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APTITUDE MASTERY SERIES

MODULE 3 – AVERAGE

1. The average of 7 consecutive odd numbers if the smallest of those numbers is denoted by k is:

(a) $k + 4$ (b) $k + 7$ **(c) $k + 6$** (d) $7k$

Solution:

$\frac{k+k+2+k+4+k+6+k+8+k+10+k+12}{7} = k + 6$

2. The average income of A, B and C is Rs.12000 per month and the average income of B, C and D is Rs.15000 per month. If the average salary of D be twice that of A, then the average salary of B and C is (in Rs.):

(a) 8000 **(b) 13500** (c) 18000 (d) 9000

Solution:

A + B + C = 12000 x 3

B + C + D = 15000 x 3

D – A = 3000 x 3

→D – A = 9000

Also D = 2A

→D = 18000 and A = 9000

Therefore average salary of B and C = $\frac{(45000-18000)}{2}$ = 13500

3. The average weight of a class of 20 students is 45 kgs. When a new student whose weight is 40 kgs replaces an old student, the average weight of the whole class decreases by 1 kg. The weight of the replaced student is:

(a) 55 kgs (b) 50 kgs **(c) 60 kgs** (d) 62 kgs

Solution:

Initially the total weight = 20 x 45 = 900

Now, the total weight when a student has been replaced = 20 x 44 = 880

It means the weight of the new student is 20 kgs less than the replaced student. Hence the weight of the replaced student = 40 + 20 = 60 kgs.

Alternatively

Since we know that there are total 20 students and when their average weight decreases by 1, it means on an average 1 kg weight is reduced from each of the students. Thus there is 20 kg weight loss, in total. Again this happens due to the student whose weight is 40 kg replaces an old student. Thus we can say that the weight of the old (or existing) student of the class was 60 kg, which is reduced by a 40 kg student.

4. There were five sections in the MAT paper. The average score of Pooja in the first 3 sections was 83 and the average in the last 3 sections was 97. If her average for the entire paper was 92, then her score in the third section was:

(a) 85 (b) 92 (c) 88 **(d) 80**

Solution:

a + b + c + d + e = 5 x 92 = 460

a + b + c = 3 x 83 = 249

c + d + e = 3 x 97 = 291

Therefore, c = (a + b + c) + (c + d + e) – (a + b + c + d + e)

or c = 540 – 460 or c = 80

5. There are twice the number of two wheelers as there are three wheelers and the number of four wheelers are equal to the number of two wheelers. The average number of wheels per vehicle is:

(a) 2 **(b) 3** (c) 4 (d) 5

Solution:

	No. of 2 wheelers	**No. of 3 wheelers**	**No. of 4 wheelers**
	$2x$	x	$2x$
No. of wheels	2 x $2x$ = $4x$	3 x x = $3x$	$2x$ x 4 = $8x$

Therefore, average number of wheels = $\frac{4x+3x+8x}{5x}$ = 3

6. Once Ajay went to the office of ROCKLINE COURIER with 4 different envelopes. The clerk in the office measured the weights in all possible pairs. The weights obtained are 59gm, 61gm, 62gm, 63gm, 64gm and 66gm. The weight of the heaviest envelope is:

(a) 35gm (b) 36gm **(c) 34gm** (d) Can't be determined

Solution:

If the highest weight be 35gm, then the second highest weight will be 31gm. Again, if the second highest will be 31, then the third highest will be 33 which is inadmissible, since then 35 + 33 = 68 which is not the greatest possible combination. Hence wrong.

Similarly 36 ((i.e., option b) is also invalid

Highest	Sec. Highest	Third Highest
36	30	34

Thus 36 + 34 = 70 > 66, hence wrong.

The greatest possible combination cannot be greater than 66.

Now, consider option (c)

Highest	Sec. Highest	Third Highest
34	32	32 × (since weights are different)
	32	31 × (since 65 is not a combination)
	32	30 ✓

So, the highest weight = 34

Sec. highest weight = 32

Third highest weight = 30

Lowest weight = 29

Since, all the weights obtained give all the 6 different combinations, hence 34 is the highest possible weight of an envelope.

