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03. Average

1) The average of seven numbers is 5. If the average of the first six of these numbers is 4, what is the seventh number?

Answer:

∙ Sum of first 6 numbers be ��

∙ Let last number be ��

∙��+��

7= 5

∙��6= 4

∙ �� = ����

2) The average of 9 numbers is 12. If each number is increased by 2, then the average of the new set of numbers is

Answer:

∙ Let the numbers be x1, x2 ….x9

∙ New numbers x1+2, x2+2, ….x9+2

∙ Sum of new numbers = sum of old numbers + 2 × 9

∙ Average of new numbers = old average + 2×9

9

∙ Average of new numbers = 12 + 2 = ����

3) The average age of 5 boys is 12 years, and the average age of 3 other boys is 16 years. The average age of all the 8 boys is

Answer:

∙ Sum of ages of 5 boys = 5 × 12 = 60

∙ Sum of ages of 3 boys = 3 × 16 = 48

∙ Sum of ages of all 8 boys = 60 + 48 = 108

∙ Average of ages of 8 boys = 108/8 = ����.��

4) The average of 11 numbers is 53. The average of the first six numbers is 50 and that of the last six numbers is 55. The sixth number is

Answer:

∙ Sum of 11 numbers = x1 + x2 +…. + x5 + x6 + x7 …. + x11 = 11 × 53 = 583

∙ Sum of first 6 numbers = x1 + x2 +…. x6 = 50 × 6 = 300

∙ Sum of last 6 numbers = x6 + x7 +…. x11 = 55 × 6 = 330

∙ x1 + x2 +…. + x5 + 2x6 + x7 …. + x11 = 300 + 330 = 630

∙ x6 = 630– 583 = ����

5) The average age of 30 boys in a class is 16 years. The average of the ages of the boys and the teachers is 17 years. The age of the teacher is

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Answer:

∙ Sum of ages of 30 boys = 16 × 30 = 480

∙ Sum of ages of 30 boys and teacher = 17 × 31 = 527

∙ Teacher’s age = 527 − 480 = ����

6) The average of ten students in a group increased by 0.4 years when a girl of age 6 years is replaced by another girl. The age of the new girl is

Answer:

∙ Sum of ages of 10 students be ��

∙��10= original average

∙ Age of new girl ��

∙��−6+��

10= original average +0.4

∙��10+��−6

10=��10+ 0.4

∙ �� − 6 = 4

∙ �� = ����

7) The average height of 25 students in a class is 140 cms. Five newly admitted students increase the average height by 1 cm. The average height of the set of 5 new students is Answer:

∙ Sum of height of 25 students = 25 × 140 = 3500

∙ Sum of height of 30 students = 30 × (140 + 1) = 4230

∙ Sum of height of 5 new students = 4230 − 3500 = 730

∙ Average height of 5 new students =7305= 146

∙ Solution: ������

8) The average of three consecutive numbers is ��. If the next two consecutive numbers are also included, the average of the five numbers will

Answer:

∙ Let the 3 consecutive numbers be (�� − 1), ��, (�� + 1)

∙ Average of 3 numbers =(��−1)+(��)+(��+1)

3= ��

∙ Average of 5 numbers =(��−1)+(��)+(��+1)+(��+2)+(��+3)

5= �� + 1

∙ Solution: **Increase by 1**

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

Answer:

∙ Let best score be ��

∙ Worst score ��

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∙ Sum of rest of the scores ��

∙��+��+��

40= 50

∙��38= 48

∙ �� = �� + 172

∙ 3 equations 3 variables

∙ Solution: ������

10) Nine men went to a hotel. Eight of them spent Rs. 30 each over their meals and the ninth spent Rs. 20 more than the average expenditure of all the nine people. The total money spent by all was

Answer:

∙ Let the total average be ��

∙8×30+(��+20)

9= ��

∙ 1 equation 1 variable

∙ Solution: ������.��

11) In an examination, the average marks obtained by Shailesh in English, Hindi and Drawing were 50. His average marks in Math, Science, Social Science and Craft were 70. If the average marks in all 7 subjects were 58, his score in Math was

Answer:

∙��+��+��

3= 50

∙��+��+����+��

4= 70

∙��+��+��+��+��+����+��

7= 58

∙ There is no way to find ‘��’ without the knowing ‘�� + ���� + ��’

∙ Solution: **Can’t be determined**

12) The average of the first 6 odd primes is

Answer:

∙3+5+7+11+13+17

6= ��.����

13) The average of the five consecutive even numbers is 38. The largest of these is Answer:

∙(2��)+(2��+2)+(2��+4)+(2��+6)+(2��+8)

5= 38

∙ �� = 17

∙ 2�� + 8 = ����

14) The average age of ��, ��, �� and �� is 58 years. If the average age of ��, ��, �� and �� is 60 years and the ages of �� and �� are in the ratio of 7: 8 the age of �� is

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Answer:

∙��+��+��+��

4= 58

∙��+��+��+��

4= 60

∙ �� = 7��, �� = 8��

∙��–��

4= 58 − 60

∙ �� = 8

∙ 8�� = ����

15) The average of 11 numbers is 50. The average of the first 6 numbers is 49 and that of the last six numbers is 52. The sixth number is

Answer:

∙ Same as question 4

∙ Solution: ����

16) A batsman increased his average by 2 runs when he makes 63 runs in his 12��ℎinning. What is his average after 12 innings?

