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RBI PHASE 1 RECAP

7th JULY '18

QUANT – AVERAGE

AVERAGE

Q.1) Three natural numbers are such that the first five number is the average of the other two. Also, the sum of two of these numbers is the value of the largest number. Find the smallest number if the largest number is 15.

[a] 5
[b] 10
[c] 7
[d] -5

Answer: 1.[a]

Let the three numbers be a, b and 15 such that a is the smallest and 15 is the largest.
Therefore, b = (a + 15)/2, i.e., a + 15 = 2b………… (1)
It is also given that a + b = 15………… (2)
b= 10 and a = 5.

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Q.2) The (integral) marks obtained by Dennice in 4 subjects at an examination are in the ratio 5 : 6 : 7 : 8. If he has obtained 80 marks in one of the subjects, find his average marks. The maximum marks that can be secured in any subject are equal to 100.

[a] 65
[b] 98
[c] 50
[d] 66.67

Answer: 2.[a]

Let the actual marks be 5x, 6x, 7x and 8x. Out of these only 5x and 8x could be factors of 80.
But if 5x = 80, then x = 16
And 7x = 112
which is not possible.
Hence, the actual marks are 50, 60, 70 and 80 and the average is 65.

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Q.3) The average marks lost on a certain test (maximum marks 20) in a class is 13 if the maximum score obtained is excluded. If the marks obtained by the highest scorer are included, the average of the marks obtained rises to 8. How many students are there in the class, if it is known that the minimum of marks lost by any student is 3?

[a] The given situation is not possible.

[b] 9

[c] 11

[d] 10

Answer: 3[d]

Let x be the total number of students and S be the sum of scores of all the students excluding the highest score. Average marks lost = 13, therefore, Average marks scored = 7

Therefore, $S = 7(x-1)$

Minimum marks lost by any student is 3. Therefore, the highest score = 17

Therefore, $S + 17 = 8x$

Eliminating S, we have

$7x + 10 = 8x$

Therefore, $x = 10$

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Q.4) The average of a, b and c is more by 5 than the average of b, c and d and 2 times of a and is less than 3 times of d by 7. Find the average of a and d.

[a] 45
[b] 45.5
[c] 44.5
[d] 43.3

Answer: 4.[c]

Average of a, b and c is $(a + b + c)/3$ and
Average of b, c and d is $(b + c + d)/3$
As per given information,
$(a + b + c)/3 = (b + c + d)/3 + 5$
i.e., $(a/3) + (b + c)/3 = (b + c)/3 + (d/3) + 5$
i.e., $(a/3) = (d/3) + 5$
i.e., $a = d + 15$
As per given information
$2a = 3d – 7$
i.e., $2(d + 15) = 3d – 7$
i.e., $d = 37$ and $a = d + 15 = 37 + 15 = 52$
Hence, average of a and d is $(a + d)/2$
$(52 + 37)/2 = 89/2 = 44.5$

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Q.5) The average of a bowler is calculated by dividing the number of runs he gives by the number of wickets he takes over a period of time. The averages of P and Q were 4 before a match. After the match in which P took 3 wickets for 24 runs and Q took 2 wickets for 26 runs, their averages still remained equal. Before the match, they had taken a total of 30 wickets between them. How many wickets had P taken before the match?

[a] 15
[b] 13
[c] 11
[d] 17
[e] 19

Answer: 5[c]

Let P take 'p' wickets prior to this match.
Let Q take 'q' wickets prior to this match.
Number of runs given before this match
By P = 4p and by Q = 4q
After the match, the number of runs given:
By P = 4p + 24
By Q = 4q + 26
Since averages after the match are the same, we get,
$(4p + 24)/(p + 3) = (4q + 26)/(q + 2)$
$(4p + 24)(q + 2) = (4q + 26)(p + 3)$
$4pq + 8p + 24q + 48 = 4pq + 26p + 12q + 78$
$18p - 12q + 30 = 0$……….. (1)
And $p + q = 30$
From Equation (1) and (2),
$p = 11$

Q.6) Four integers are in proportion. The sum of the extremes is 7. The ratio of the first two terms is 1:2. If the sum of the squares of four numbers is 50, the average of the four numbers will be:

[a] 2
[b] 3
[c] 4
[d] 3.5

Answer: 6.[b]

Let the smallest number be x.
As the four numbers are in the proportion and the ratio of first two terms is 1:2, the four numbers are x, 2x, [(7-x)/2], (7-x)
Therefore, $x^2 + (2x)^2 + [(7-x)/2]^2 + (7-x)^2 = 50$
$5x^2 + (7-x)^2 \times (5/4) = 50$
$20x^2 + 5(7-x)^2 = 200$
i.e., $5x^2 - 14x + 9 = 0$
$x = 1$ or $9/5$
Since, x is an integer x = 1 and the four numbers are 1, 2, 3 and 6. Their average is 3.