7. In a particular week the average number of people who visited Golkonda is 40. If we exclude the holidays, then the average increases by 16. If we also exclude the day on which maximum number of people - 112 visited Golkonda, then the average becomes 42. The number of holidays in the week is:

(a) 1 **(b) 2** (c) 3 (d) 4

Solution:

Number of days in a week = 7

Average number of visitors = 40

Total visitors = 280 (7 x 40)

Now, if *n* be the number of holidays in a week then

$(7 - n) \times 56 = 280$ (40 + 16 = 56)

$n = 2$

The rest data is redundant or useless, since our problem is solved here without using it.

Alternatively

Go through options,

40 x 7 = 280 = 56 x 5 hence proved.

8. The average age of a group of persons going for a movie is 20 years. 10 new persons with an average age of 10 years join the group on the spot due to which the average of the group becomes 18 years. Find the number of persons initially going for the movie?

(a) 40 (b) 20 (c) 50 (d) 30

Solution:

By Weighted Average**,**

18	
20	10
18 – 10 = 8	20 – 18 = 2

8 : 2

4 : 1

Number of persons initially going to the movie = 40

9. The average age of 10 men increases by 3 years when one of them, whose age is 54 years is replaced by a woman. What is the age of the woman?

(a) 68 years (b) 82 years (c) 72 years **(d) 84 years**

Solution:

The woman's age would be 10 x 3 = 30 years more than the age of the man she replaces. Age of the woman = 54 + 3 x 10 = 84 years.

10. Satyajit earns 3/2 times in January, April, July and October than his average earning of Rs.600 per month in the rest of the months. As a result, his savings in January, April, July and October goes to 5/4 times of Rs. 400, which is his savings per month in the rest of the months. What is his average expenditure per month?

(a) Rs.266.66 (b) Rs.250 (c) Rs.233.33 (d) Rs.433.33

Solution:

Earning in the 8 months = 600 x 8 = 4800

Earning in the 4 months = $\left(600 \text{ x } \frac{3}{2}\right) \text{ x } 4 = 3600$

Total earning = Rs.8400

Saving in 8 months = 400 x 8 = 3200

Saving in 4 months = $\left(400 \text{ x } \frac{5}{4}\right) \text{ x } 4 = 2000$

Total savings = Rs.5200

Total expenditure for 12 months = 8400 – 5200 = 3200

Therefore, average saving per month = $\frac{3200}{12}$ = 266.66

11. A man had ten children. When their average age was 15 years a child aged 6 years died. The average age of the remaining 9 children is:

(a) 16 years (b) 13 years (c) 17 years (d) 15 years

Solution:

Total age of 10 children = 15 x 10 = 150 years. When the 6 year old child dies, the total age of the remaining 9 children would be 150 – 6 = 144. Required average = 144/9 = 16 years.

12. The average temperature on Monday, Tuesday and Wednesday is 38° C. The average temperature on Tuesday, Wednesday and Thursday is 43° C. If the average temperature on Monday and Thursday is 18.5° C. The average temperature on Monday is:

(a) 11°C (b) 21°C (c) 35°C (d) 27°C

Solution:

M + T + W = 38 x 3 = 114 → (1)

T + W + Th = 43 x 3 = 129 → (2)

Therefore, Th – M = 15 → (2) – (1)

And Th + M = 37

Thus the temperature on Monday is 11°C and on Thursday is 26°C.

13. The average weight of all the 11 players of Indian Cricket Team is 50 kg. If the average of first six lightest players is 49 kg and that of the six heaviest players is 52 kg, then the average weight of the player who lies in the sixth position when all the 11 players are arranged in the order of increasing or decreasing weight is:

(a) 51 kg (b) 52 kg **(c) 56 kg** (d) none of these

Solution:

Let A, B, C, D, E, F, G, H, I, J, K be the 11 players in the order of increasing weight then,

A + B + C + D + E + F = 49 x 6 = 294

F + G + H + I + J + K = 52 x 6 = 312

And A + B + C + D + E + F + G + H + I + J + K = 50 x 11 = 550

Therefore F = (A + B + C + D + E + F) + (F + G + H + I + J + K) – (A + B + C + D + E + F + G + H + I + J + K)

= 294 + 312 – 550 → Hence, the average weight of F is 56 kg

14. A number is such that when it is multiplied by 8, it gives another number which is as much more than 270 as the original number itself is less than 270. The average of the original number and the resultant number is:

(a) 33.75 (b) 190 (c) Can't be determined **(d) 270**

Solution:

Since the number is as below 270 as its multiple is as above 270. It means these two numbers are equidistant from 270. Hence the average is 270.

