Average

Lession #1

Consecutive No:

$x, x+1, x+2, x+3, x+4, \ldots$

10, 11, (12), 13, 14

Consecutive odd No:

$x, x+2, x+4, x+6, x+8, \ldots$

11, 13, (15), 17, 19

Consecutive even No:

$x, x+2, x+4, x+6, x+8, \ldots$

10, 12, (14), 16, 18

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

Eg: 10 60 46 20

$$\text{Average} = \frac{10+60+46+20}{4} = \frac{136}{4}$$

$$= 34$$

Con. No: Eg:

① 1, 3, (5), 7, 9

② 101 102 | 103 104 (102.5)

③ 26, 28, 30, 32, 34

④ 96, 97, 98, 99, 100

⑤ 52, 54, 56, 58

Lession - 2 Basic Questions:

1. The Average age of A, B and C is 26 years, if the average age of A and C is 29 years, what is the age of B in years?

$$\frac{A+B+C}{3} = 26 \qquad \frac{A+C}{2} = 29$$

$$A+B+C = 78 \qquad A+C = 58$$

$$58 + B = 78$$

$$B = 78 - 58$$

$$B = 20$$

2. The Average of 7 number is 5. If the average of first six of these numbers is 4, the seventh number is?

1-7
total 7 = 7 × 5 = 35
1-6 = 6 × 4 = 24
7th => 35 - 24 = 11

3. The Average of number 10 number is 7. what will be the new Average if each of the number is multiplied by 8?

10 No's total = 10 × 7 = 70

8 ×
560 => 560/10 => 56

4. The Average of five consecutive even numbers starting with 4, is.

4 6 8 10 12

Avg: 8

5. A, B, C and D four consecutive even numbers respectively and their average is 65. what the Product of A and D.

A B ↓ C D
62 64 65 66 68

A D
=> 62 × 68 = 4216

6. A, B, C, D are four consecutive odd numbers and their average is 42. what is the Product of B and D?

A B ↓ C D
39 41 42 43 45

B D
=> 41 × 45 = 1845

7. Of the three numbers. The first is twice the second and the second is thrice the third. If the Average of the three numbers is 10. The numbers are:

Third = x (3) Second = $3x$ (9) First = $6x$ (18)

$$\frac{6x + 3x + x}{3} = 10$$

$$10x = 30 \Rightarrow x = \frac{30}{10} \Rightarrow \boxed{x = 3} \quad \boxed{3 | 9 | 18}$$

8. The sum of five numbers is 555. The average of the first two numbers is 75 and the third number is 115. What is the average of the last two numbers?

$$a + b + c + d + e = 555$$

$$\frac{a+b}{2} = 75 \qquad \boxed{c = 115}$$

$$\boxed{a + b = 150}$$

$$150 + 115 + d + e = 555$$

$$d + e = 555 - 265$$

$$d + e = 290/2$$

$$\boxed{d + e = 145}$$

9. The Average expenditure of a man for the first five months is Rs. 3600 and for next seven month it is Rs. 3900. If he saves Rs. 8700 during the year, his average income per month is.

$5^{th} \times 3600 \Rightarrow 18,000$ +

$7 \times 3900 \Rightarrow 27,300$ +

8700

54000

$\Rightarrow \frac{54000}{12} = \boxed{4500}$

10. The sum of three number is 98. If the ratio between first and second be 2:3 and between second and third be 5:8, Then the second number is:

$a + b + c = 98$

$a : b = 2 : 3 \qquad b : c = 5 : 8$

$\frac{a}{b} = \frac{2}{3} \qquad \frac{b}{c} = \frac{5}{8}$

$a = \frac{2b}{3} \qquad c = \frac{8b}{5}$

$a + b + c = 98$

$\frac{2b}{3} + b + \frac{8b}{5} = 98$

$$\frac{10b + 15b + 24b}{15} = 98$$

$$\frac{49b}{15} = 98$$

$$\boxed{b = 30}$$ (Or)

$a + b + c = 98$

$a : b = 2 : 3$ $\quad b : c = 5 : 8$

$a : b : c = 2 : 3$
$\quad\quad\quad\quad 1$
$\quad\quad\quad\quad 5 : 8$

$10 : 15 : 24$

$10x + 15x + 24x = 98$

$49x = 98$

$\boxed{x = 2}$

$b \Rightarrow 15 \times 2 = \boxed{30}$ //.

