AVERAGE

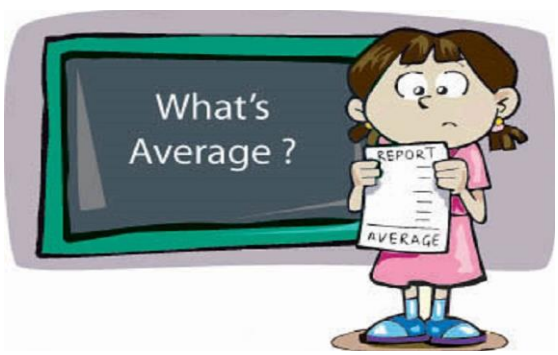
What is the first thing that comes in your mind after hearing average??
In simple words we can say that average is that **common value which may be assigned to all** and after doing this end result will be same.

The average of the number of quantities of observations of the same kind is their sum divided by their number. The average is also called average value or mean value or arithmetic mean.

$$\text{Average} = \frac{\text{Sum of terms}}{\text{Number of terms}}$$

For observations x1 ,x2, x3, ……xn

$$\text{Average} = \frac{x_1 + x_2 + x_3 + \ldots\ldots\ldots\ldots + x_n}{n}$$



- The result obtained by adding several quantities together and then dividing this total by the number of quantities is called Average.
- The main term of average is equal distribution of a value among all which may distribute persons or things. We obtain the average of a number using formulae that is sum of observations divided by Number of observations.
- Here are Average based some fact and formula and some shortcut tricks with examples. Given below are some more example for practicing.
Formula:
- Average = (Sum of observations / Number of observations).
Find the Average Speed

- If a person travels a distance at a speed of x km/hr and the same distance at a speed of y km/hr then the average speed during the whole journey is given by- $\frac{2xy}{x+y}$
- If a person covers A km at x km/hr and B km at y km/hr and C km at z km/hr, then the average speed in covering the whole distance is- $\frac{A+B+C}{\frac{A}{x}+\frac{B}{y}+\frac{C}{z}}$

Note-

- If the average age is increased, Age of new person = Age of separated person + (Increase in average × total number of persons)
- If the average age is decreased, Age of new person = Age of separated person - (Decrease in average × total number of persons)

When a person joins the group-In case of increase in average

- Age of new member = Previous average + (Increase in average × Number of members including new member)

In case of decrease in average

- Age of new member = Previous average - (Decrease in average × Number of members including new member)

In the Arithmetic Progression, there are two cases when the number of terms is odd and second one is when the number of terms is even.

So when the number of terms is odd the average will be the middle terWhen

- When the number of terms is even then the average will be the average of two middle terms.

Average

An average or an arithmetic mean of given data is the sum of the given observations divided by number of observations.

Important Formulae Related to Average of numbers

1. Average of first n natural number=(n+1)/2
2. Average of first n even number = (n+1)
3. Average of first n odd number = n
4. Average of consecutive number
   = (Firtst number+Last number)/2
5. Average of 1 to n odd numbers
   = (Last odd number+1)/2
6. Average of 1 to n even numbers
   = (Last even number+2)/2
7. Average of squares of first n natural numbers
   = [(n+1)(2n+1)]/6
8. Average of the cubes of first n natural number
   $=[n(n+1)^2]/4$
9. Average of n multiples of any number
   =[Number×(n+1)]/2

Concept 1

If the average of n1 observations is a1; the average of n2 observations is a2 and so on, then

Average of all the observations

=(n1× a_1+n2 ×a2+.....)/(n1+n2+.....)

Concept 2

If the average of m observations is a and the average of n observations taken out of is b, then

Average of rest of the observations=(ma-n(2)/(m-n)

Example :

A man bought 20 cows in RS. 200000. If the average cost of 12 cows is Rs. 12500, then what will be the average cot of remaining cows?

