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10. Average

$$\text{Avg} = \frac{\text{sum of term}}{\text{No. of term}}$$

$$\begin{array}{ccc} \text{No.} & \xrightarrow{\text{Avg}} & \text{sum} \\ 10 & \xrightarrow{50} & 500 \end{array}$$

In consecutive numbers middle element is average.

$$\begin{array}{cccccc} 1 & 2 & 3 & 4 & 5 \\ 3 & 6 & 9 & 12 & 15 & 18 \\ \hline & & 1 & & & \\ & & 10.5 & & & \end{array}$$

Formula :- First term + Last term

$$\text{Natural Number} \rightarrow 1, 2, 3, 4, \dots, n \Rightarrow \frac{1+n}{2}$$

$$\text{Even number} \rightarrow 2, 4, 6, 8, \dots, 2n \Rightarrow \frac{2+2n}{2} \Rightarrow n+1$$

$$\text{Odd number} \rightarrow 1, 3, 5, 7, \dots, 2n-1 \Rightarrow \frac{2n-1}{2} = n$$

- Q) In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?



$$10 \xrightarrow{3.2} 32$$

$$\begin{array}{r} 280 \\ - 32 \\ \hline 250 \end{array}$$

$$40 \xrightarrow{6.25} 250$$

$$\begin{array}{r} 6.25 \\ \times 40 \\ \hline 250 \end{array}$$

(6.25) ← run rate

2) A family consists of two grandparents, two parents and three grandchildren. The average age of the grandparents is 67 years, that of the parents is 35 years and that of the grandchildren is 6 years. What is the average age of the family?

$$\begin{array}{rcl}
 \text{GF + GM} & \xrightarrow{\times 67} & 134 \\
 \text{M + F} & \xrightarrow{\times 35} & 70 \\
 \text{C}_1 + \text{C}_2 + \text{C}_3 & \xrightarrow{\times 6} & 18 \\
 \hline
 \text{Family total} & \xrightarrow{\times 7} & 222 \\
 \end{array}$$

family age total.

Avg of family age $\frac{31.7}{7}$

3) A grocer has a sale of Rs. 6435, Rs. 6927, Rs. 6855, Rs. 7230 and Rs. 6562 for 5 consecutive months. How much sale must he have in the 6th month so that he gets an average sale of Rs. 6500?

$$\begin{array}{l}
 5 \text{ m} \rightarrow 6435, 6927, 6855, 7230, 6562 \Rightarrow \underline{34009} \\
 \text{6th m} \rightarrow \boxed{4991} \\
 \text{6th month sale} \rightarrow \underline{04991} \\
 \text{6m} \times 6500 \rightarrow \underline{39000} \\
 \end{array}$$

39008	34009	321
34009	6927	6435
04991	6855	6562
	7230	
	34009	

4) The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero?

$$\begin{array}{c}
 \boxed{x} \\
 \hline
 1 - 19
 \end{array}
 \quad
 \begin{array}{c}
 -2x \\
 \hline
 20
 \end{array}$$

19 numbers \rightarrow +ve means greater than zero

5) The average weight of 8 person's increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. what might be the weight of the new person?

$$\rightarrow 2.5 \times 8 = [20]$$

$$2.5 \ 2.5 \ 2.5 \ 2.5 \ 2.5 \ 2.5 \ 2.5$$

$$1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$$

65 kg

condition:-

New \rightarrow 65 kg

+ 20 kg

85 kg

new person weight

6) The captain of a cricket team of 11 members is 26 years old and the wicket keeper is 3 years older. if the ages of these two are excluded, the average age of the remaining players is one year less than the average age of the whole team. what is the average age of the team?



$$11 \rightarrow C + w$$

9	26	29
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$$9x(x-1) + 55 = 11x$$

$$9x - 9 + 55 = 11x$$

$$9x + 46 = 11x$$

$$2x = 46$$

$$x = 23$$

Avg age of team

23

② The average monthly income of P and Q is Rs. 5050. The average monthly income of Q and R is Rs. 6250 and the average monthly income of P and R is Rs. 5200. The monthly income of P is:



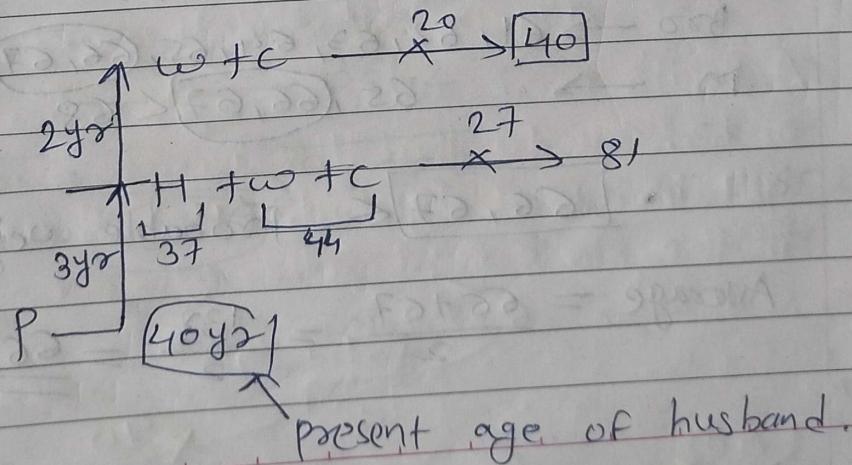
$$\begin{array}{rcl}
 P+Q & \xrightarrow{5050} & 10100 \\
 Q+R & \xrightarrow{6250} & 12500 \\
 P+R & \xrightarrow{5200} & 10400 \\
 \hline
 2(P+Q+R) & \longrightarrow & 33000 \\
 & & \frac{16500}{2} \\
 P+Q+R & \longrightarrow & 16500 \\
 P+(12500) & \longrightarrow & 16500
 \end{array}$$