Lession-3 Based ON Equation

1. The Average of marks obtained by 120 candidates was 35. If the average of marks of passed candidates was 39 and that of failed candidates was 15, the number of candidates who passed the examination is:

$120 \times 35 = 4200$

$\frac{120 \text{ candidates}}{120} = 35$

120

x Pass $\quad$ $120 - x$ fail

$4200 = x \times 39 + (120 - x) \times 15$

$4200 = 39x + 1800 - 15x$

$2400 = 24x$

$\boxed{x = 100}$ //.

2. In a school, the average age of students is 6 years and the average age of 12 teachers is 40 years. If the average age of combined group of all the teachers and the students is 7 years, then the number of students is:

Teachers + Students

$(12+x) \times 7 = x \times 6 + 12 \times 40$

$84 + 7x = 6x + 480$

$x = 480 - 84$

$\boxed{x = 396}$ //.

3. The Average monthly salary of all the employees in an industry is Rs. 12000. The Average salary of male employee is Rs. 15000 and that of female employee is Rs. 8000. What is the ratio of male employees to female employees?

Mal $= x$ Female $= y$

$(x+y) \times 12000 = x \times 15000 + y \times 8000$

$12x + 12y = 15x + 8y$

$12y - 8y = 15x - 12x$

$4y = 3x$

$\boxed{\frac{x}{y} = \frac{4}{3}}$ //.

4. In a school with 600 students, the average age of boys is 12 years and that of the girls is 11 years. If the average age of the school is 11 years and 9 months, then the number of girls in the school is:

600

/ \

(x) boys $(600-x)$ girls

$600 \times \frac{47}{4} = x \times 12 + (600-x) \times 11$

$150 \times 47 = 12x + 6600 - 11x$

$7050 = x + 6600$

$\boxed{x = 450}$ //.

$\Rightarrow 11\frac{9}{12}$

$\Rightarrow \frac{132+9}{12} = \frac{47}{4}$

Lesson - 4 True / False Average

1. The mean of the marks obtained by 100 students is 60. If the marks obtained by one of the students was incorrectly calculated as 75, whereas the actual marks obtained by him was 65, what is the correct mean of the marks obtained by the students?

$100 \times 60 = 6000$

Correct Mark 65 → (-10) → Wrong Mark 75

$= \frac{5990}{100}$

$= \boxed{59.9}$ //

2. The Average of marks of 14 students was calculated as 71. But, it was later found that the marks of one student had been wrongly entered as 42 instead of 56 and of another as 74 instead of 32. The correct average is?

$14 \times 71 = 994 + 14 - 42$

$= 994 - 28$

$= \frac{966}{14}$ ~~483~~ 69

$= \boxed{69}$ //

$14\left(\begin{matrix} 56 & 32 \\ 42 & 74 \end{matrix}\right)42$

3. The Average marks in English subject of a class of 24 students is 56. If the marks of three students were misread as 44, 45, and 61 of the actual marks 48, 59, and 67, respectively, then what would be the correct average?

$24 \times 56 = 1344$

$\frac{24}{1368}$ +

$\Rightarrow \frac{1368}{24} \Rightarrow \boxed{57}$ //

48	59	67
+4	+14	+6
44	45	61

Lesson - 5 Replacing a Person

1. The average age of a committee of 8 members is 40 years. A member, aged 55 years, retired and he was replaced by a member aged 39 years. The average age of the present committee is:

$8 \times 40 = 320$

$$\frac{320 - 55 + 39}{8} = \frac{304}{8} \Rightarrow \boxed{38} \text{ //.}$$

2. The average weight of 3 men A, B, C is 84 kg. another man, D, joins the group, and the average weight 3kg more than that of D, replaces A, then average weight of B, C, D, and E becomes 79 kg. the weight of A is:

$$\frac{A+B+C}{3} = 84 \text{ kg} \qquad \frac{A+B+C+D}{4} = 80 \text{ kg}$$

$A+B+C = 252$ $\qquad A+B+C+D = 320$

$252 + D = 320$

$\boxed{D = 68 \text{ kg}}$ $\boxed{E = 71 \text{ kg}}$

$$\frac{B+C+D+E}{4} = 79$$

$B+C+D+E = 316$ $\qquad \Rightarrow A + 177 = 252$

$B+C = 316 - 139$ $\qquad A = 252 - 177$

$\boxed{B+C = 177}$ $\qquad \boxed{A = 75}$

Lession - 6 Including / Excluding

1. The Average weight of 21 boys was recorded as 64 kg. If the weight of the teacher was added the average increased by one kg. what was the teacher kg?

Boys (Boys + Toch)

$(21 \times 64) \sim (22 \times 65)$

$(1344) \sim (1430)$

$\Rightarrow \boxed{86 \text{ kg}}$ //.

2. The average age of 14 girls and their teacher's age is 15yr. If the teacher's age is excluded then the Average reduced by 1. what is the teachers age?

Girls + Teacher ~ girls

(15 × 15) ~ (14 × 14)

225 ~ 196

29 age //.

3. The Average age of 5 members of a family is 25yr. If the servant of the family is included the average age increased by 40%. what is the age of the servant?

Family

(5 × 25)

$25 + 25 \times \frac{40}{100} = 35$ → (6 × 35)

5 × 25 ~ 6 × 35

125 ~ 210

85 age //.

4. The average age of the class is 35yr. 6 new students with an average age of 33yr joined in that class, there by decreasing the average by half year. The original strength of the class was?

$$\frac{x \times 35 + 6 \times 33}{x + 6} = 35 - 0.5$$

$$35x + 198 = 34.5(x + 6)$$

$$35x + 198 = 34.5x + 207$$

$$0.5x = 9$$

$$x = 90/5$$

$$x = 18$$ //.

Lesson - 7 **Average Speed**

Note: If the certain distance is covered at the speed of x km/hr and the same distance is covered at y km/hr, then the average speed during entire journey $= \left(\frac{2xy}{x+y}\right)$ km/hr.

1. A man goes to a certain place at a speed of 30 km/hr and returns to original place at a speed of 20 km/hr. Findout the average speed during the entire journey

$$\Rightarrow \left(\frac{2xy}{x+y}\right) \text{ km/hr}$$

$$\Rightarrow \frac{2 \times 30 \times 20}{50} \Rightarrow \boxed{24 \text{ km/hr}} //.$$

Note: If the certain distance is covered at the speed of x km/hr and the ~~different~~ same distance is covered at y km/hr, then the average speed during entire journey $= \left(\frac{2xy}{x+y}\right)$ km/hr.

2. A train covers the first 160 km at a speed of 120 km/hr another 160 km at 140 km/hr and last 160 km at 80 km/hr. Find out the average speed of the train for entire journey.

$$\Rightarrow \left(\frac{3xyz}{xy+yz+zx}\right)$$

$$\Rightarrow \frac{3 \times 120 \times 140 \times 80}{(120 \times 140) + (140 \times 80) + (80 \times 120)}$$

$$\Rightarrow \frac{3 \times 120 \times 140 \times 80}{16800 + 11200 + 9600} = \frac{3 \times 120 \times 140 \times 80}{37600}$$

$$\Rightarrow \frac{3 \times 15 \times 14}{47} \Rightarrow$$

Note: If the person covers A km at a speed of x km/hr. B km at a speed of y km/hr. and C km/hr at a speed of z km/hr. Find out avg speed of entire journey. $\left(\frac{A+B+C}{\frac{A}{x}+\frac{B}{y}+\frac{C}{z}}\right)$ km/hr.

1. A person covers 9 km at a speed of 3km/hr, 25 km at a speed of 5 km/hr and 30 km at a speed of 10km/hr. Find out the average speed of the entire journey?

$$\Rightarrow \left(\frac{A+B+C}{\frac{A}{x}+\frac{B}{y}+\frac{C}{z}}\right) \Rightarrow \left(\frac{9+25+30}{\frac{9}{3}+\frac{25}{5}+\frac{30}{10}}\right)$$