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Q.7) The average of (n-1) distinct numbers, which are from the set of n consecutive natural numbers starting from 1 is 285/23. What can be the value of the number, which has not been considered?

[a] 13
[b] 15
[c] 17
[d] 20
[e] 22

Answer: 7.[b]

Let the number that has not been considered be p.

Therefore, $\{[n(n+1)/2] - p\} / (n-1) = 285/23$

n-1 could be 23 or a multiple of 23

Let $n - 1 = 23$

Therefore, $(24 \times 25)/2 - p = 285$

Therefore, $300 - p = 285$

$p = 15$

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Q.8) The average of the first eleven multiples of a number is found. If one of the numbers is removed, what is the range over which the average can swing, with respect to the initial average?

[a] 15%

[b] 16.67%

[c] 8.33%

[d] 20%

Answer: 8.[b]

Let the number be x.

If the biggest number, i.e., 11x is removed,

Average becomes $(66x – 11x)/10 = 5.5x$

If the smallest number, i.e., x is removed,

Average becomes $(66x – x)/10 = 6.5x$

Therefore, percentage swing = $[(6.5x – 5.5x)/6x]$ X100 = 16.67%

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Q.9) The average marks of three classes X, Y and Z are 20, 40 and 60 respectively. If the average mark of classes X and Y together is 100/3 and that of classes Y and Z together is 50, then find the average mark of the three classes put together.

[a] 40
[b] 42
[c] 44
[d] Cannot be determined

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Answer: 9.[c]

Average mark of X = x = 20
Average mark of Y = y = 40
Average mark of Z = z = 60
Let n_x, n_y and n_z be the number of students in each class.
We know that average of X and Y = 50
$(20n_x + 40n_y)/(n_x + n_y) = 100/3$
$(20/3)n_x = (10/3)n_y$
$2n_x = n_y$………………. (1)
Also average of Y and Z
$= (40n_y + 60n_z)/(n_y + n_z) = 50$
$n_z = n_y$…………………. (2)
Using (1) and (2), average of all three
$= [20 \text{ X } (n_y/2) + 40n_y + 60$

Alternate method:
Using Alligation rule, find the ratio of number of students in each of the sections are shown below.
Ratio of students in sections X and Y
= [40 – (100/3)]/[(100/3)-20] = ½
Ratio of the students in sections Y and Z
(60 – 50)/(50 – 40) = 1/1
Therefore, ratio of students in sections X, Y and Z = 1 : 2 : 2
Hence the required average mark = [(20 x 1) + (40 x 2) + (60 x 2)]/5 = 44

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Q.10) There are a certain number of pages in a book. Arjun tore a certain page out of the book and later found that the average of the remaining page numbers is 608/13. Which of the following were the page numbers of the page that Arjun had torn?

[a] 57 and 58
[b] 59 and 60
[c] 45 and 46
[d] 47 and 48

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Answer: 10.[a]

Since only two page numbers are missing, the average would not change considerably and hence the number of pages remaining (after tearing away two page numbers is approximately equal to 45 x 2 = 90

Therefore, Since the average (of the remaining pages) was found by dividing with the remaining number of pages and as we have 13 as the denominator, the number of pages remaining 'n' must be 13 or a multiple of it close to 90, i.e., 13 x 7 = 91

Therefore, total pages = 91 + 2 =93

Therefore, sum of all pages (initially)

$= \Sigma 93 = 93 \times [(93 + 1)/2] = 4371$

And sum after two pages missing

$= (608/13) \times 91 = 4256$

Missing pages = m and (m+1) say then

$4372 - 4256 = m + (m+1)$

$115 = 2m + 1$

m= 57

(m+1) = 58

Therefore, the missing page numbers are 57 and 58