Here m = 20 , n = 12 , a = 10000 , b = 12500

average cost of remaining cows (20-8) cows

= (2010000 - 12×12500)/(20-8) =Rs 6250

Concept 3

If the average of n students in a class is a, where average of passed students is x and average of failed students is y, then

Number of students passed=[Total Students (Total average-Average of failed students)]/(Average of passed students-Average of failed students)

= [n(a-y)]/(x-y)

Example :

In a class, there are 75 students are their average marks in the annual examination is 35. If the average marks of passed students is 55 and average marks of failed students is 30, then find out the number of students who failed.

Here , n = 75 , a = 35 , x = 55 , y = 30

Number of students who passed

= 75(35- 30)/(55- 30) = 15

Number of students who failed = 75- 15 = 60

Concept 4

If the average of total components in a group is a, where average of n components (1st part) is b and average of remaining components (2nd part) is c, then Number of remaining components (2nd part)=[n(a-(2)]/(c-(1)

Example :

The average salary of the entire staff in an offfice is Rs. 200 per day. The average salary of officers is Rs. 550 and that of non-officers is Rs. 120. If the number of officers is 16, then find the numbers of non-officers in the office.

Here n= 16 , a = 200 , b = 550 , c = 120

Number of non - officer = 16(200- 550)/(120- 200) = 70

Average Speed

Average speed is defined as total distance travelled divided by total time taken.

Average speed=Total distance travelled/ Total time taken

Case 1

If a person covers a certain distance at a speed of A km/h and again covers the same distance at a speed of B km/h, then the average speed during the whole journey will be 2AB/A+B

Case II

If a person covers three equal distances at the speed of A km/h, B km/h and C km/h respectively, then the average speed during the whole Journey will be

3ABC/(AB+BC+C(1)

Case III

If distance P is covered with speed x, distance Q is covered with speed y and distance R is covered with speed z, then for the whole journey,

Average speed=(P+Q+R+.....)/(P/x+Q/y+R/z+...)

Example :

A person covers 20 km distance with a speed of 5 km/h, then he covers the next 15 km with a speed of 3 km/h and the last 10 km is covered by him with a speed of 2 km/h. Find out his average speed for the whole journey.

Average speed = (20 +15 +10)/(20/5+15/3+10/2)

= 3(3/14)

Case IV

If a person covers P part of his total distance with speed of x, Q part of total distance with speed of y and R part of total distance with speed of z,then

Average speed=1/(P/x+Q/y+R/z+.....)

Ex: The average of 6 consecutive even number is 21. Find the largest number?

Largest no. = A + (n−1)

A = average

n = no. of terms

Largest no. = 21 + (6 -1) = 26

Ex: The average of 6 consecutive odd number is 22. Find the smallest number?

Smallest no. = A - (n - 1)

A = average

n = no. of terms

Smallest no. = 22 - (6 - 1)

= 17

Ex: The average of 5 consecutive even number is 46. Find the smallest number?

Smallest no. = A - (n - 1)

A = average

n = no. of terms

Smallest no. = 46 -(5 -1)

= 42

Ex: Find the average of first 100 natural numbers.?

Sol: Average = $\frac{(n+1)}{2}$

= $\frac{(100+1)}{2}$ = 50.5

Ex: The average of 5 numbers is 29. If one number is excluded, the average becomes 27.Find the excluded number?

Sol: Excluded no. = (5×29 - 4×27)

= (145-108)= 37

Ex: The average age of 36 students is 15 years. When teacher's age is included to it, the average increased by 1.What is the teacher's age?

Sol: Teacher's age = (37×16 - 36×15)

= (592-540)= 52

Ex: The average weight of 8 persons increases by 2.5 kg when a new person comes in place of one of them weighing 40 kg . What is the weight of new person?

Sol: Total weight increased = 8 x 2.5

= 20 kg

weight of the new person = 40 + 20

= 60 kg

Ex: The average weight of 10 persons decreases by 2.5 kg when a new person comes in place of one of them weighing 70 kg . What is the weight of new person?

Sol: Total weight decreased = 10 x 2.5

= 25 kg Weight of the new person = 70 - 25

= 45 kg

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

Sol: Let the average after 17th inning = X

and average after 16th inning = (X - 3)

$\therefore$ 16(X - 3) + 87 = 17X

16X - 48 +87 = 17X

X = 39

Ex: The average of 11 results is 60. If the average of first 6 results is 58 and that of last 6 results is 63. Find the 6th result?

