

Concepts of Average by Agnihotri Classes

1) Average is the ratio of sum of observations to the no. of observations.

$$\text{Average} = \frac{\text{Sum of observations}}{\text{No. of observations}}$$

2) Some important series and their average

(a) 'n' Natural numbers

$$\text{Sum of 'n' natural no.} = \frac{n(n+1)}{2}$$

$$\text{Average of 'n' natural no. } (A_N) = \frac{\frac{n(n+1)}{2}}{n} = \frac{n+1}{2}$$

(b) 'n' odd numbers

$$\text{Sum of 'n' odd number} = n^2$$

$$\text{Average of 'n' odd no. } (A_O) = \frac{n^2}{n} = n$$

(c) 'n' Even numbers

$$\text{sum of 'n' Even no.} = n(n+1)$$

$$\text{Average of 'n' Even no. } (A_E) = \frac{n(n+1)}{n} = n+1$$

(d) Average of series $1^2, 2^2, 3^2, \dots, n^2$

$$\text{Sum of series} = \frac{n(n+1)(2n+1)}{6}$$

$$\text{Average} = \frac{n(n+1)(2n+1)}{6 \times n} = \frac{(n+1)(2n+1)}{6}$$

(e) Average of Series $1^3, 2^3, 3^3, \dots, n^3$

$$\text{Sum of the series} = \left[\frac{n(n+1)}{2} \right]^2 = \frac{n^2(n+1)^2}{4}$$

$$\text{Average} = \frac{\frac{n^2(n+1)^2}{4}}{4 \times n} = \frac{n(n+1)^2}{4}$$

3) If a person covers a distance with x m/s and again covers the same distance at y m/s then person's

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}} = \frac{2xy}{x+y}$$

mco's based on the Concepts Explained

Average sheet - 1

Q.1) What is the average of initial 60 natural nos
a) 30 b) 30.5 c) 31 d) 32

Ans. b)

Sol. $A_N = \frac{n+1}{2} = \frac{60+1}{2} = \frac{61}{2} = 30.5$

Q.2) What is the average of initial 16 odd numbers
a) 15 b) 16 c) 18 d) 20

Ans. b)

Sol. $A_O = n = 16$

Q.3) What is the average of first 20 even no
a) 18 b) 19 c) 20 d) 21

Ans. d)

Sol. $A_E = n+1 = 20+1 = 21$

Q.4) Find the average of $1^2, 2^2, 3^2, 4^2, \dots, 10^2$
a) 35 b) 38 c) 38.5 d) 40

Ans. c)

Sol. $Average = \frac{(n+1)(2n+1)}{6} = \frac{(10+1)(2 \times 10+1)}{6} = \frac{11 \times 21}{6} = \frac{77}{2} = 38.5$

Q.5) Find the average of $1^3, 2^3, 3^3, 4^3, 5^3, 6^3, 7^3$
a) 100 b) 110 c) 112 d) 115

Ans. c)

Sol. $Average = \frac{n(n+1)^2}{4} = \frac{7 \times 8^2}{4} = \frac{7 \times 64}{4} = 112$

Q.6) Find the average of first 25 multiples of 7
a) 90 b) 91 c) 92 d) 94

Ans. b)

Sol. $Avg. = \frac{7+14+21+\dots \text{ upto 25 terms}}{25} = \frac{7(1+2+\dots \text{ 25 terms})}{25} = \frac{7 \times 25 \times 26}{25 \times 2} = 7 \times 13 = 91$

q. 7) The average of first 8 prime no.
a) 9 b) 9.125 c) 9.625 d) 9.25

Ans. c)

Sol. Avg. = $\frac{2+3+5+7+11+13+17+19}{8} = \frac{77}{8} = 9.625$

q. 8) Find the average of initial two primes and initial two composite no. a) 3 b) 3.25 c) 3.75 d) 4

Ans. c)

Sol. Avg. = $\frac{2+3+4+6}{4} = \frac{15}{4} = 3.75$

q. 9) The average of 7 consecutive numbers is 20. The largest of these no. is a) 20 b) 22 c) 23 d) 24

Ans. c)

Sol. $n + (n+1) + (n+2) + \dots + (n+6) = 20$

$\frac{7n + 6 \times 7}{7} = 20 \Rightarrow \frac{7(n+3)}{7} = 20$

$n+3 = 20 \Rightarrow n = 17$

Hence largest no. = $n+6 = 17+6 = 23$

q. 10) Distance between Vidisha Railway station to Agnihotri classes is 200m. A student walk to visit the class with a speed of 8 kmph while he returns back to the station with a speed of 12 kmph.

Find the average speed of the student

a) 9.4 kmph b) 9.6 kmph c) 9.8 kmph d) 10.2 kmph

Ans. b)

Sol. Avg. speed = $\frac{2xy}{x+y} = \frac{2 \times 8 \times 12}{8+12} = \frac{2 \times 96}{20} = \frac{192}{20} = 9.6 \text{ kmph}$