

Answer on Question #82453 – Math – Algebra

Question

The average weekly salary per head of the entire staff of a factory consisting of supervisors and the labourers is Rs. 55. The average salary per head of the supervisors is Rs. 300 and that of the labourers is Rs. 40. Given that the number of supervisors is 10, find the number of labourers in the factory.

Solution

Let the number of labourers in the factory be x . Then the all workers at factory earns Rs. $(10*300 + 40*x)$, but on the other hand, we know that all workers earns Rs. $(10 + x)*55$.

Thus,

$$10*300 + 40*x = (10 + x)*55$$

$$3000 + 40x = 550 + 55x$$

$$15x = 2450$$

$$x = 163.(3)$$

But we know that x is the number of all labourers in factory, so x must be integer. We must round x so that the average weekly salary per head of the entire staff of a factory consisting of supervisors and the labourers will be Rs. 55. If we round x down, the average weekly salary per head of the entire staff of a factory will be $(163*40 + 300*10)/(163 + 10) \approx 55.03$ (so $\Delta\text{DOWN} = |55 - 55.03| = 0.03$). If we round x up, the average weekly salary per head of the entire staff of a factory will be $(164*40 + 300*10)/(164 + 10) \approx 54.94$ (so $\Delta\text{UP} = |55 - 54.94| = 0.06$). We can see that ΔDOWN is less than ΔUP , let's choose $x = 163$ (minimizing Δ).

Answer: 163.