Sol: A11 = 60

Average of first 6 (A6) = 58

Average of last 6 (A6) = 63

6th result = (58 × 6 + 63 × 6 - 60 × 11)

= (348+378) - 660

= 726 -660

= 66

Ex: The average of a, 11,23 and 17 is 15 and the average of a,b,12 and 25 is 16. Find the value of a : b?

Sol: a + 11 + 23 +17 = 15 x 4

a = 9

a + b + 12 + 25 = 16 x 4

a + b = 27

9 + b = 27

b = 18

a : b = 9 : 18

= 1 : 2

Ex: The average age of all the 100 employees in an office is 29 years , where 2/5 employees are female and the ratio of average age of male to female is 5 : 7. Find the average age of female employees?

Sol: 60 × 5x + 40 × 7x = 29 ×100

300x + 280x = 2900

x = 5

average age of female employees

= 7x

= 7 x 5

= 35 years

Ex: The average of two numbers A & B is 20, an average of B & C is 19 and average of C & A is 21,So find the value of A?

Sol: A + B = 40

B + C = 40

C + A = 42

On adding above three

2(A + B + (3)=40 + 38 + 42= 120

= A + B + C = 60

A = (A + B + (3) – (B + (3)

= 60 – 38= 22

Ex: Three maths classes X, Y and Z, take an algebra test. The average score of class X is 83. The average score of class Y is 76. The average score of class Z is 85. The average score of class X and Y is 79 and average score of class Y and Z is 81. What is the average score of classes X, Y and Z?

Sol: Let the number is student in classes X, Y and Z be a, b and c respectively then total score of

X=83a, Y = 76b and Z =85c and

$$\frac{83a+76b}{a+b}=79 \Rightarrow 4a=3b \Rightarrow \frac{a}{b}=\frac{3}{4}$$

$$\frac{76b+85c}{b+c}=81 \Rightarrow 4c=5b$$

$$\Rightarrow \frac{c}{b}=\frac{5}{4}$$

a : b : c = 3 : 4 : 5

Average score of X, Y, Z

$$=\frac{83a+76b+85c}{a+b+c}=\frac{978}{12}=81.5$$

Ex: Three 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:

Sol: Total age of 5 members, 3 years ago

=(17×5) = 85 years

Total age of 5 members, now =[85+(3×5)]

= 85 +15 = 100 years

Total age of 6 members now = (17×6)

= 102 years

The age of the baby = (102-100)

= 2 years.

Ex: The average temperature of a 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. The temperature of the first and fifth days was in the ratio 7:8, then what is the temperature on the fifth day?

Sol: First four days average Temperature =580

1,2,3, 4th days total temp. = 58×4 = 232

Then 2,3,4,5 days total temp. = 60×4 = 240

Let the unknown temp, be x

5th day – 1st day = 240-232

=8(2,3,4 days temp. is common)

Given the ratio of first and fifth day is 7 : 8

8x-7x=8

x=8

Fifth day's temperature = 8x=8x8=64

Ex: There were 35 students in a hostel. If the number of students is increased by 7 the expenditure on food increased by Rs. 42 per day while the average

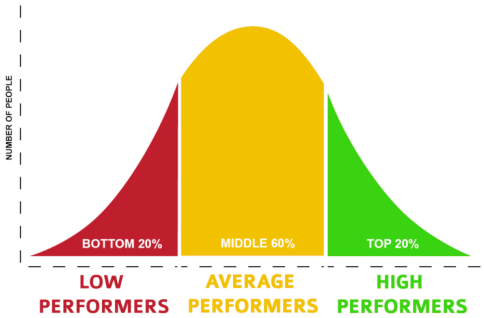
expenditure of students is reduced by Re.1. What was the initial expenditure on food per day?

Sol: Suppose the initial expenditure per day = Rs.x

$$\frac{x}{35}-\frac{x+42}{42}=1$$

$$\Rightarrow \frac{6x-5x-210}{210}=1$$

x = 210+210 = Rs. 420



SOLVED EXAMPLES

Q1. Shubham was conducting an experiment in which the average of 11 observations came to be 90, while the average of first five observations was 87, and that of the last five was 84. What was the measure of the 6th observation?