$$P = 16500 - 12500$$

$$\boxed{P = 4000}$$

ans

③ The average age of husband, wife and their child 3 years ago was 27 years and that of wife and the child 5 years ago was 20 years. The present age of the husband is:



present age of husband.

- Q) A car owner buys petrol at Rs. 7.50, Rs. 8 and Rs. 8.50 per litre for three successive years. what approximately is the average cost per litre of petrol if he spends Rs. 4000 each year?

 \Rightarrow

$\frac{4000}{7.5}$	$\frac{4000}{8}$	$\frac{4000}{8.5}$	$\Rightarrow \frac{12000}{\cancel{4} \cancel{000}} = 3000$
533 litre	500 litre	470 litre	$\Rightarrow \frac{1503}{\cancel{3} \cancel{03}} = 501$

$$\text{average cost per litre} = \frac{7200}{1503} = 7.9 \text{ Rs/ltr}$$

- 10) In Arun's opinion, his weight is greater than 65 kg but less than 72 kg. His brother doesn't not agree with Arun and he thinks that Arun's weight is greater than 60 kg but less than 70 kg. His mother's view is that his weight cannot be greater than 68 kg. If all are them are correct in their estimation, what is the average of different probable weights of Arun?

 \Rightarrow

$$A \rightarrow (66, 67) < 68, 69, 70, 71$$

$$Bro \rightarrow 61, 62, 63, 64, 65, (66, 67) < 68, 69$$

$$M \rightarrow 65, (66, 67) < 68$$

$(66, 67) <$ Probable weights of Arun.

$$\text{Average} = \frac{66+67}{2} = \frac{133}{2} = 66.5$$

Average weight

11) The average weight of A, B and C is 45 kg. If the average weights of A and B be 40 kg and that of B and C be 43 kg, then the weights of B is:



$$A + B + C \xrightarrow{45} 135$$

$$A + B \xrightarrow{40} 80$$

$$B + C \xrightarrow{43} 86$$

$$(A + B) + C \longrightarrow 135$$

$$80 + C \longrightarrow 135$$

$$C = 135 - 80$$

$$C = 55$$

$$B + C \longrightarrow 86$$

$$B + 55 = 86$$

$$B = 86 - 55$$

$$\boxed{B = 31} \leftarrow \text{age of B}$$

12) The average weight of 16 boys in a class is 50.25 kg and that of the remaining 8 boys is 45.15 kg. Find the average weights of all the boys in the class.



$$16 \xrightarrow{50.25} 804$$

$$8 \xrightarrow{45.15} 361.2$$

$$\begin{array}{r} 804 \\ + 361.2 \\ \hline 1165.2 \end{array}$$

48.55
Avg of class

(B) A library has an average of 510 visitors on Sundays and 240 on other days. The average number of visitors per day in a month of 30 days beginning with a Sunday is :-

$$\begin{array}{rcl}
 5 \times 510 \Rightarrow 2550 & & 30 \text{ days} \rightarrow 1 - 54n \\
 25 \times 240 \Rightarrow 6000 & & 8 \checkmark \\
 \hline
 & & 15 \checkmark \\
 30 \xrightarrow{\quad\quad\quad} 8550 & & 22 \checkmark \\
 \begin{array}{r} 285 \\ \hline 1 \end{array} & & 29 \checkmark \\
 \hline
 & & \\
 \text{Aug visit of month} & & \text{Aug}
 \end{array}$$

14) If the average marks of three batches of 55, 60, and 45 students respectively is 50, 55, 60 then the average marks of all the student is:

$$\begin{array}{r}
 55 \xrightarrow{\times 50} 2750 \\
 60 \xrightarrow{\times 55} 3300 \\
 45 \xrightarrow{\times 60} 2700 \\
 \hline
 160 \xrightarrow{\times} \underline{8750} \\
 \boxed{54.8} \\
 \end{array}
 \quad
 \frac{8750}{160} = 54.8$$

(15) A Pupil's marks were wrongly entered as 83 instead of 63. Due to that the average marks for the class got increased by half ($\frac{1}{2}$). The number of pupils in the class is:

$$\begin{array}{ccccccc}
 & \nearrow & & & \times & & \\
 & \text{Increase of each} & & & & & \\
 & \text{marks in} & 63 & & & 83 & \\
 & \text{that is } 20 \text{ marks in} & & & & & \\
 & \text{no students.} & & & & & \\
 \text{O.S} & \xrightarrow{\text{Extra}} & 120 & & \xrightarrow{40} & & \leftarrow \frac{1}{2} \\
 \text{Total} & & & & & & \\
 \text{Students Total} & & & & & &
 \end{array}$$