

Average

⌚ Time Spent : 00 Hours 33 Minutes 58 Seconds

</> Average Shortcut Tricks To Solve Aptitude Problems

- ✓ **Average Shortcut Tricks** : topic is one of the most important chapters in aptitude , questions can be asked in any form. They are in either in data interpretation or can ask directly. The basic thing is you need to learn different types of concepts along with formulas.
- ✓ Then you can solve easily any type of questions. The aspirant must know all types of concepts regarding average questions with Average Shortcut Tricks like average age, average weight, and the average speed and must know all Average Shortcut Tricks, formulas to solve within a short approach and need to practice.



</> Basics In Average Shortcut Tricks

- ✓ The average is the value, that the sum of observations divided by the number of observations.
- ✓ Average Shortcut Tricks topic is one of the most important chapters in aptitude, questions can be asked in any form. They are in either in data interpretation or can ask directly. The basic thing is you need to learn different types of concepts along with formulas.
- ✓ Then you can solve easily any type of questions. The aspirant must know all types of concepts regarding average questions with Average Shortcut Tricks like average age, average weight, and the average speed and must know all Average Shortcut Tricks, formulas to solve within a short approach and need to practice.



</> Basics In Average Shortcut Tricks

- ✓ The average is the value, that the sum of observations divided by the number of observations.
- ✓ Average Sum of observations / Number of given observations
- **The Above Formula Can Rewrite To Find Sum Or Number Of Observations As Below**
 - ✓ Sum of given observations = Average x Number of given observations.
 - ✓ Number of given observations = Sum of observations/ Average

</> Average-1

</> Average-2

➤ Average Shortcut Tricks- Average Solved Example

Example: Find the average of 10, 20, 30, 0?

Answer: Average = Sum of observations / Number of observations

$$= 10+20+30+0/3$$

$$= 60/3$$

$$= 20.$$

Note:



- ✓ Average of given different observations always less than highest value of data and always greater than lowest value. It means that average always between the highest value and lowest value of given data.
- ✓ If the given observations are same in data, that average will be same and equal to given observation values.
- ✓ If "0" is given in observation then that "0" also will be included while calculating average of data.

</> Average Shortcut Tricks – Important Rules

- ✓ If all the given observations (or) numbers increased by x , then the average must be increased by x .
- ✓ If all the given observations (or) numbers decreased by x , then the average must be decreased by x .
- ✓ If all the given observations (or) numbers multiplied by x , then the average must be multiplied by x .
- ✓ If all the given observations (or) numbers divided by x , then the average must be divided by x .

</> Average-3

</> Concepts Of Average Shortcut Tricks

- ✓ Solved Concept Based Examples with all Average Shortcut Tricks
- ✓ Here we explained different types of concepts along with important formulas. Follow all concepts related to average and practice problems help to score easily without taking much time for any type of question.
- ✓ Note : 'n' always is the number of observations.

> Concepts Related To Average Of Natural, Even, Odd, Consecutive Numbers

Concept 1: Average of first 'n' natural numbers = $\frac{(n+1)}{2}$

Example: Find the average of from 1 to 27 (natural numbers)?

Answer: Total number of natural numbers (n) = 27.

Average of 26 natural numbers = $\frac{(n+1)}{2}$

= $\frac{27+1}{2}$

= $\frac{28}{2} = 14$.

Concept 2: Average of first 'n' even numbers = $(n+1)$.

Example: Find the average of 2, 4, 6, 8, 10, 12, 14, 16. Answer: Total number of given even numbers (n) = 8.

Average of first 8 even numbers = $(n+1) = 8+1 = 9$.

Concept 3: Average of first 'n' odd numbers = n

Example: Find the average of 1, 3, 5, 7, 9. Answer: Total number of given odd numbers (n) = 5.

Average of first 5 odd numbers = $(n) = 5$.

Concept 4: Average of consecutive numbers = $\frac{(\text{First number} + \text{Last number})}{2}$

Note: consecutive numbers means the difference between number after number continuous in series will be same

Example: Find the average of 1, 2, 3, ..., 21. (The series is consecutive, because of $2-1=3-2=4-3=1$)

Answer: Here 1 to 21 are consecutive number. Among these 1 is the first number and 21 is the last number.