(1) 165 (2) 150 (3) 145
(4) 135 (5) 125

Q2. A batsman has a certain average of runs for 12 innings. In the 13th innings he scores 96 runs, thereby increasing his average by 5 runs. What is his average after the 13th innings?

(1) 64 (2) 48 (3) 36
(4) 72 (5) 89

Q3. There was one mess for 30 boarders in a certain hostel. If the number of boarders was increased by 10, the expenses of the mess increased by Rs. 40 per month, while the average expenditure per head diminished by Rs. 2. Find the original monthly expenses.

(1) Rs. 390 (2) Rs. 360 (3) Rs. 410
(4) Rs. 480 (5) Rs. 450

Q4. The mean monthly salary paid to 75 workers in a factory is Rs. 5680. The mean salary of 25 of them is Rs. 5400 and that of 30 others is Rs. 5700. The mean salary of remaining workers is:

(1) Rs. 5000 (2) Rs. 7000 (3) Rs. 6000
(4) Rs. 8000 (5) Rs. 9000

Q5. Of the three numbers, the first is twice the second and the second is twice the third. The average of these three numbers is 21. Find the largest number.

(1) 36 (2) 38 (3) 47
(4) 48 (5) 35

Q6. In a mathematics exam, a student scored 30% marks in the first paper out of a total of 180. How much should he score in the second paper out of a total of 150, if he is to get an overall average of 50%?

(1) 74% (2) 76% (3) 70%
(4) 80% (5) 75%

Q7. The average marks of a student in 8 subjects is 87. Of these, the highest marks are 2 more than the next in value. If these two subjects are eliminated, the average marks of the remaining subjects is 85. What is highest score?

(1) 91 (2) 94 (3) 89
(4) 96 (5) 92

Q8. An officer's pension on retirement from service is equal to half the average salary during last 36 months of his service. His salary from 1 January, 2014 is Rs. 3800 per month with increment of Rs. 400 on 1 October 2014, October 2015 and 1 October, 2016. If he retires on 1 January, 2017, what pension does he draw?

(1) Rs. 2100 (2) Rs. 2150 (3) Rs. 2200
(4) Rs. 2250 (5) Rs. 2300

Q9. In a one-day cricket match, Virat, Sehwag, Sachin, Dhoni and Yuvraj scored an average of 39 runs. Dhoni scored 7 more than Yuvraj. Yuvraj scored 9 fewer than Virat. Sehwag scored as many as Dhoni and Yuvraj combined; and Sehwag and Sachin together scored 110 runs between them. How many runs did Sachin score?

(1) 47 (2) 51 (3) 53
(4) 49 (5) 57

Q10. 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, then the number of those candidates, who passed the examination was:

(1) 100 (2) 110 (3) 120
(4) 150 (5) 115

Q11. A painter is paid x rupees for painting every 10 metres of a wall and y rupees for painting every extra metre. During a week, he painted 10 metres on Monday, 13 metres on Tuesday, 12 metres on Wednesday, 11 metres on Thursday and 12 metres on Friday. What is average daily earning in rupees for the five day week?

(1) x + (8/5)y (2) (5x + 9y)/5 (3) 10x + (8/5)y

(4) 5x + 8y (5) Cannot be determined

Q12. The average age of a husband and wife was 23 when they were married 5 years ago. The average age of the husband, the wife and a child who was born during the interval, is 20 years now. How old is the child now?
(1) 9 months (2) 1 year (3) 3 years
(4) 4 years (5) 2 years

Q13. The average marks of a students in 10 papers are 80. If the highest and the lowest scores are not considered, the average is 81. If the highest score is 92, find the lowest?
(1) 55 (2) 60 (3) 62
(4) 65 (5) Cannot be determined

