AVERAGE

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 $\left(\dfrac{2xy}{x+y}\right)$ km/h.

❖ 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 netural 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 avarage $= \dfrac{7(1+2+3+\ldots+20)}{20}$

$= \left(\dfrac{7\times 20\times 21}{20\times 2}\right) = \left(\dfrac{147}{2}\right) = 73.5$

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,

$\dfrac{x+(x+2)+(x+4)+(x+6)}{4} = 27$

$\Rightarrow \dfrac{4x+12}{4} = 27 \Rightarrow x + 3 = 27 \Rightarrow x = 24$

$\therefore$ 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 weitht 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 × 15) years = 585 years

Average age of 40 persons

$$= 15 \text{ years } 3 \text{ months} = \frac{61}{4} \text{ years}$$

Total age of 40 persons

$$= \left(\frac{61}{4} \times 40\right) \text{ years} = 610 \text{ years}$$

$\therefore$ 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 weight 53 kg is replaced by a new man. Find the weight of the new man.

Sol. Total weight increased = (1.8 × 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 × 12) = Rs. 420

Ex.14: A batsman makes a score of 87 runs in the 17^{th} inning and thus in cases 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 return 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

$$= \left(\frac{2xy}{x+y}\right) \text{km/hr} = \frac{2 \times 84 \times 56}{(84+56)} \text{ km /hr}$$

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

EXERCISE

Q.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?
(A) 65 (B) 69
(C) 72 (D) None of these

Q.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 weight of Arun?
(A) 67kg (B) 68 kg
(C) 69 kg (D) None of these

Q.3 The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero?
(A) 0 (B) 1 (C) 10 (D) 19

Q.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

Q.5 The average of first five multiples of 3 is:
(A) 3 (B) 9 (C) 12 (D) 15

Q.6 The average of the first nine prime numbers is:
(A) 9 (B) 11 (C) $11\frac{1}{9}$ (D) $11\frac{2}{9}$

Q.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 ?
(A) 3 (B) 7 (C) 17 (D) 31

Q.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

Q.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:
(A) 11 (B) 13 (C) 15 (D) 17

Q.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) $9M^2$

Q.11 The average of the two digit numbers, which remain the same when the digits interchange their positions, is:
(A) 33 (B) 44 (C) 55 (D) 66

Q.12 The average of first 50 natural numbers is:
(A) 12.25 (B) 21.25 (C) 25(D) 25.5

Q.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

Q.14 The average of all odd numbers upto 100 is:
(A) 49 (B) 49.5 (C) 50 (D) 51

Q.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

Q.16 The average of a non-zero number and its square is 5 times the number. The number is :
(A) 9 (B) 17 (C) 29 (D) 295

Q.17 The average of 7 consecutive numbers is 20. The largest of these numbers is:
(A) 20 (B) 22 (C) 23 (D) 24

Q.18 The average of five consecutive odd numbers is 61. What is the difference between the highest and lowest numbers?
(A) 2 (B) 5
(C) 8 (D) None of these

Q.19 The sum of three consecutive odd numbers is 38 more than the average of these numbers. What is the first of these numbers?
(A) 13 (B) 17
(C) 19 (D) None of these

Q.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:
(A) 15 years
(B) 15.5 years
(C) 16 years
(D) Cannot be computed with the given information

Q.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) $\frac{11S+T}{12}$

Q.22 A family consists of grandparents, parents and three grandchildren. The average age of the grandparent 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?

(A) $28\frac{4}{7}$ years (B) $31\frac{5}{7}$ years

(C) $32\frac{1}{7}$ years (D) None of these

Q.23 A library has an average of 510 visitors on Sunday and 240 on other days. The average numbers of visitors per day in a month of 30 days beginning with a Sunday is:
(A) 250 (B) 276 (C) 280 (D) 285

Q.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:
(A) 55.33 (B) 54.68
(C) 55 (D) None of these

Q.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.
(A) 47.55 kgs (B) 48 kgs
(C) 48.55 kgs (D) 49.25 kgs

Q.26 A car owner buys petrol at Rs 7.50, Rs 8 and 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?
(A) Rs 7.98 (B) Rs. 8
(C) Rs 8.50 (D) Rs 9

Q.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:
(A) $x = y + z$ (B) $2x = y + z$
(C) $x = 2y + 2z$ (D) None of these

Q.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:
(A) Rs. 260 (B) Rs. 290
(C) Rs 292.50 (D) Rs. 400.50

Q.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 :
(A) 28.32 (B) 28.78 (C) 29.27(D) 29.68

Q.30 The average of five numbers is 27. If one number is excluded, the average becomes 25. The excluded number is:
(A) 25 (B) 27 (C) 30 (D) 35

Q.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 of remaining 14 students?
(A) 15 years (B) 17 years
(C) 18 years (D) 19 years

Q.32 16 children are to be divided in to 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 ?

