

## Solution for Unequal averages NRICH secondary live problem

Hello NRICH team,

I am A.Dhanyashree from Chennai, India. I worked on Unequal averages

(<https://nrich.maths.org/problems/unequal-averages>) as part of the STEPS IN MATH program conducted by The GYM Foundation. (<https://thegymfoundation.com/stepsinmath>) I have attached the scanned copy of my solution. Thank you.

The image shows a handwritten solution on lined paper. At the top right, there are fields for 'Page No.' and 'Date / /'. The word 'NRICH' is written in the center and underlined. Below it, the problem is stated: 'Find 5 numbers in which, the mean, median, mode, range are equal.' A diagram shows five positions labeled 'a', 'b', 'c', 'd', 'e' with arrows pointing to each. To the right of this diagram, it says 'Equal = 2'. The solution is presented in four numbered steps: 1) Finding the median as 2. 2) Finding the mode by repeating 2 at positions b and d. 3) Finding the mean by calculating the total sum as 10, with 4 already accounted for by the two 2s, leaving 6 to be distributed. 4) Finding the range by choosing 1 and 3 for positions a and e, which also satisfies the range of 2.

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Find 5 numbers in which, the mean, median, mode, range are equal.

a, b, c, d, e Equal = 2

- ① First I decided to find the median which is easy, because it is the number in the middle that is 2.
- ② Next I found the mode that is by repeating 2 before and after the middle c position (that is b and d). First I put 2 at b position.
- ③ Next I need to find Mean. We know that the total needs to be 10. Till now the running total is 4. Remaining is 6.
- ④ To find the Range which should also be 2, we need to find the smallest and largest number, in the group. For ~~I~~ now I chose 1 and 3, as 'a' and 'e' positions which is 1 ~~greater~~ smaller, and 1 greater

than 2, respectively.  $3 - 1 = 2$  is range

- ⑤ Now the running total is 8 and total is 10. To find the mean, we need to find position  $d'$  that must be 2, because  $10 - 8 = 2$ . Now Total is 10.  $\frac{10}{5} = 2$  is mean.

- ⑥ ~~as~~ In the range part, I found 1 by the following steps:-

$$x + y = 4$$

$$y - x = 2$$

$$y = 2 + x$$

$$x + 2 + x = 4$$

$$2x - 2$$

$$x = 1$$

$$\text{To find } 3, \rightarrow 2 + 1 = 3 //$$

- ⑦  $\frac{1}{a}, \frac{2}{b}, \frac{2}{c}, \frac{2}{d}, \frac{3}{e}$

$$a = 1$$

$$b = 2$$

$$c = 2$$

$$d = 2$$

$$e = 3$$

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Find a set of 5 numbers in which  $\rightarrow$  mode  $<$  median  $<$  mean

$\frac{a}{\quad} > \frac{b}{\quad} > \frac{c}{\quad} > \frac{d}{\quad} > \frac{e}{\quad}$

- ① First I decided to find ~~mean~~ the ~~mean~~ mode. Then I took a small number that is 3, which must be repeated more. So, it can be kept only before the median (position c) that is only at position 'a' ~~and 'b'~~ and 'b'.

①  $\frac{3}{a} > \frac{3}{b} > \frac{-}{c} > \frac{-}{d} > \frac{-}{e}$

- ② Next I found median which should be at the middle of the sequence, and greater than 3. So, I kept the next smallest number that is 4, as the median,  $3 < 4$

$\frac{3}{a} > \frac{3}{b} > \frac{4}{c} > \frac{-}{d} > \frac{-}{e}$

- ③ Finally, I found mean. As of now the running total is 10, and the whole total must be 25, which I decided earlier. Remaining is 15. The next smallest number is 6, at position 'd' and 9 at 'e'. Mean =  $\frac{25}{5} = 5 > 4 > 3$

$\frac{3}{a} > \frac{3}{b} > \frac{4}{c} > \frac{6}{d} > \frac{9}{e}$