Q14. The average weight of 45 students in a class was calculated as 36 kg. It was later found that the weight of two students in the class was wrongly calculated. The actual weight of one of the boys in the class was 32 kg., but it was calculated as 34 kg. and the weight of another boy in the class was 45 kg. whereas it was calculated as 40 kg. What is the actual average weight of the 45 students in the class? (Rounded off to two-digits after decimal)
(1) 36.07 kg. (2) 36.16 kg. (3) 35.84 kg.
(4) Cannot be determined
(5) None of these

Q15. 'Mr. Hatim's total annual gross salary, which was Rs. 10 lakhs per year in 2007, has been reduced by 10% in 2008. In 2007 his family expenditure for food items was 40% of the total annual gross salary. The prices of average food items have increased by 5% between 2007 and 2008. Assuming that the family consumed the same amount of food in 2008, the percentage expenditure on food items, calculated on total annual gross salary in 2008, is approximately:
(1) 43% (2) 45% (3) 47%
(4) 49% (5) 50%

16. The average of 30 boys of a class is equal to 14 yrs. When the age of the class teacher is included the average becomes 15 yrs. Find the age of the class teacher.
(1) 45 yrs (2) 50 yrs (3) 30
(4) 22 yrs (5) 46 yrs

17. The average weight of 4 men is increased by 3kg when one of them who weighs 120 kg is replaced by another man. What is the weight of the new man?
(1) 125 kg (2) 150 kg (3) 122 kg
(4) 132 kg (5) 135 kg

18. 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) 90 (2) 85 (3) 100
(4) 120 (5) None of these

19. The average of 11 results is The average of 11 results is50. If the average of first six results is 49 and that of last six is 52, find the sixth result?
(1) 45 (2) 46 (3) 55
(4) 56 (5) 50

20. A bats man is his 17^{th} innings makes a score of 85, and thereby increases his average by 3. What is his average after 17 innings?
(1) 40 (2) 36 (3) 37
(4) 38 (5) None of these

21. A train travels from A to B at the rate of 20kmper hour and from B to A at the rate of 30 km/hr. What is the average rate for the whole journey?
(1) 24 km/hr (2) 25 km/hr
(3) 26 km/hr (4) 28 km/hr
(5) None of these

22. The average salary of the entire staff in a office is Rs 120 per month. The average salary of officers is Rs 460 and that of non- officers is Rs 110. If the number of officers is 15, then find the number of non – officers in the office.
(1) 500 (2) 510 (3) 520
(4) 550 (5) None of these

23. There were 35 students in a hostel. If the number of students increases by 7, the expenses of the mess increase by Rs. 42 per day while the average expenditure per head diminishes by Rs1. Find the original expenditure of the mess.
(1) Rs. 400 (2) Rs. 340 (3) Rs. 420
(4) Rs. 450 (5) Rs. 300

24. The average age of a jury of 5 is 40,if a member aged 35 resigns and a man aged 25 becomes a member, then the average age of the new jury is
(1) 30 (2) 38 (3) 40
(4) 42 (5) 36

25. The average weight of 8 person is increased by 2.5 kg when one of them whose weight is 56 kg is replaced by a new man. The weight of the new man is:
(1) 58.5 kg (2) 76 kg (3) 20 kg
(4) 64 kg (5) None of these

26. Last year my age was a perfect square number .next year it will be a cubic number. what is my present age ?
(1) 26 years (2) 24 years (3) 25 years
(4) 27 years (5) None of these

27. The average of 30 boys of a class is equal to 14 yrs. When the age of the class teacher is included the average becomes 15 yrs. Find the age of the class teacher.
(1) 45 yrs (2) 50 yrs (3) 30 yrs
(4) 22 yrs (5) 56 yrs

28. The average weight of 4 men is increased by 3kg when one of them who weighs 120 kg is replaced by another man. What is the weight of the new man?
(1) 125 kg (2) 150 kg (3) 122 kg
(4) 132 kg (5) None of these

29. The average of marks obtained by 120 candidates in a certain examination is 35. If the average mark of passed candidates is 39 and that of the failed candidates is 15, what is the number of candidates who passed the examination?
(1) 90 (2) 85 (3) 100
(4) 120 (5) 88

30. The average of 11 results is the average of 11 results is 50. If the average of first six results is 49 and that of last six is 52, find the sixth result?
(1) 45 (2) 46 (3) 55
(4) 56 (5) 58

