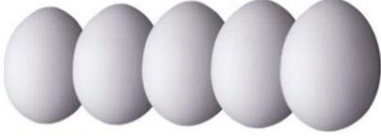


Weighing Eggs

12 January 2025

Jim Stevenson



This is another problem¹ from A+Click.

As each of five eggs is weighed, the average weight increases by one gram each time. If the first egg weighs 50 grams, what is the weight of the last egg?

Answer Choices: 55 grams 56 grams 57 grams 58 grams

My Solution

Let x_1, x_2, x_3, x_4, x_5 be the successively increasing weights of the eggs. Then for the averages we have

$$\begin{aligned}x_1/1 &= x_1 \\(x_1 + x_2)/2 &= x_1 + 1 \\(x_1 + x_2 + x_3)/3 &= (x_1 + 1) + 1 = x_1 + 2 \\x_1 + x_2 + x_3 + x_4 &= 4(x_1 + 3) = 4x_1 + 4 \cdot 3 \\x_1 + x_2 + x_3 + x_4 + x_5 &= 5(x_1 + 4) = 5x_1 + 5 \cdot 4\end{aligned}$$

Therefore,

$$x_5 = (5x_1 + 5 \cdot 4) - (4x_1 + 4 \cdot 3) = x_1 + 8$$

So $x_1 = 50$ grams implies $x_5 = 58$ grams.

Note that we have a general expression for n eggs, and thus the weight of the n th egg based on the weight of the first, namely,

$$x_1 + x_2 + \dots + x_n = n(x_1 + n - 1) \Rightarrow x_n = x_1 + 2(n - 1).$$

A+Click Solution

The first egg weighs 50 grams; the average weight is 50 grams. The second egg weighs 52 grams; the average weight is 51 grams. The third egg weighs 54 grams; the cumulative average weight is 52 grams. The fourth egg weighs 56 grams; the cumulative average weight is 53 grams. The fifth egg weighs 58 grams; the cumulative average weight is 54 grams.

There seems to be a reluctance to use symbolic algebra in the solution. And the way the solution is phrased suggests misleadingly that the weight of the n th egg is known first and the average computed second, rather than deducing the weight of the egg from the relationship on the average.

© 2025 James Stevenson

¹ <https://aplusclick.org/t.htm?level=12;q=1044>