Alternatively

Let the number be x then

$270 - x = 8x - 270$

$x = 60$ and $8x = 480$

Therefore, the average of 60 and 480 is 270.

15. A travel agency has three types of vehicles viz. 4 seater autorickshaw, 10 seater maxi cab and 20 seater minibus. The rate for each passenger (irrespective of his age or weight or seniority) for the autorickshaw is Rs. 12, for the maxicab is Rs.15 and for the minibus is Rs.8 for one round. The average occupancy of the seats is 100%, 80% and 75% respectively. If the travel agency has only one vehicle of each kind, then the average earning for one round of each vehicle is:

(a) Rs.96 (b) Rs.90 (c) Rs.86 (d) Rs.70

Solution:

	Auto Rickshaw	**Maxi cab**	**Minibus**
No. of seats	4	10	20
No. of seats occupied	4	8	15
Rate per seat	12	15	8
Total Amount (in Rs.)	48	120	120

Therefore average earning = $\frac{48+120+120}{3}$ = 96

HOME WORK

16. There are 6 consecutive odd numbers in increasing order. The difference between the average of the squares of the first 4 numbers and the last four numbers is 64. If the sum of the squares of the first and the last element (i.e., odd numbers) is 178, then the average of all the six numbers is:

(a) 7 **(b) 8** (c) 9 (d) 10

Solution:

Let the numbers be (a – 5), (a – 3), (a – 1), (a + 1), (a + 3), (a + 5)

Then their average

= $\frac{(a-5)+(a+3)+(a-1)+(a+1)+(a+3)+(a+5)}{6}$ = a

Again, the value of 'a' can be found by using the last statement

i.e., $(a-5)^2 + (a+5)^2 = 178$

→ $a^2 = 64$ → a = 8

17. The average age of 60 students of IIM Bangalore of the 2005 batch is 23 years. What will be the new average if we include the 40 faculty members whose average age is 35 years?

(a) 27 years (b) 26.5 years **(c) 27.8 years** (d) 28 years

Solution:

(60 x 23 + 40 x 35) / 100 = 2780 / 100 = 27.8 years

18. The average weight of 3 boys A, B and C is 74 kg. Another boy D joins the group and the average now becomes 70 kg. If another boy E, whose weight is 3 kg more than that of D, replaces A then the average weight of B, C, D and E becomes 75 kg. The weight of A is:

(a) 40 kg (b) 42 kg (c) 49 kg **(d) 41 kg**

Solution:

D's weight = 4 x 70 – 3 x 74 = 280 – 222 = 58

E's weight = 58 + 3 = 61

Now, we know that A + B + C + D = 4 x 70 = 280 and B + C+ D + E = 75 x 4 = 300. Hence, A's weight is 20 kg less than E's weight. A = 61 – 20 = 41kg

19. The average presence of students in a class on Monday, Tuesday and Wednesday is 30 and on Wednesday, Thursday, Friday and Saturday is 28. Find the number of students who attended the class on Wednesday if the average number of students on all the six days is 27:

(a) 24 (b) 25 (c) 20 **(d) 40**

Solution:

Since W = (M + T + W) + (W + Th + F + S) – (M + T + W + Th + F + S)

= (30 x 3) + (28 x 4) – (27 x 6)

= 202 – 162 = 40

20. The average salary of employees in BPL is Rs.20000, the average salary of managers being Rs.40000 and the management trainees being Rs.5000. The total number of workers could be:

(a) 350 (b) 300 (c) 100 (d) 500

Solution

By Weighted Average**,** 20,000

5000	40000
40000 – 20000 = 20000	20000 – 5000 = 15000

20000 : 15000

4 : 3

Hence, only 350 (multiple of 4 + 3 = 7) is a possible value for the number of people.