31. A bats man is his 17th innings makes a score of 85, and thereby increases his average by 3. What is his average after 17 innings?
(1) 40 (2) 36 (3) 37
(4) 38 (5) None of these

32. A train travels from A to B at the rate of 20 k/p hour and from B to A at the rate of 30 km/hr. What is the average rate for the whole journey?
(1) 24 km/hr (2) 25 km/hr
(3) 26 km/hr (4) 28 km/hr
(5) None of these

33. The average salary of the entire staff in a office is Rs 120 per month. The average salary of officers is Rs 460 and that of non- officers are Rs 110. If the number of officers is 15, then find the number of non – officers in the office.
(1) 500 (2) 510 (3) 520
(4) 550 (5) 530

Solutions

Q.1.(4) Sol. $11 \times 90 - 5 \times 87 - 5 \times 84$
$= 990 - 435 - 420 = 135$

Q.2.(3) Suppose his average after 12 innings = x
Then, $\frac{12x + 96}{13} = x + 5$
$X = 31$
Required average = $x + 5 = 31 + 5 = 36$

Q.3.(2) Sol. Let the original average expenditure be Rs. x
Then,
$40(x - 2) - 30x = 40$
$\Rightarrow 10x = 120 \Rightarrow x = 12$
Original expenditure = 30×12 = Rs. 360

Q.4.(3) Sol. Total salary of 75 workers = Rs. 426000
Total salary of 25 workers = Rs. 135000
Total salary of 30 workers = Rs. 171000
Total salary of remaining 20 workers
$= 426000 - (135000 + 171000)$
$= 120000$
Mean salary of 20 workers =120000/20 = Rs. 6000.

Q.5. (1) Let number be F, S and T
According to the question
F=2S, S=2T and F+S+T=63
Now $2S + S + \frac{S}{2} = 63$
$S=18$
f=2×18=36
T=18/2=9
Largest number=36

Q.6. (1) Max. mark = 180 + 150 = 330
$\frac{30}{100} \times 180 + \frac{x}{100} + 150 = \frac{50}{100} \times 330 = 165$
$54+\frac{3x}{2}=165$
$x=74\%$

Q.7.(2) Total score of 8 subjects = $87 \times 8 = 696$
Total score of 6 subjects = $85 \times 6 = 510$
Score of remaining two subjects = 696 - 510 = 186
Now, let the highest and the next highest score are x and x - 2, then
$(x) + (x - 2) = 186$
$\Rightarrow 2x = 188 \Rightarrow x = 94.$

Q.8.(2) For first nine months his salary is Rs. 3800 per month.
His average salary of last 36 months
$\frac{9\times3800+12(4200+4600)+3\times5000}{36} = 4300$
So his pension is Rs. 2150 per months

Q.9.(5) (Virat + Sehwag + Sachin + David + Yuvraj)
Make = 39 × 5 = 195 runs
With respect to scoring runs
Dhoni = Yuvraj + 7
Yuvraj = Virat - 9
Sehwag = Dhoni + Yuvraj
Sehwag + Sachin = 110
⇒ Virat, Dhoni, Yuvraj, Sehwag and Sachin scored
= 32, 30, 23, 53 and 57 runs respectively.

Q.10.(1) Suppose the number of candidates passed = x
39x + 15 (120 - x) = 120 × 35
⇒ 24x = 120 × 35 - 120 × 15
= 120 (35 - 15) = 120 × 20
⇒ x = 100

Q.11. (1) Average daily earning during the five-day week= $\frac{5x+8y}{5} = x + \frac{8y}{5}$

Q.12.(4) Present total age of husband and wife
= (23 × 2 + 5 × 2) = 56 years
Present total age of husband, wife and child
= 20 × 3 = 60 years
age of child = (60 - 56) = 4 years

Q.13.(2) Total marks in 10 papers = 800
Total marks in 8 papers = 648
Total of highest and lowest marks = 152
Lowest marks = 152 - 92 = 60.