Answer:

∙ Let average of 11 innings be ��

∙ Average of 12 innings = �� + 2 =��×11+63

12

∙ 1 equation 1 variable; �� = 39; (�� + 2) = 41

∙ Solution: ����

17) On a journey across Delhi, a taxi averages 30 kmph for 60% of the distance, 20 Kmph for 20% of it and 10 kmph for the remainder. The average speed for the whole journey is Answer:

∙ Let the total distance be 100 km (60% = 60km, 20% = 20km, rest=20% = 20km) ∙ Time @ 30kmph = 60/30 = 2

∙ Time @ 20kmph = 20/20 = 1

∙ Time @ 10kmph = 20/10 = 2

∙ Average speed = ���������� ����������������

���������� �������� =100

2+1+2= 20

∙ Solution: ����

18) The average of marks obtained by 120 candidates was 35. If the average of the passed candidates was 39 and that of the failed candidates was 15, the number of candidates who passed the examination was

Answer:

∙ Number of candidates who passed = ����

∙ Sum of marks of the candidates who passed = 39����

∙ Number of candidates who failed = ����

∙ Sum of marks of the candidates who failed = 15����

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∙ ���� + ���� = 120

∙ 39���� + 15���� = 35 × 120

∙ 2 equations 2 variables

∙ Solution: ������

19) A class of 30 students obtained on an average of 45 marks. On rechecking it was found that marks had been wrongly entered in two cases. After correction of these marks were increased by 24 and 6 respectively. The correct average marks per student are

Answer:

∙ Let the wrong marks be �� and ��

∙ Let the sum of the rest of the 28 marks be ��

∙��+��+��

30= 45

∙ New average =��+(��+24)+(��+6)

30=��+��+��

30+24+6

30= 45 + 1 = 46

∙ Solution: ����

20) If 1��+1��=1��and ���� = ��, what is the average of �� and ��?

Answer:

∙1��+1��=1��–> ��+��

����=1�� –> ��+��

��=1��–> �� + �� = 1 –> ��+��

∙ Solution: ����

2=12

21) A man travels a certain distance at the rate of 20 ����/ℎ�� and returns at the rate of 30 ����/ℎ��. The average speed for the whole journey in ����/ℎ�� is

Answer:

∙ Let the distance be 60����

∙ Time @ 20����/ℎ�� = 60/20 = 3ℎ��

∙ Time @ 30����/ℎ�� = 60/30 = 2ℎ��

∙ �������������� ���������� =���������� ����������������

���������� �������� =60+60

3+2=1205= 24

∙ Solution: ����

22) Average monthly income of a family of four earning members was ����. 2940. One of the earning members died and therefore the average income came down to 2600. The income of the deceased was

Answer:

∙ Let the 4 earning members be ��, ��, �� and ��.

∙��+��+��+��

4= 2940

∙ �� -> dead

∙��+��+��

3= 2600

∙ (�� + �� + ��) = 7800

∙ (�� + �� + �� + ��)/4 = 2940 –> 7800+��

4= 2940 –> �� = 3960

∙ Solution: ��������

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23) The average of 8 reading is 24.3 out of which the average of the first two is 18.5 and that of the next three is 21.2. If the sixth reading is 3 less than the seventh and 8 less than the 8th, what is the sixth reading?

Answer:

∙ Let the 8 readings be: ��1, ��2, … ��8

∙��1+��2+ … +��6+��7+��8

∙��1+��2

8= 24.3

2= 18.5

∙ (��1 + ��2) = 37

∙��3+��4+��5

3= 21.2

∙ (��3 + ��4 + ��5) = 63.6

∙37+63.6+��6+��7+��8

8= 24.3 …… (1)

∙ ��6 + 3 = ��7 …… (2)

∙ ��6 + 8 = ��8 …… (3)

∙ 3 equations and 3 variables

∙ Solution: ����.��

24) The average salary per head of all the employees of an institution is $60. The average salary per head of 12 officers is $400 and the average salary per head of the rest of $56. Find the total number of employees in the institution.

Answer:

∙ Let the total number of employees be ��

∙ Total salary paid = 60��

∙ Salary paid to officers = 400 ∗ 12 = 4800

∙ Salary paid to rest = 56 × (�� − 12)

∙ Total salary paid = Salary paid to officers + Salary paid to rest

∙ 60�� = 4800 + 56(�� − 12)

∙ 1 equation 1 variable

∙ Solution: ��������

25) The average weight of a class of 35 students is 47.5 ����. If the weight of the teacher is included, the average rises by 500 ����. What is the weight of the teacher?

Answer:

∙ Sum of weight of 35 students = 47.5 ∗ 35 = 1662.5

∙ Sum of weight of 35 students and teacher = 48 ∗ 36 = 1728

∙ Teacher’s weight = Sum of weight of 35 students and teacher - Sum of weight of 35 students

∙ Teacher’s weight = 1728– 1662.5 = 65.5

∙ Solution: ����.��

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