## AVERAGE

The simple formula for average is :-
Average $=\underline{\text { Sum of the numbers }}$
Total numbers
Q.> Calculate the average of following six numbers.
$10,25,40,50,75,100$
Soln.> First calculate the sum of numbers.

$$
10+25+40+50+75+100=300
$$

Then divide it by the number of numbers given which is here 6 .

$$
\text { Average }=300 / 6=50 \text { ans } .
$$

But using this formula in exams would be time taking and requires more calculation and in exams like clat where time is everything you need tricks or likely to say methods which are less time taking. Here are some methods which can ease your burden.

- Suppose numbers given in the question are in some series. For eg. 10,20,30,40,50...... In this case 2 types of questions are there:-

1. When numbers of terms are odd. Suppose $15,20,25,30,35$

Then average is $\underline{n+1}{ }^{\text {th }}$ term. Here average $=5+1 / 2=3^{\text {rd }}$ term $=25$
2. When numbers of term given are even. Suppose $15,20,25,30,35,40$

Then average is mean of $n / 2$ and $(n+1) / 2$ term. Here $\mathrm{n} / 2^{\text {th }}$ term is the $3^{\text {rd }}$ term and $(\mathrm{n}+1) / 2$ term is $4^{\text {th }}$ term.
Therefore average $=\underline{25+30}=27.5$

Another method is there which works for both even and odd that is:

## Average $=\underline{\text { first term }+ \text { last term }}$

$$
2
$$

Therefore for even. Average $=(a+1) / 2=(15+35) / 2=25$
and for odd. Average $=(15+40) / 2=27.5$

- For the questions in which terms given are not in series following methods applies:

For eg. the question contains following numbers
57, 62, 63, 69, 73

Then in order to solve it assume any number between 57 and 73 . Suppose we choose 60. Then first add the difference of all the terms with the assumed number and add them. Like here-
$(57-60)+(62-60)+(63-60)+(69-60)+(73-60)$
$=-3+2+3+9+13$
$=24$
now divide it by the number of terms $24 / 5=4.8$
And then add it to the assumed number $60+4.8=64.8$ which is the required average

Suppose we had chosen 65 , then the process would have been same.
$-8+(-3)+(-2)+1+8=-1$
$-1 / 5=-0.2$
$65-0.2=64.8$ ans.

Remember friends do not go for learning these tricks, just practice as many as questions possible using these methods, this will make these tricks fit in the gaps of your mind. Once you are done with ample amount of questions, at the time of exam you will only see the question and solve it in your mind only without making your pen run on the rough sheet.

One more thing it is not necessary you will get direct questions like finding average of given numbers. So here are some questions unlike that of direct type. These are actually types of questions which have been asked in various exams, go through them and method of solving them.
Q.> The average age of 15 students is 25 . If the age of the class teacher is included, the average increases by 2 years. What is the age of class teacher?

Soln. In first case, average age = sum of ages of students/ total number of students

$$
\text { Total age }=\text { number of student } \mathrm{X} \text { average }=15 \times 25=375
$$

Now let the age of class teacher $=x$, therefore the total age would be $375+x$ and the total number would become 16.
Putting in the formula, $\underline{375+x}=(25+2)$
16
Therefore age of teacher $=x=57$ ans.
This was the traditional way of solving this problem. Now I am giving you a trick to solve these types of questions.

Average age of all the students was 25 . Now there is addition of age of class teacher, therefore the average to increase, the minimum age of the teacher has to be 25 in any case. Now due to the addition of class teacher the total number of persons becomes 16 and the increase in average is 2 .
Therefore age of class teacher $=25+(16 \mathrm{X} 2)=57$
Think it otherwise, the minimum age of class teacher is 25 . Now due to increase in average by 2 , its minimum age become 27. Now the total increase in age due do addition of age $=$ $15 \mathrm{X} 2=30$.
Therefore age of class teacher is increased average + total increase $=27+37=57$.
Another similar type of question is as follow.
Q. $>$ The average of a batsman after 25 innings was 56 runs per inning. If after the $26^{\text {th }}$ inning his average increases by 2 runs, then what was his run in $26^{\text {th }}$ inning?

Soln. Going by the above method we get, increased average $=56+2=58$.
Total increase $=25 \times 2=50$.
Runs scored in last inning will be $58+50=108$.
Following are some questions, each one if of different type. Go through them, they are very important.
Q.> A man travels at 60 kmph on journey from $A$ to $B$ and returned at 100 kmph . Find his average speed for the journey.

Soln. Many of you will think the answer is $(60+100) / 2=80 \mathrm{kmph}$. It will be given in the option and you will bubble it and you will get clean bowled. This is not the right answer. It does not go like this.

Average speed is basically total distance divided by total time. For total distance we take L.C.M of 60 and 100 which is 300 (it is distance between $A$ and $B$ ).

Therefore total distance is $300+300=600 \mathrm{kms}$.
Total time $=300 / 60+300 / 100=5+3=8$ hours.
Average $=600 / 8=75 \mathrm{kmph}$ which is the required average .

But again if you follow this technique, there will be a loss of time. So there is a shortcut formula.

Average $=\underline{2 \times S_{1} \times S_{2}}=(2 \times 60 \times 100) / 160=75 \mathrm{kmph}$. $\mathrm{S}_{1}+\mathrm{S}_{2}$

The above formula is derived from a general formula which is:-
Average speed = $\qquad$
Q.> A car travels $A$ to $B$ at 200 kmph , then $B$ to $C$ at 400 kmph , then $C$ to $D$ at 600 kmph and finally $D$ to $E$ at 800 kmph . Find the average speed of the car.

Soln. Here $\mathrm{n}=4$. Therefore average speed $=$ 4
$(1 / 200)+(1 / 400)+(1 / 600)+(1 / 800)$
4
$(12+6+4+3) / 2400$
$=96 \times 4=384$ ans.
Q.> The average marks obtained by a student in 3 papers is 52 and in the fourth paper he obtained 60 marks. Find his new average.
Soln. You can solve it by the traditional way of calculating total and then average, but hey you have to save time. So solve it by this way.

If in the fourth paper the student has scored 52, the average would have been the same i.e 52.

Now the rest 8 numbers should be distributed among the 4 papers since he has scored 60 in the fourth paper i.e each paper will get 2.
Therefore the new average will be 52+2 = 54 ans.
Q.> The average age of groups of men is increased by 5 years when a person aged 18 years is replaced by new person of age 38 years. How many men are there in the group?
Soln. When the individuals are replaced the difference between the ages of 2 is 20 years. If the age of the new individual which has been included had been 18 , there would be
increase in the average. So rest 20 has to be distributed. Since the average is increased by 5 , the total number of members $=20 / 5=4$.
Q.> If the average age of a group of 7 persons is 30 years today. Then after 5 years average age will be?
soln. The answer is 35 because the increment in age of each member will be 5 years, so it will get added and the average will become 35 .