Q.14.(1) Actual weight of all the students
= 36 × 45 - 34 + 32 - 40 + 45
= 1620 + 3 = 1623kg.
Actual average weight = 1623/45 = 36.07 kg

Q.15. (3) Hatim's salary in 2008 = 900000 rupees
Expenditure on food in 2007=400000
Expenditure on food in 2008=105% of 400000=420000
Percentage expenditure on food items in 2008=
$\frac{420000}{900000} \times 100 \approx 47\%$

Q.16. Total ages of 30 boys = 14 x 30 = 420 yrs.
Total ages when class teacher is included
= 15 x 31 = 465 yrs
Age of class teacher = 465 – 420 = 45 yrs.
Shortcut :
Age of new entrant = New average + No. of old members x increase in average

Q.17. If the average is increased by 3 kg, then sum of weights increases by 3 x 4 = 12 kg .
And this increase in weight is due to the extra weight included due to the inclusion of new person.
Weight of new man = 120 + 12 = 132 kg.

Q.18. Let the number of passed candidates be x. then total marks = 120 x 35 = 39x + (120 – x) x 15 or, 4200 = 39x + 1800 – 15x
or, 24x = 2400 So x = 100

Q.19. The total of 11 results = 11 x 50 = 550
The total of first 6 results = 6 x 49 = 294
The total of last 6 results = 6 x 52 = 312
The 6^{th} result is common to both;
Sixth result = 294 + 312 - 550 = 56

Q.20. Let the average after 16^{th} innings be x, then 16x + 85 = 17 (x + 3) = Total score after 17^{th} innings.
x = 34
average after 17 innings = x + 3 = 34 + 3 = 37

Q.21. By the formula : average speed = (2 x 20 x 30) / (20 + 30) = 24 km/hr

Q.22. Let the required number of non – officers = x
Then, 110x + 460 x 15 = 120 (15 + x)
or, 120 x – 110 x = 460 x 15 – 120 x 15 = 15 (460 – 120)
So, x = 510

Q.23. Suppose the average join the mess , total expenditure = 35x + 42
Now, the average expenditure
= (35x + 42)/ (35 + 7) = x – 1
or, 35x + 42 = 42x – 42
or, x = 12
Thus the original expenditure of the mess = 35 x 12 = Rs. 42

Q.24. (2) Sum of 5 members = 40×5 = 200 years
sum of remaining 4 members = 200 – 35 =165 years
New sum of 5 members = 165+25 = 190 years
Average age of new jury = 190/5 = 38 years

Q.25. (2) The weight of new man = weight of ex person +2.5×8
= 56 + 20 = 76 kg

Q.26. (1) Last year my age was a perfect square number = 25
Next year it will be a cubic number = 27
my present age = 26 years

Q.27. (1) Total ages of 30 boys = 14 x 30 = 420 yrs.
Total ages when class teacher is included
= 15 x 31 = 465 yrs
Age of class teacher = 465 – 420 = 45 yrs.

Q.28. (4) If the average is increased by 3 kg,

Then sum of weights increases by 3 x 4 = 12 kg.

And this increase in weight is due to the extra weight included

due to the inclusion of new person.

Weight of new man = 120 + 12 = 132 kg.

Q.29. (3) Let the number of passed candidates be x.

Then total marks = 120 x 35 = 39x + (120 – x) x 15

4200 = 39x + 1800 – 15x

24x = 2400, So x = 100

Q.30. (4) The total of 11 results = 11 x 50 = 550

The total of first 6 results = 6 x 49 = 294

The total of last 6 results = 6 x 52 = 312

The 6th result is common to both;

Sixth result = 294 + 312 - 550 = 56

Q.31. (3) Let the average after 16th innings be x, then

16x + 85= 17 (x + 3) = Total score after 17th innings.

x = 34

Average after 17 innings = x + 3 = 34 + 3 = 37

Q.32. (1) By the formula: 2 U V / U+V

Average speed = (2 x 20 x 30) / (20 + 30) = 24 km/hr

Q.33. (2) Let the required number of non - officers = x

Then, 110x + 460 x 15 = 120 (15 + x)

Or, 120 x – 110 x = 460 x 15 – 120 x 15 = 15 (460 – 120)

So, x = 510