(A) $77\frac{1}{3}$ (B) $77\frac{2}{3}$ (C) $78\frac{1}{3}$ (D) $78\frac{2}{3}$

Q.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

Q.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

Q.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

Q.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

Q.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

Q.38 A grocer has a sale of Rs 6435, Rs. 6927, Rs. 7230 and Rs. 6562 for 5 consecutive months. How much sale must he have in the six month so that he gets an average sale of Rs. 6500 ?
(A) Rs. 4991 (B) Rs. 5991
(C) Rs. 6001 (D) Rs 6991

Q.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?
(A) 4500(B) 4600(C) 4680 (D) 4710

Q.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?
(A) 6.25 (B) 6.5 (C) 6.75 (D) 7

Q.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

Q.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:
(A) 9 (B) 25 (C) 30 (D) None of these

Q.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:
(A) 15 (B) 45 (C) 48 (D) 60.25

Q.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

Q.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?
(A) 15 (B) 45
(C) Data inadequate (D) None of these

Q.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:
(A) 18 (B) 22 (C) 25 (D) 27

Q.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:
(A) 30 (B) 40 (C) 70 (D) 90

Q.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

Q.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%

Q.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:
(A) 35.2 (B) 36.1 (C) 36.5 (D) 39.1

ANSWER KEY

Q.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	D	D	D	B	B	C	B	C	B	B	C	D	B	C	D	A	C	C	B	D
Q.No	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	D	B	D	B	C	A	B	C	D	D	D	B	C	B	D	C	D	A	A	A
Q.No	41	42	43	44	45	46	47	48	49	50										
Ans.	A	D	C	C	D	C	B	D	D	C										

HINTS & SOLUTION

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

$= \left(\frac{375}{5}\right) = 75$

Sol.2 Let Arun's weight be X kg.
According to Arun, $65 < X < 72$
According to Arun's brother's $60 < X < 70$
According to Arun's mother's $X < 68$
The value 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.

Sol.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).

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

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

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

$= \frac{100}{9} = 11\frac{1}{9}$

Sol.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 $x = 144 - 137 = 7$

Sol.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 $y = 20$

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

Sol.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 =

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

Sol.11 Average

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

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

$$=\left(\frac{4\times110+55}{9}\right)=\frac{495}{9}=55$$

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

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

$$1^2+ 2^2+ 3^2 + ... + 7^2 = \left(\frac{7\times8\times15}{6}\right)=140$$

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

Sol.14 Sum of odd numbers up to 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 $= \left(\frac{2500}{50}\right)=50$

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

$$\therefore \text{Average} = \frac{a+(a+2)+(a+4)+(a+6)+(a+8)}{5}$$

$$=\left(\frac{5a+20}{5}\right)=(a+4)$$

Sol.16 Let the number be x. Then

$\frac{x+x^2}{2}=5x \quad \Leftrightarrow x^2-9x=0$

$\Leftrightarrow x(x-9)=0 \quad \Leftrightarrow x=0$ or $\Leftrightarrow x=9$

So, the number is 9.

Sol.17 Let the numbers be

x, x + 1, x +2, x + 3, x + 4, x + 5 and x + 6

Then $\frac{x+(x+1)+(x+2)+(x+3)+(x+4)+(x+5)+(x+6)}{7}$

= 20

or $7x + 21 = 140$

or $7x = 119$ or $x = 17$

∴ Largest number = x + 6 = 23

Sol.18 Let the numbers be

x, x + 2, x + 4, x + 6 and x + 8

Then

$\frac{x+(x+2)+(x+4)+(x+6)+(x+8)}{5}=61$

or $5x + 20 = 305$ or $x = 57$

So, required difference = (57 + 8) – 57 = 8

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

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

or $(3x+6)-\frac{(3x+6)}{3}=38$

or $2\,(3x + 6) = 114$ or $6x = 102$ or $x = 17$

So, first number = x = 17

Sol.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.

Sol.21 Let the number of other workers be x.

Then, number of agricultural workers = 11x

Total number of workers = 12x

∴ Average monthly income

$= \frac{S\times 11+T\times x}{12x}=\frac{11S+T}{12}$

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

$= \left(\frac{134+70+18}{7}\right)=\frac{222}{7}$

$= 31\frac{5}{7}$

Sol.23 Since the month begines with Sunday, so there will be five Sunday in the month.

∴ Required average $= \left(\frac{510\times 5+240\times 25}{30}\right)$

$=\frac{8550}{30}=285$

Sol.24 Required average

$$= \left(\frac{55\times 50+60\times 55+45\times 60}{55+60+45}\right)$$
$$= \left(\frac{2750+3300+2700}{160}\right)$$
$$= \frac{8750}{160} = 54.68$$

Sol.25 Required average

$$= \left(\frac{50.25\times 16+45.15\times 8}{16+8}\right)$$
$$= \left(\frac{804+361.20}{24}\right) = \frac{1165.20}{24} = 48.55$$

Sol.26 Total quantity of petrol consumed in 3 years

$$\left(\frac{4000}{7.50}+\frac{4000}{8}+\frac{4000}{8.50}\right) \text{ litres}$$
$$= 4000\left(\frac{2}{15}+\frac{1}{8}+\frac{2}{17}\right)$$
$$= \left(\frac{76700}{51}\right) \text{ litres}$$

total amount spent = Rx. (3 × 4000) = Rs. 12000.

