

# CHAPTER

## Average

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shortcut

Average of first 'n' natural no  $= (n+1)/2$

Average of first n even no  $= (n+1)$

Average of first n odd no  $= n$

Q1. If a, b, c, d & e are five consecutive odd integers, what is their average?

Ans:

$$\begin{array}{c} a \ b \ c \ d \ e \\ a \ a+2 \ a+4 \ a+6 \ a+8 \\ \downarrow \\ \text{Average} \end{array}$$

∴ a + 4.

Q2. The average salary of 20 workers in an office is Rs 1900 per month. If manager's salary is added, the avg becomes Rs 2000 per month. The manager's annual salary (in Rs) is

Ans.  $N \times \text{Avg} = \text{Sum}$

$$\begin{matrix} 20 \times 1900 = 38000 \\ \text{Manager} \quad \boxed{21 \times 2000 = 42000} \end{matrix} \quad \text{diff} = 4000$$

Manager salary 4000 per month  
48000 per year.

5) None of these

Q23. In a coconut grove,  $(x+2)$  trees yield 60 nuts per year per tree,  $x$  trees yield 120 nuts per year per tree, and  $(x-2)$  trees yield 180 nuts per year per tree. If the avg. yield per year per tree is 100, find  $x$ .

Ans:

$$N \times \text{Avg} = \text{Total sum} \quad (\text{total nuts})$$

$$(x+2) \times 60 = 60x + 120$$

$$x \times 120 = 120x$$

$$(x-2) \times 180 = 180x - 360$$

$$\text{(total trees)} \quad 3x = 360x - 360 \quad (\text{total nuts})$$

$$\text{Avg} = \frac{360x - 360}{3x} = 100$$

$$x = 4$$

∴ 4.

Q4.

1A9

$$N \times \text{Avg} = \text{Total sum}$$

$$60 \times 12 = 720$$

$$40 \times 13 = 520$$

$$50 \times 14 = 700$$

$$50 \times 15 = 750$$

$$\underline{200 \quad 2690}$$

$$\text{Avg} = \frac{2690}{200} = 13.45$$

Q3. In a coconut grove,  $(x+2)$  trees yield 60 nuts per year per tree,  $x$  trees yield 120 nuts per year per tree, and  $(x-2)$  trees yield 180 nuts per year per tree. If the avg. yield per year per tree is 100, find  $x$ .

Ans.

$$N \times \text{Avg} = \text{Total sum} \quad (\text{total nuts})$$

$$(x+2)x60 = 60x + 120$$

$$x \times 120 = 120x$$

$$(x-2)x180 = 180x - 360$$

$$\frac{(\text{total trees})}{(x)} = \frac{360x - 360}{3x} \quad (\text{total nuts})$$

$$\text{Avg} = \frac{360x - 360}{3x} = 100.$$

$$x = 4$$

∴ 4.

Q4. 1a a

$$N \times \text{Avg} = \text{Total sum}$$

$$60x12 = 720$$

$$40x13 = 520$$

$$50x14 = 700$$

$$50x15 = 750$$

$$\frac{200}{26.90}$$

$$\text{Avg} = \frac{2690}{200} = 13.45$$

$$3) 13.45$$

Q5. The average age of 24 students & class teacher is 16 years. If class teacher's age is excluded, the avg reduces by 1 year. What is age of class teacher?

Ans:  $N \times \text{Avg} = \text{Total sum}$   $N = 25$  because  
 $24 \times 16 + \text{teacher's age} = 400$  : teacher + student  
 $\underline{24 \times 15}$  = 360  
 Teacher  $\quad \quad \quad$  No (difference)

3) 40 years.

Q6. The average of 8 no is 14. If 2 is subtracted from each given no, what will be new avg?

Ans: Effect =  $14 - 2 = 12$

2) 12

Q7. The avg of x no is 32. If  $(x-1)$  is subtracted from each given no. what will be new avg?

