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1988 Q21

21. A fifth number, n, is added to the set of numbers {3,6,9,10} to make the mean of the set of five numbers equal to its median. The number of possible values for n is

A) 1 B) 2 C) 3 D) 4 E) more than 4

21. C There are three possible values for the new number, n. It is either less than 6, between 6 and 9, or greater than 9. If the five elements are listed in increasing order, these three possibilities in the table below are: one of the first two, the middle one, and one of the last two. Since the median is the middle number in a set of five elements, there are three values for the median: 6, n, or 9.

					Median
n	3	6	9	10	6
3	n	6	9	10	6
3	6	n	9	10	n
3	6	9	n	10	9
3	6	9	10	n	9

Query: Can you find the values of n and which of the two alternatives occurs in the first and third cases ?

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2009 Q21

21. Andy and Bethany have a rectangular array of numbers with 40 rows and 75 columns. Andy adds the numbers in each row. The average of his 40 sums is A. Bethany adds the numbers in each column. The average of her 75 sums is B. What is the value of $\frac{A}{B}$?

(A) $\frac{64}{225}$ (B) $\frac{8}{15}$ (C) 1 (D) $\frac{15}{8}$ (E) $\frac{225}{64}$

21. **Answer (D):** There are 40 rows, so the sum of the 40 row sums is $40A$. This number is also the sum of all of the numbers in the array because each number in the array is added to obtain one of the row sums. Similarly, there are 75 columns, so the sum of the 75 column sums is $75B$, and this, too, is the sum of all of the numbers in the array. So $40A = 75B$, and $\frac{A}{B} = \frac{75}{40} = \frac{15}{8}$.

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2012 Q22

22. Let R be a set of nine distinct integers. Six of the elements of the set are 2, 3, 4, 6, 9, and 14. What is the number of possible values of the median of R?

(A) 4 **(B)** 5 **(C)** 6 **(D)** 7 **(E)** 8

22. **Answer (D):** If nine distinct integers are written in increasing order, the median, which is the middle number, would be in the fifth place. If all of the remaining integers are greater than 9, then the median is 9. If all of the remaining integers are less than 3, then the median is 3. All the integers from 3 to 9 are possible medians, as shown in the following table.

Include in R	Median of R
-1, 0, 1	3
0, 1, 5	4
1, 5, 7	5
5, 7, 8	6
7, 8, 10	7
8, 10, 11	8
10, 11, 12	9

So, 3, 4, 5, 6, 7, 8, and 9 are the possible medians, and their count is 7.