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Hunting for averages solutions

a) $\begin{array}{ccc} & 8 & \\ 9 & 5 & 0 \\ & 3 & \end{array}$

b) $\begin{array}{ccc} 1 & 2 & \\ 1 & 4 & 6 & 15 \\ & 8 & 3 & \end{array}$

1) Let the missing central number in this be named " x ", and let the number of external numbers be " n ".

We are told that " x " must be the mean of the 4 numbers.

So " x " must be $\frac{\text{total of 4 numbers}}{n}$.

We know " n " in this case is 4. So

$x = \frac{\text{total of 4 numbers}}{4}$ therefore

$4x = \text{total of 4 numbers}$.

We are given these 4 numbers in the question, 8, 0, 9, 3.

So

$$4x = 8 + 0 + 9 + 3$$

$4x = 20$. By dividing both sides by 4, we find $x = 5$.

b)

(1) (2)

(1) [a] [b] (15)

(8) (3)

Let the 2 unknowns in the centre be named "a" and "b" respectively. We know that both a and b are the mean of their 4 external numbers, and so we can form the two equations below.

$$\frac{1+1+8+b}{n} = a \quad \frac{2+a+15+3}{n} = b$$

We know "n" is 4, thus

$$\frac{10+b}{4} = a \quad \frac{20+a}{4} = b$$

By multiplying both sides by n, or 4, we find that 4 cancels out.

$$10+b = 4a \quad 20+a = 4b$$

We know that we now have 2 simultaneous equations.

$$10 + b = 4a$$

$$20 + a = 4b$$

by using the method of substitution, we can thus solve for a .

$$b = 4a - 10$$

$$20 + a = 4(4a - 10)$$

$$20 + a = 16a - 40$$

$$15a = 60$$

$\therefore$

$$a = 4$$

Now we may use one of the above ~~se~~ equations to solve for b .

$$20 + a = 4b$$

$$a = 4$$

$$24 = 4b$$

$\therefore$

$$b = 6$$

Hence, we can explain why 4 and 6 belong in the above sequences.