3 as common
$= 3(1, 2, 3 , 4 ...., 20)$
= 3 (Sum of natural numbers upto 20)

$$= 3\left(\frac{(x+1)}{2}\right) = 3\left(\frac{(20+1)}{2}\right) = 3 \times 10.5$$

$$= 31.5$$

Note:- that if the common difference between two consecutive terms are same then the required average would be $\frac{\text{1st term + last term}}{2}$

9.2; $\frac{23+29+31+37}{4} = \frac{120}{4} = 30$

10.3; From problem,
∵ The sum of m numbers = mn^2
and the sum of n numbers = nm^2
∴ Average of (m + n) numbers

$$= \frac{mn^2 + nm^2}{(m+n)} = \frac{mn\ (n+m)}{(m+n)} = mn$$

11.4; Let A = x, B = $x + 2$, C = $x + 4$,

D = $x + 6$ and E = $x + 8$

$\because \frac{A+C}{2} = \frac{x+(x+4)}{2} = 59$

$\therefore x = 57$

$\therefore$ The smallest number = 57

11.4; **Shortcut:-**
We know that in such cases the middle number is the average

A **B** **C** **D** **E**

B ↓ 59

Smallest = 57

12.3; Let the first even number A be $(x + 2)$

$\therefore$ E $\Rightarrow (x + 10)$

Now, according to the question

$$\frac{x+2+x+10}{2} = 46$$

or, $2x + 12 = 92$

or, $2x = 92 - 12 = 80$

or, $x = 40$

$\therefore$ The largest number E = $x + 10$
= 40 + 10
= 50

12.3; **Shortcut:-**
We know that in the given case the middle number is the average

A	**B**	**C**	**D**	**E**
42	44	46	48	50

Largest = 50

13. 4; a, a + 2, a + 4, a + 6, a + 8

$$\frac{a+6+a+8}{2} - (a+2)$$

a + 7 - a - 2 = 7 - 2 = 5

13.4; **Shortcut:-**

10	<u>12</u>	14	5	<u>7</u>	9
12	<u>14</u>	16	7	<u>9</u>	11

14.1; Let the three consecutive odd numbers be x, $x + 2$ and $x + 4$
Average of three consecutive odd numbers

$$= \frac{x+x+2+x+4}{3} = \frac{3x+6}{3} = x+2$$

Three consecutive even numbers = 12, 14 and 16

$$\text{Average} = \frac{12+14+16}{3} = 14$$

Now, according to the question

$x + 2 + 14 = 21$

or, $x = 21 - 16 = 5$

14.1; **Shortcut:-**

12 14 16 12 - 14 5 7 9

14 → Average; 16 → Highest; 5 → Lowest; 7 → Average

14 + 7 = 21

(Given that sum of average of three consecutive odd numbers and three consecutive even numbers is 21.)

15.2; We should know that the middle number is the average.
for eg the average of 1...........5

$$\frac{1+2+3+4+5}{5} = \frac{15}{5} = 3$$

Hence 3 is the average. So if K is average the five consecutive odd numbers will be k-4, k-2, k, k + 2, k + 4,
Now if 3 more are added the 3 new numbers will be k+6, k+8, k+10,
Hence new average will be the middle one but since now we have two middle numbers.
Hence, the average is

$$= \frac{k+2+k+4}{2} = \frac{2k+6}{2} = k+3$$

Diff = (K+3)-(K) = 3

15.2; **Shortcut:-**

(1 3 5 7 9) 11 13 15

↓

K

∴ It three more odd numbers are added then average will be 8

∴ Hence difference between the new and the old average = 8 - 5 = 3

16.2; Sum or 6 numbers = 45.5 × 6
= 273

Sum of 7 numbers = 47 × 7
= 329

New numbers = 329 - 273
= 56

16.2; **Shortcut:-** The required number
= (47– 45.5) × 7 + 45.5 = 56

17.1; Let the three numbers be n, 2n and 4n respectively. Then from problem, we have;

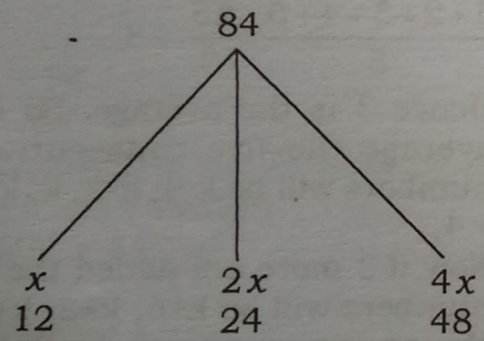
$$\because \frac{n+2n+4n}{3} = 28$$

$$\therefore n = \frac{84}{7} = 12$$

i.e. The third number = $4n$
= 4 × 12
= 48

17.1; **Shortcut:-**

Sum = 28 × 3 = 84



18. 3; $\frac{A+B+C+D}{4} = 5$

∴ A + B + C + D = 20 ________(i)

according to question.

$$\therefore \frac{A+B+C}{3} = 3D \text{ \_\_\_\_\_\_\_\_(ii)}$$

A + B + C = 9D

Putting the value of A + B + C in equation (i)