According to formula average is = $\frac{1+21}{2}$

= $\frac{22}{2} = 11$.

Concept 5: Average of 1 to n odd numbers = $\frac{(\text{Last odd number} + 1)}{2}$

Example: Find the average of 1 to 11. Answer: Here, Last odd number = 11 According to formula Average will be = $\frac{11+1}{2} = 12$ ^

Concept 6: Average of 1 to n even numbers = $(\text{Last even number} + 2) / 2$

Example: Find the average of 1 to 16. Answer: Here, Last even number = 16

According to formula Average will be = $16+2/2 = 18/2 = 9$.

Concepts related to average of squares, cubes of natural numbers and multiples of any number.

Concept 7: Average of squares of first n natural numbers = $[(n+1)(2n+1)] / 6$

Example: Find the average of squares of 1 to 25. Answer: Here the n value = 25.

According to formula Average will be = $(25+1)(2 \times 25+1)/6 = (26 \times 51)/6$

= $1326/6$

= 221.

Concept 8: Average of cubes of first n natural numbers = $n(n+1)^2 / 4$ Example: Find the average of cubes of 1 to 9. Answer: Here the n value = 9.

According to formula Average will be = $9(9+1)^2 / 4$

= $(100 \times 9) / 4$

= 225.

Concept 9: Average of n multiples of any number = $[n(n+1)] / 2$ Example: Find the average of first 3 multiples of 5. Answer: Here the n value = 3.

According to formula Average will be = $\frac{5 \times (3+1)}{2}$

= $20/2$

= 10.

➤ Average Shortcut Tricks -Other Concepts:

Concept 10: How to find total average if two or more than two categories and their respective averages given?

- ✓ If two categories and their respective averages given, then apply the below formula
- ✓ Assume that 1st Category = n₁ and its average = a₁;
- ✓ And also that 2nd Category = n₂ and its average = a₂;
- ✓ Average of all categories = $(n_1 a_1 + n_2 a_2) / (n_1 + n_2)$

Note : same process applicable if more than two categories and averages given also. Just add as n₃, n₄— and a₃, a₄— respectively in same formula. Average of all categories = $(n_1 a_1 + n_2 a_2 + n_3 a_3 + \dots) / (n_1 + n_2 + n_3 + \dots)$

Example: There are 12 boys and 15 girls in a class. If the average age of boys is 12 year and girls is 10 year, then find out the average of both girls and boys in class?

Answer: while we applied above formula here, n₁ = 12 and n₂ = 15 and averages a₁ = 12 and a₂ = 10 respectively.

Average of total girls and boys in class = $(n_1 a_1 + n_2 a_2) / (n_1 + n_2)$

= $(12 \times 12) + (15 \times 10) / (12 + 15)$

= $(144 + 150) / 27$

= $194 / 27$

= 7.181 years.

Concept 11: How to find the average of remaining part of total observations?

- ✓ If the average of total m observations is a and among them the average of n observations is b, then the average of remaining observations in them. Then apply below formula
- ✓ Average of remaining part of total observations = $(ma - nb) / (m - n)$

Example: The cost of 20 cows is Rs 200000/-. Among them, if the average cost of 12 cows is 12500, then what will be the average cost of the remaining cows? Answer: First we need to find out average cost of 20 cows = Total cost / number of cows

= $200000 / 20 = 10000$

Here we can assume that m = 20, n = 12, a = 10000, b = 12500

Average cost of remaining cows (i.e. 20 - 12 = 8 cows) = $(ma - nb) / (m - n)$

= $(20 \times 10000 - 12 \times 12500) / (20 - 12)$

= $200000 - 150000 / 8$

= $50000 / 8$

= Rs 6250/-.

Case 1 : If the average of n observations is a , but while eliminated one observation, then the average changes to b . then the value of eliminated observation = $n(a-b)+b$.

Example: In a cricket team, the average age of 11 players and the coach is 18 years. If the age of the coach is not considered, then the average decreases by 1 year. Find out the age of the coach? Answer: We know that **Sum of given observations = Average \times Number of given observations**

Total age of 11 players along with coach = $12 \times 18 = 216$ years,

Total age of 11 players only = $11 \times 17 = 187$ years.