Ans: Effect =  $32 - (x-1)$   
 $= 32 - x + 1$   
 $= 2x + 1$

2)  $2x + 1$

Q8. avg  $N \times \text{Avg} = \text{Total sum}$

$$34 \times 14 = 476$$

$$\underline{35 \times 15 = 525} \quad \text{) gap is teacher age}$$

$$\underline{\quad \quad \quad 49}$$

3) 49

Q9. The average of 10 no's is 40.5. If each of no is divisible by 10, find avg of new set of numbers:

Ans: New Avg = Old Avg / 10

$$= \frac{40.5}{10} = 27$$

∴ 27

Q10. The average of 8 numbers is 21. If each of no is multiplied by 8, find avg of new set of numbers:

Ans: New Avg = Old Avg  $\times$  8

$$= 21 \times 8$$

$$= 168$$

∴ 168

Q11. The avg weight of 8 persons increases by 1.5 kg if a person whose weight is 65 kg is replaced by a new person, what could be weight of new person?

Ans: New Avg = 75.12

$$8 \times \text{Avg} = 8x$$

$$8x(x+1.5) = 8x - 65 + \text{New}$$

$$8x + 12 = 8x - 65 + \text{New}$$

$$\text{New} = 77$$

∴ 77.

→ shortcut to find new person weight.

New = Old + inc or decrease  $\times$  Num. of old cond.

$$= 1.5 \times 8 + 65$$

$$= 12 + 65$$

$$= 77$$

Q12. The avg age of class consisting of 24 students is decreased by 3 months when 1 boy aged 20 years is replaced by new boy. Find age of new boy?

Ans. New =  $\text{Inc/dec} \times \text{Avg} \pm \text{old cond/da}$ .

$$= \frac{3}{12} \times 20 \pm 20$$

$$= 20 - 6 = 14$$

→) 14.

Q13. Ans

$$N \times \text{Avg} = 7.54 \text{ M}$$

$$77 \times 17 = 17 \times 77$$

$$P \times 19 = 19P$$

$$5(77-P) \times 8 = 8 \times 77 - 8P$$

$$\text{cor}, 17 \times 77 = 19P + 8 \times 77 - 8P$$

$$\text{or}, P = 83$$

2) 83

Q14. The average of 13 results is 89. The average of first five is 88 & avg of last seven is 36. Find value of 6th number

Ans.  $N \times \text{Avg} = N \times \text{sum}$

$$\begin{aligned} 13 \times 89 &\rightarrow [13 \times 89 = 1157] \\ 5 \times 88 &= 190 \\ 7 \times 36 &= 252 \end{aligned}$$

$$1157 - 190 - 252 = 65$$

3) 65

Q15.

$$\text{Ans: } \text{New Avg} = 7.54 \text{ m}$$

$$18x - x = 18x$$

$$(18x + 4) = 18x + 92$$

$$16x + 64 = 18x + 92$$

$$x = 92 - 64 = 28 \text{ (old avg)}$$

$$\text{New Avg} = 28 + 4 = 32$$

1) 32.

Q16.

$$\text{Ans: } \text{New Avg} = 7.54 \text{ m}$$

$$18x - x = 18x$$

$$19x + 3 = 18x + 98 \text{ (Missing a century)}$$

$$x = 41 \text{ (old Avg)}$$

$$\text{New Avg} = 41 + 3 = 44$$

2) 44.

Q17.

$$\text{Ans: } \text{Avg Speed} = \frac{s_1 + s_2}{s_1 + s_2}$$

$$\approx \frac{2430 \times 40}{30 + 40}$$

$$= 34.285$$

3) 34.29 km/h

Q18.

$$\text{Ans: } \text{Avg} = \frac{3s_1 s_2 s_3}{s_2 s_1 + s_2 s_3 + s_3 s_1}$$

$$= \frac{3 \times 20 \times 15 \times 10}{20 \times 15 + 15 \times 10 + 10 \times 20} = \frac{9000}{600} = 13 \frac{11}{18}$$

1) 13(11/18) km/h.

Q19.

$$\text{Ans: } \text{Avg speed} = \frac{\text{Total distance}}{\text{Total time}}$$

$$= \frac{18 + 16 + 30}{\frac{18}{8} + \frac{16}{8} + \frac{30}{8}}$$

$$= \frac{64}{16} = 6.4$$

2) 6.4 km/h

Q20.

$$\text{Ans: } \frac{1}{4} \quad \frac{3}{8}$$

$$\text{Remaining} = 1 - \frac{1}{4} - 35$$

$$= \frac{20-5-12}{20} = \frac{3}{20}$$

5)  $\frac{6(98)}{117} \text{ Kmh.}$

q21.

