

# CAT Notes

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# Introduction

This is a series of notes that I am making to learn  $\text{\LaTeX}$  as well as makes notes for CAT and any aptitude exam preparation. The youtube channels and resources I am using are as follows

- [Rodha Youtube Channel](#)
- [Free CAT Question Bank](#) : This contains question for each topic.



Part I

Number System





**Part II**

**Arithmetic**



# Chapter 1

## Averages

### 1.1 Basics and Interesting cases

Average is defined as  $\frac{\text{Sum}}{\text{Number of quantities}}$ . For example, the average of numbers 17,12,10 and 20 is  $\frac{17 + 12 + 10 + 20}{4} = \frac{59}{4} = 14.75$ . There are some special cases  
When numbers are in AP (Arithmetic Progression), the average of that sequence is the middle term of the sequence

- Middle term of AP is given as  $\frac{\text{First term} + \text{Last term}}{2}$ 
  - This middle term may or may not exist in the sequence itself : If a sequence has odd number of terms, then the average exists in the sequence but if there are even number of terms, average will not exist in sequence
  - 2,4,6,8,10 . Average =  $\frac{2 + 10}{2} = 6$ . 6 exists in AP.
  - 1,3,5,7. Average =  $\frac{1 + 7}{2} = 4$ . 4 does not exist in AP
- If we want to find the index of the middle term/s that resulted in average, they are as follows
  - Odd number of terms :  $\left\lfloor \frac{\text{Number of terms}}{2} \right\rfloor + 1$
  - Even number of terms :  $\frac{\text{Number of terms}}{2}, \frac{\text{Number of terms}}{2} + 1$ . The average of AP is the average of these middle terms

**Question 1.1** : Average of 7 consecutive even integers is 36. Product of 2nd and 5th term is?

Since we have odd number of terms in the AP, the middle term of the AP will be the average. If we write our AP as  $a, a + 2, a + 4, a + 6, a + 8, a + 10, a + 12$ . The middle term is  $a + 6 = 36 \implies a = 30$ .

Product of 2nd and 5th term =  $(a + 2) * (a + 8) = 32 * 38 = 1216$

**Question 1.2** : Average of 12 consecutive odd integers is 30. Find the sequence

The sequence is an AP with 12 terms and common difference = 2. Since we have even terms, the average is calculated as average of middle terms. Let the first term of the AP be  $a$ .

$$\begin{aligned}
30 &= \frac{a + (4 * 2) + a + (5 * 2)}{2} \\
30 &= \frac{2a + 18}{2} \\
&= a + 9 \\
a &= 21
\end{aligned}$$

Series is therefore, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43

#### Another approach

We can see that the average of the sequence is 30. In a sequence of 12 terms, average is derived by average of 2 middle terms. In this question, the terms would be the 5th and 6th term.

- If the average of 2 terms is an integer  $x$ , then the terms must be  $x - 1$  and  $x + 1$ .  $\frac{(x - 1) + (x + 1)}{2} = \frac{2x}{2} = x$ .
- If the average of 2 terms is a decimal  $y$ , then the terms must be  $y - 0.5$  and  $y + 0.5$ . For example, if average is 14.5, then the terms are 14 and 15  $\frac{14 + 15}{2} = \frac{29}{2} = 14.5$ .

Using the above, we can find the 5th and 6th terms : 30-1 and 30+1 respectively. Using that, with common difference of 2, we can find the terms

**Question 1.3 :** Average of 143 consecutive odd integers is 'P'. Average of last 67 terms is 'n'. Find 'P' in terms of 'n'

- Since average of 143 terms is  $P$ , we can say that  $\left\lfloor \frac{143}{2} \right\rfloor + 1 = 72^{nd}$  term is equal to  $P$ .
- The last 67 terms are in the range 77th term to 143rd term ( $143 - 67 + 1 = 76$ ). The middle term of this sequence will be  $\frac{77 + 143}{2} = 110$ .
- $110^{th}$  term =  $n$ ,  $72^{nd}$  term =  $P$ . Difference =  $110 - 72 = 38$ . Therefore,  $n = P + 38$

[Continue from here](#)

**Part III**

**Thank you**

