

Average

Definition:

Average can be defined as the sum of all numbers divided by the total number of values.

Formula:

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

$$\text{Average value} = (a + b + c + \dots) / n.$$

For consecutive number:

$$x, x+1, x+2, x+3, x+4 \dots$$

$$\text{Eg: } x=90 \Rightarrow 90 \quad 91 \quad \textcircled{92} \quad 93 \quad 94.$$

92 is the average.

For consecutive odd number:

$$x, x+2, x+4, x+6, x+8 \dots$$

$$\text{Eg: } x=1 \Rightarrow 1 \quad 3 \quad \textcircled{5} \quad 7 \quad 9$$

5 is the average.

For consecutive even number:

$$x, x+2, x+4, x+6, x+8 \dots$$

$$\text{Eg: } x=4 \Rightarrow 4 \quad 6 \quad \textcircled{8} \quad 10 \quad 12$$

8 is the average.

Examples:

1. The average age of A, B and C is 26 years, if the average age of A and C is 29 years, what is the age of B in years?

Solution:

$$\frac{A+B+C}{3} = 26 \quad \frac{A+C}{2} = 29$$

$$A+B+C = 78$$

$$A+C = 58$$

$$B = 20$$

∴ The age of the person B is 20.

2. The average of 7 numbers is 5.

If the average of first six of these numbers is 4, the seventh number is?

Solution:

$$\text{Total of 7 numbers} = 7 \times 5 = 35$$

$$\text{Total of 6 numbers} = 6 \times 4 = 24$$

∴ The seventh number is 11.

3. The average of number to number is 7. What will be the new average if each of the number is multiplied by 8?

Solution:

$$\begin{aligned} \text{Total of 10 numbers} &= 70 \\ &= 70 \times 8 \\ &= 560 \end{aligned}$$

$$\text{Average} = \frac{560}{10} = 56.$$

\therefore The new average number is 56.

4. The average of five consecutive even numbers starting with 4, is.

Solution:

Let A, B, C, D, E is the five consecutive numbers.

| | | | | |
|----------|----------|----------|-----------|-----------|
| A | B | C | D | E |
| <u>4</u> | <u>6</u> | <u>8</u> | <u>10</u> | <u>12</u> |

\therefore The average of five consecutive even numbers is 8.

5. A, B, C and D are four consecutive odd numbers and their average is 42. What is the product of B and D.

Solution:

$$\begin{array}{cccc}
 A & B & C & D \\
 39 & 41 & 43 & 45 \\
 \hline
 & & 42 &
 \end{array}$$

$$\text{Product} = 41 \times 45$$

$$= 1845$$

∴ The product of B and D is 1845.

6. One of the three numbers. The first is twice the second and the second is three times the third. If the average of the three numbers is 10. The numbers are:

Solution:

$$\left. \begin{array}{l} \text{Third} \\ \text{no} \end{array} \right\} = x, \quad \left. \begin{array}{l} \text{Secondly} \\ \text{no} \end{array} \right\} = 3x, \quad \left. \begin{array}{l} \text{First} \\ \text{no} \end{array} \right\} = 6x$$

$$\frac{6x + 3x + x}{3} = 10$$

$$\frac{10x}{3} = 10 \quad \frac{d^2x}{dt^2} = 3 \times 3 = 9$$

$$10x = 30 \quad = 6 \times 3 = 18.$$

$$x = 3$$

∴ The first number is 18.

The second number is 9.

The third number is 3.

7. The sum of three numbers is 98. If the ratio between first and second be 2:3 and between second and third be 5:8, then the second number is:

Solution:

Let a, b, c is the three nos.

$$a + b + c = 98 \quad \text{--- (1)}$$

$$a : b = 2 : 3 \quad \text{and} \quad b : c = 5 : 8$$

$$\frac{a}{b} = \frac{2}{3} \quad ; \quad \frac{b}{c} = \frac{5}{8}$$

$$a = \frac{2b}{3} \quad \text{--- (2)}$$

$$c = \frac{8b}{5} \quad \text{--- (3)}$$

Sub (2) & (3) in (1).

$$\frac{2b}{3} + b + \frac{8b}{5} = 98.$$

$$\frac{10b + 15b + 24b}{15} = 98.$$

$$a = \frac{49b}{15} = \frac{98}{3}$$

$$b = 30$$

∴ The second number is 30.

8. The average marks in English subject of a class of 24 students is 50. If the marks of three students were misread as 44, 45 and 61 of the actual marks 48, 59 and 67, respectively, then what would be correct average?

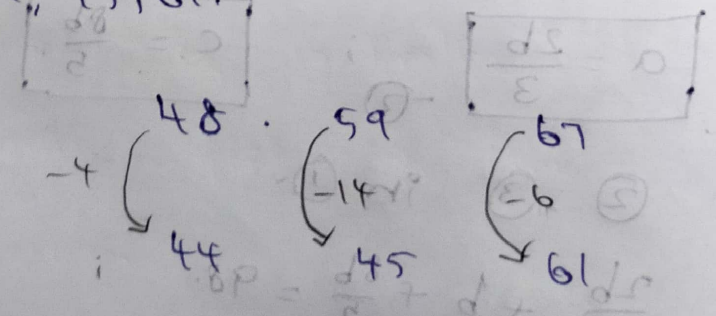
Solution:

$$24 \times 50 = 1200$$

The total mark is 1200.

Marks of the three student

44, 45, 61.



$$= 1200 + 24 = 1224$$

$$= \frac{1368}{24} = 57.$$

\therefore The correct average is 57.

To calculate average speed :

There are two formula's to calculate average speed.

1. If the certain distance is covered at the speed of x km/hr and the same distance is covered at y km/hr, then the average speed during entire journey is,

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

2. If the person covers A km at a speed of x km/hr, B km at a speed of y km/hr and C km at a speed of z km/hr. Find out average speed of entire journey.

$$\left(\frac{A+B+C}{\frac{A}{x} + \frac{B}{y} + \frac{C}{z}} \right) \text{ km/hr}$$

Examples:

1. A man goes to a certain place at a speed of 30 km/hr and returns to original place at a speed of 20 km/hr, find out the average speed during the entire journey.

Solution:

The value of x and y is 30 and 20.

$$\Rightarrow \frac{2(30)(20)}{50}$$

$$\Rightarrow \frac{120}{5}$$

$$\Rightarrow 24 \text{ km/hr}$$

2. A person covers 9 km at a speed of 3 km/hr, 25 km at a speed of 5 km/hr and 30 km at a speed of 10 km/hr. Find out the average speed of the entire journey?

Solution:

Let A, B, C be the distance of
9, 25, 30.

$$\Rightarrow \left(\frac{9+25+30}{\frac{9}{3} + \frac{25}{5} + \frac{30}{10}} \right)$$

$$\therefore \left(\frac{A+B+C}{\frac{A}{x} + \frac{B}{y} + \frac{C}{z}} \right) \text{ km/hr}$$

$$\Rightarrow \left(\frac{64}{\frac{9^3}{3} + \frac{25^3}{5} + \frac{30^3}{10}} \right)$$

$$\Rightarrow \frac{64}{3+5+3} \Rightarrow \frac{64}{11}$$

$$\Rightarrow 5.8181 \text{ km/hr.}$$

\therefore The average speed of the
entire journey.