9D + D = 20

10D = 20

D = 2

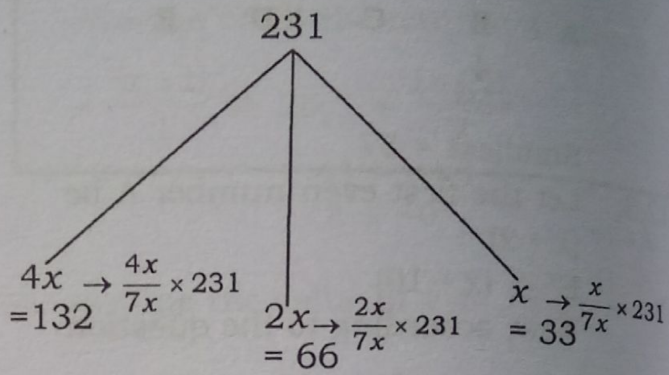
19.4; Sum = 77 × 3 = 231

1st number = 2 × 2nd number

2nd number = 2 × 3rd number

Hence ratio = $4x : 2x : x$

Total = $4x + 2x + x$
= $7x$



20.1; Ratio = $2x : x : 4x$

$$\text{Average} = \frac{7x}{3} = 56$$

$x = 24$

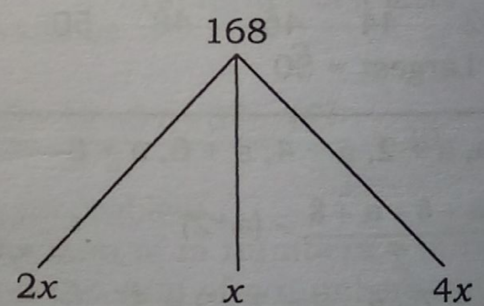
1st number = $2x = 48$

3rd number = $4x = 96$

Hence, difference between the 3rd number and the 1st number = 96 - 48
= 48

20.1; **Shortcut:-**

Sum of 3 numbers = 56 × 3
= 168



Difference between the 1st and the 3rd numbers = $2x$

$$\frac{2x}{7x} \times 168 = 48$$

21.1;

$$\overbrace{\underbrace{1^{st}\quad 2^{nd}}_{15.5}\quad \underbrace{3^{rd}\quad 4^{th}\quad 5^{th}}_{21\frac{1}{3}}\quad 6^{th}\quad 7^{th}\quad 8^{th}}^{20}$$

Total of all the 8 numbers $= 20 \times 8$
$= 160$

Total of the first 2 numbers $= 2 \times 15.5$
$= 31$

Total of the next 3 numbers $= 3 \times 21\frac{1}{3}$
$= 64$

Total of 6th, 7th, and 8th numbers
$= 160 - (31 + 64)$
$= 160 - 95 = 65$

According to the question,

$6^{th}, \quad 7^{th}, \quad 8^{th}$

$x, \quad x+4, \quad x+7$

$x + x + 4 + x + 7 = 65$

$3x + 11 = 65$

$3x = 65 - 11$

$3x = 54$

$x = \frac{54}{3} = 18$

8^{th} numbers $= x + 7$
$= 18 + 7 = 25$

21.1;	**Shortcut:-** Sum of all = 160 Sum of first 5 = 95 coming from $= (15.5 \times 2 + 21\frac{1}{3} \times 3)$ sum of last 3 = 65 $x + x + 4 + x + 7 = 65$ $18 + 22 + 25$

22.1; $\frac{M + T + W}{3} = 37$

$\frac{T + W + Th}{3} = 34$

$Th = \frac{4}{5} M$

$\frac{T + W + \frac{4}{5} M}{3} = 34$

$T + W + \frac{4}{5} M = 102$ ______ (ii)

$M + T + W = 111$ ______ (i)

$-\frac{1}{5} M = -9$

$M = 45^0$

Thursday $= \frac{4}{5} M = \frac{4}{5} \times 45 = 36^0$

22.1;	**Shortcut:-** Mon + Tues + Wed = 111 Tues + Wed + Thurs = 102 (diff. = 9) $\frac{1}{5} = 9$ Thursday $= \frac{4}{5} = 36$

23.2; $\frac{x+y+z}{3} = 60$

$x + y + z = 180$ ______ (i)

$x = \frac{1}{4}(y + z)$

$4x = y + z$

Putting the value of $y + z$ in equation ______ (i) $x + 4x = 180$

$5x = 180$

$\therefore x = 36$

23.2;	**Shortcut:-** Sum = 180 a = b+c $\Rightarrow$ a $= \frac{1}{5} \times 180 = 36$ $\downarrow$ 1 : 4 (according to the question)

24. 1;

$$\overbrace{\underbrace{1st, 2nd, 3rd, 4th, 5th, 6th}_{10.5}, \underbrace{7th, 8th, 9th, 10th, 11th}_{11.4}}^{10.9}$$

Total of 11 no. $= 10.9 \times 11 = 119.9$

Total of first six numbers $= 10.5 \times 6 = 63.0$