Ans:

~~$N \times \text{Avg} = T - 5400$~~

$$(16+26) \times 130 = 16x130 + 13x$$

$$16x540 = 16x540 \quad | \cancel{16x540}$$

$$2x114 = 1140 \quad | \cancel{2x114}$$

$$\text{or}, 1140 + 16x540 = 16x130 + 13x$$

$$\text{or}, x = 410$$

2) 410.

q22.

Ans:  $N \times \text{Avg} = T - 5400$

$$42x x = 42x$$

$$49x(x-1.8) = 42x + 32.5$$

$$49x^2 - 1.8 \cdot 49x = 42x + 32.5$$

$$x = \frac{106}{7} = 42x \Rightarrow 42x \cdot \frac{106}{7}$$

∴ 888

$$\Rightarrow 636$$

Q23

$$\text{Ans: } NX ARG = 754 \text{ m}$$

$$36x0 = 36x$$

$$40(40) x(p-1) = 36x + 32$$

$$40x - 40 = 36x + 32$$

$$4 = 18$$

$$\text{total expenditure} = 36x = 36 \times 18 = 648$$

2) 648

Q24.

Ans:

$$\frac{GfH}{2} = 85$$

$$GfS = 60 \times 2 = 130 \rightarrow ①$$

$$GfH = 140 \rightarrow ②$$

Subtract ① & ②. on 20.

Q24.

$$\text{Ans: } \frac{x}{4} + s + m + h + \left( \frac{e + h + s + m}{4} \right) = 15$$

Perimeter

$$s + m = 60$$

② 60.

Q25.

$$\text{Ans: } m + t + w = 40^\circ = 120^\circ$$

$$t + w + th = 41^\circ = 123$$

subtract both.

$$th - m = 3$$

$$42 - m = 3$$

$$m = 39^\circ$$

② 39.

Q26.

$$\text{Ans: } N \times \text{Arg} = T \cdot \text{Sym}$$

$$3 \times 320 = 960$$

$$4 \times 320 = 1280 ] \quad \text{subtract} =$$

$$4^{\text{rd}} \text{ day} = 1280 - 960 = 30$$

Q27.

Ans.  $D_1 = V_1 \times t_1$  : [Distance = Speed  $\times$  Time]   
 $D_2 = V_2 \times t$

$$\text{Avg speed} = \frac{\text{total distance}}{\text{total time}}$$

$$= \frac{V_1 t_1 + V_2 t_2}{t_1 + t_2}$$

$\approx \frac{V_1 t_1 + V_2 t_2}{t_1 + t_2}$

Q28.

Ans: Distance = constant

$$\text{Avg} = \frac{S_1 + S_2 + S_3 + S_4}{4}$$

$$= \frac{S_1 S_2 S_3 + S_2 S_3 S_4 + S_3 S_4 S_1 + S_4 S_1 S_2}{4 S_1 S_2 S_3}$$

$$= \text{putting all values,}$$

$$\Rightarrow 384 \text{ km/h.}$$

$\approx 384 \text{ km/h.}$

Note:

If 200, 400, 600, then  $a_N = 384$

If 20, 40, 80, 80 then  $a_N = 38.4$

If 2, 4, 8, 16 then  $a_N = 3.84$ .

Q29:  $3x + 5x + 7x = 15x$

Avg =  $\frac{15x}{3} =$

Avg from  $\frac{15x}{2} = 15$

Or  $15x = 30$

$x = 2$

Oldest =  $7x = 14$

2) 14 yrs.

Q30

Avg

$$100 \xrightarrow{20\%} 120 \xrightarrow{20\%} 144 \xrightarrow{44\%} 216$$

116% total increase

$$\Rightarrow \frac{116}{3} = 38 \frac{2}{3}\%$$

3)  $38 \frac{2}{3}\%$ .

Q31:

Avg:

$$\frac{1}{4}$$

$$\frac{2}{3}$$

$$\frac{1}{12}$$

Remaining

$$= 1 - \frac{1}{4} - \frac{2}{3}$$

$$= \frac{12 - 3 - 8}{12}$$

$$= \frac{1}{12}$$

84

Net + Total Capital Loss

2) 50 v. 918

932.

Avg 9) 27.6

933.

Avg