Then age of coach = $216 - 187 = 29$ years.

(Or) According to formula

$n=11+1=12$, initial average (a) = 18 years, changed average (b) = $18-1=17$ years.

Age of coach = **$n(a-b)+b$**

$=12(18-17) + 17$

$=12(1) + 17$

$=29$ years.

Case 2: If average of n observations is a , but while added one observation, then the average changes to b . then the value of eliminated observation = $n(b-a) + b$.

Example: The average run scored by a batsman in 20 innings is 32. After 21st innings, the runs average becomes 34. How much runs does the batsman score in his 21st innings? Answer: We know that **Sum of given observations = Average \times Number of given observations**

Total runs scored in 20 innings = $20 \times 32 = 640$.

Runs scored in total 21 innings = $21 \times 34 = 714$.

Net Runs scored in the 21st innings = $714 - 640 = 74$

(Or) According to formula = **$n(b-a) + b$** .

Here $n=20$; initial average (a)= 32 ; last average (b)= 34 ;

Net Runs scored in the 21st innings = $n(b-a) + b$.

$=20(34-32)+34$

$=(20 \times 2)+34$

$=74$.

➤ Average Shortcut Tricks-Average Age/ Average Weight

Concept 13: If the average (b) increases or decreases, in a set (n) of observations when some observations (a) replaced by new observations, how to find the value of a new observations = $a \pm n b$ (+ for increase in average and – for decrease in average)

Case 1: Increase/decrease in average by replacing person then, Age /weight of new comer = Age/weight of old replaced one \pm (number of persons \times increase/decrease in average)

Note: '+' for increase in average and '-' for decrease in average Example: The average weight of 3 men is increased by 5 kg, when one of them whose weight is 100kg, is replaced by another one. What is the weight of new one? Answer: weight of new one = weight of old replaced one + (number of persons \times increase in average)

$= 100 + (3 \times 5)$

$= 100 + 15$

$= 115$ kg s

Case 2: Increase/decrease in average when a person joined without replacing person then, Age /weight of new comer = initial average Age/weight \pm (total number of persons including new joined one \times increase/decrease in average)

Note: '+' for increase in average and '-' for decrease in average

Case 3: Increase/decrease in average when a person leaves and nobody joins then, Age /weight of left person = initial average Age/weight \pm (total number of persons after leaving \times increase/decrease in average)

Note: '+' for increase in average and '-' for decrease in average

Concept 14: How to find the number of passed/ failed candidates, if the average of n students in a class is a , and average of passed students ' x ' and average of failed students y , then

- ✓ Number of students passed = $[\text{Total students} (\text{Total average} - \text{Average of failed students})] / \text{Average of passed} - \text{Average of failed}$

Example: In a class, there are 75 students and 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 passed and failed? Answer:

Number of students passed = $\frac{\text{Total students} (\text{Total average} - \text{Average of failed students})}{\text{Average of passed} - \text{Average of failed}}$

$\frac{75(35-30)}{55-30}$

Number of students passed = $75(35-30)/55-30$

Number of students failed = total students – passed students
= 75-15=60.

Concept 15: How to find the number of remaining or 2nd part of components, 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 apply the below formula
The number of remaining or 2nd part of components = $n(a-b)/(c-a)$ Example: The average salary of total staff in an office is Rs 200/- per day. The average salary of officers is Rs 550/- and non-officers is Rs 120/-. If the number of officers is 16, then find the numbers of non-officers in the office? Answer: The number of remaining or 2nd part of components = $n(a-b)/(c-a)$

Assume values of n = 16, a=200, b=550, c=120

$$\begin{aligned} &= n(a-b)/(c-a) \\ &= 16(200-550)/120-200 \\ &= 16(-350)/-80 \\ &= 16 \times 35/8 \\ &= 70. \end{aligned}$$

> Average Shortcut Tricks – Average Speed Calculation

Concept 16 : Average Speed = Total distance travelled/ Total time taken. Example: A person covers a certain distance by car at a speed of 25km/h and comes back at a speed of 40km/h. What is average speed during the whole journey?

