Math Diversion 955

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Good detective always look for something unusual.
— Charlie Chan

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Source: The Ether of Great Mathematical Ideas
Title: The drying watermelon paradox
 Presenter: Patrick
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1 Problem

This problem brings us some unintuitive results: A 100Kg watermelon is estimated to be 99% water and 1% flesh part (that is, what would be left of the watermelon if all water were removed from it). After some days, the watermelon has dehydrated a bit and its water content is down to 98%. How much does the dehydrated watermelon weigh?

2 Solution

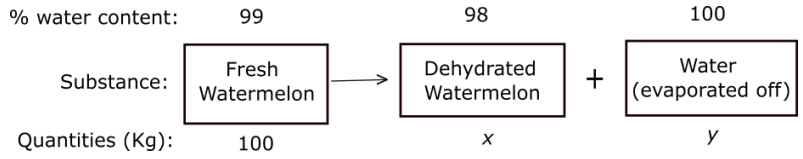

Figure 1. Is x close to the original weight or not? Note: On the RHS of the arrow the box should read "Partially dehydrated watermelon."

To properly analyze this thought experiment, it's crucial to think of the watermelon as being made up of two parts of stuff: 'watermelon flesh' and water. Both of these are conserved in this process. Though we won't consider capturing the evaporated water, it still exists in the atmosphere.

We could solve for x by balancing on water in this 'before and after' process, but it's even easier to balance on the watermelon flesh part. In the 'before'

watermelon, the flesh part constitutes 1%, and in the 'after' part it constitutes 2%:

$$.01(100) = .02x\,, \tag{1}$$

which has the solution $x = 50\,\mathrm{Kg}$.