

Runners' World

According to an article in Runners' World magazine:

On average the human body is more than 50 percent water [by weight]. Runners and other endurance athletes average around 60 percent. This equals about 120 soda cans' worth of water in a 160-pound runner!

Investigate their calculation. Approximately how many soda cans' worth of water are in the body of a 160-pound runner? What unprovided information do you need to answer this question?



Commentary

This task provides students with an opportunity to engage in Florida Standard for Mathematical Practice 6, Attending to precision. It intentionally omits some relevant information -- namely, that a typical soda can holds 12 oz of fluid, that a pound is equivalent to 16 dry ounces, and that an ounce of water weighs approximately 1.04 dry ounces (at the temperature of the human body) -- in the interest of having students discover that these are relevant quantities. The incompleteness of the problem statement makes the task more amenable to having students do work in groups.



Solution: Solution

According to the 60% figure, a 160-pound runner contains about $.6 \times 160 = 96$ pounds of water, or $96 \times 16 = 1536$ ounces. In turn, 1536 ounces of water occupies a volume of $1536 \text{ oz} \cdot \frac{1 \text{ fl. oz}}{1.043 \text{ oz}} \approx 1473$ fluid ounces. Finally, dividing these 1473 ounces into 12-ounce cans will require approx $1473 \div 12 \approx 123$ cans.

Alternatively, we can write down a single equation encapsulating all of the above steps, using units to guide our way from the runners weight in pounds to the number of soda cans:

$$160 \text{ lbs} \times \frac{0.6 \text{ lbs water}}{\text{lb}} \times \frac{16 \text{ oz}}{\text{lb water}} \times \frac{1 \text{ fl. oz}}{1.043 \text{ oz}} \times \frac{1 \text{ can}}{12 \text{ fl. oz}} \approx 123 \text{ cans.}$$

Given the approximations made in the problem (most notably, the very approximate 60%), it is reasonable to report an answer only to the nearest multiple of 10, and report a final answer of 120 cans, leading us to concur with the magazine's calculation.