$\therefore$ Average cost $= \text{Rs } \left(\frac{12000\times 51}{76700}\right)$

$= \text{Rs. } \frac{6120}{767} = \text{Rs. } 7.98$

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

Sol.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

$= 9x = \text{Rs.}(9 \times 32.50) = \text{Rs. } 292.50$

Sol.29 Sum of 50 numbers = 30 × 50 = 1500.

Sum of remaining 48 numbers

$= 1500 - (35 + 40) = 1425$

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

Sol.30 Excluded number

$= (27\times 5) - (25 \times 4) = 135 - 100 = 35$

Sol.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

Sol.32 Required average

$$= \frac{(76\times16)-(75\times10)}{6} = \left(\frac{1216-750}{6}\right)$$

$$= \frac{466}{6} = \frac{233}{3} = 77\frac{2}{3}$$

Sol.33 Required average

$$= \frac{(38.9\times10)-(42\times6)}{4} = \frac{137}{4} = 34.25$$

Sol.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 $= \left(\frac{9.2}{2}\right) = 4.6$

Sol.35 Let the highest score be x. Then,

lowest score = (x – 172).

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

$\Leftrightarrow 2x = 2000 + 172 - 1824$

$\Leftrightarrow 2x = 348$

$\Leftrightarrow x = 174$

Sol.36 Total price of the two books

= Rs. $[(12\times10) - (11.75 \times8)]$

= 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. $\left(x + \frac{3}{5}x\right)$ = Rx. $\left(\frac{8x}{5}\right)$

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

Sol.37 Average after 11 innings = 36

$\therefore$ Required number of runs

$= (36 \times 11) - (32 \times 10)$

$= 396 - 320 = 76$

Sol.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

Sol.39 Required average

$$= \frac{(4375\times12)-(4000\times3)}{9}$$

$$= \frac{52500-12000}{9} = \frac{40500}{9} = 4500$$

Sol.40 Required run rate

$$= \frac{282-(3.2\times10)}{40} = \frac{250}{40} = 6.25$$

Sol.41 The their prices be 3x, 5x and 7x
Then, 3x + 5x + 7x = (15000 × 3) or x = 3000
∴ Cost of cheapest item = 3x = Rs 9000

Sol.42 Let the fourth number be x.

Then, third number = 5x, second number = $\frac{5x}{3}$ and first number = $\frac{10x}{3}$.

$$x+5x+\frac{5x}{3}+\frac{10x}{3} = (24.75\times4)$$

or 11x = 99 or x = 9
So, the number are 9, 45, 15 and 30
∴ Largest number = 45

Sol.43 Let the first number be x.
Then, sum of the four numbers = x + 4x = 5x

So, $\frac{5x}{4} = 60$ or $x = \left(\frac{60\times4}{5}\right) = 48$

Sol.44 Let the third number be x.
Then, second number = 2x.
First number = 4x

$$\therefore \frac{1}{x}+\frac{1}{2x}+\frac{1}{4x} = \left(\frac{7}{72}\times3\right)$$

or $\frac{7}{4x} = \frac{7}{24}$ or 4x = 24 or x = 6
So, the numbers are 24, 12 and 6.

Sol.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

Sol.46 Let the eighth number be x.
Then, sixth number = (x – 7)
Seventh number = (x –7) + 4 = (x – 3)

So, $\left(2\times15\frac{1}{2}\right)+\left(3\times21\frac{1}{3}\right)$ + (x – 7) + (x – 3) + x = 8 × 20
⇔ 31 + 64 + (3x –10) = 160
⇔ 3x = 75
⇔ x = 25

Sol.47 A.M. of 75 numbers = 35
Sum of 75 numbers = (75 × 35) = 2625
Total increase = (75 × 5) = 375
Increased sum = (2625 + 375) = 3000

Increased average = $\frac{3000}{75} = 40$

Sol.48 Average of 10 numbers = 7

Sum of these 10 numbers = (10 × 7) = 70

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

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

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

$\Rightarrow$ Average of new numbers is 84

Sol.49 $\frac{x_1 + x_2 + ... + x_{10}}{10} = \overline{x}$

$\Rightarrow x_1 + x_2 + ...+ x_{10} = 10\overline{x}$

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

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

$\Rightarrow$ Average is increased by 10%

Sol.50 Correct sum = (36× 50 + 48 – 23) = 1825

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