Answer: Here Assume X= 25km/h, Y= 40km/h

$$\text{Average speed} = 2xy/x+y$$

$$= 2 \times 25 \times 40 / 25 + 40$$

$$= 30.76 \text{ km/h.}$$

Case 2: For three equal distances $3xyz/xy+yz+zx$

Example : A person covers 3 equal distances by car at a speed of 30km/h, 15km/h and 10km/h. What is average speed during the whole journey? Answer: Here Assume X= 25km/h, Y= 40km/h

$$\text{Average speed} = 3xyz/xy+yz+zx$$

$$= 3 \times 30 \times 15 \times 10 / (30 \times 15) + (15 \times 10) + (10 \times 30)$$

$$= 15 \text{ km/h.}$$

Case 3: If different distance p, q, r kms covered by different speeds respectively x, y, z km/h,

then the average speed = $\frac{P+Q+R+....}{P/x+Q/y+R/z+....}$

$$P/x+Q/y+R/z+....$$

Example: A person covers 3 different 20km, 15km, 10km distances by car at a speed of 5km/h, 3km/h and 2km/h respectively. What is average speed during the whole journey? Answer: Here Assume P= 20km, Q= 15km, R= 10km and x=5km/h, y= 3km/h, z= 2km/h

$$\text{Average speed} = \frac{P+Q+R+....}{P/x+Q/y+R/z+....}$$

$$P/x+Q/y+R/z+....$$

$$= \frac{20+15+10}{20/5+15/3+10/2}$$

$$= 45/14 \text{ km/h}$$

Case 4: If person covers p part of total distance with speed of x km/h, Q part of total distance with speed of y km/h and R part of total distance with speed of z km/h then average speed = $\frac{1}{P/x + Q/y + R/z +}$

$$P/x + Q/y + R/z +$$

Example: A person covers 25% of journey with speed of 10km/h, 45% of journey with speed of 5km/h, and remaining 30% distance by car at a speed of 15km/h. What is average speed during the whole journey? Answer: >Assume values as

$$P= 25\% = 1/4; x=10\text{km/h};$$

$$Q=45\%=9/20; y=5\text{km/h};$$

$$R=30\%=30/100; z=15\text{km/h};$$

$$\text{Average speed} = \frac{1}{P/x + Q/y + R/z +}$$

$$P/x + Q/y + R/z +$$

$$= \frac{1}{1/4 \times 10 + 9/20 \times 5 + 3/10 \times 15}$$

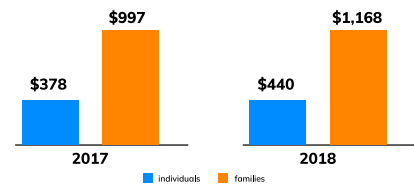
$$= \frac{1}{1/4 \times 10 + 9/20 \times 5 + 3/10 \times 15}$$

$$= 200/27 = 7.40 \text{ km/h}$$

✓ This is all about Average formulas and tricks to apply different types of concept-based questions to solve in aptitude.

- ✓ A calculated "central" value of a set of numbers.
- ✓ **To calculate:** To calculate the average of the numbers, first add all the numbers and divide the sum with the no. of observations

Average monthly premiums:



</> Formulae And Example Problems

- ✓ "Average" is also called Arithmetic mean
Average = (Sum of total observation)/(No of total observation)
- ✓ Example : Find the Average of 85,80,90,60,70,75.
- ✓ Answer : Sum = 85+80+90+60+70+75 = 460
Average = 460/6 = 76.6

> Change In The Values In Group And Change In Average:

- ✓ In a group of series 'n' numbers average is 'x', If every number in series added/subtracted by the same number (say k), The average of the series also added/subtracted by the same number.
N numbers avg = x
- ✓ +K -- X+K
- ✓ -K -- X-K
- ✓ In a group of series 'n' numbers average is 'x', If every number in series multiplied/divided by the same number (say k), The average of the series also multiplied/divided by the same number.
N numbers avg = x
- ✓ *K -- X*K
- ✓ /K -- X/K

$$\text{Average} = \frac{\text{sum of total observations}}{\text{num of total observations}}$$

MARK AS COMPLETED

