Math Diversion Problem 438

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> A mathematician is a machine for turning
> coffee into theorems.
> — Alfred Renyi

Problem Statement

Note: This is Problem is from:

https://www.algebra.com/algebra/homework/Percentage-and-ratio-word-problems/Advanced-problems-on-percentage.lesson

The Problem

In a basket full of fruit, 60% are mangoes and remaining 40% are apples. 25% of apples are green and the rest 75% are red. Of the mangoes, 80% are red and the rest of the mangoes are green. What percentage of the green fruits are mangoes?

Visualizing the Problem

Our figure needs to represent the logical division of fruit first into both mangoes and apples, and then into green or red.

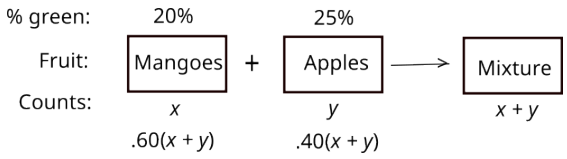

Figure 1. Although we don't have information that will give us the sum $x + y$, to compensate for this, we are given information to calculate the ratio of x to y.

Scheme & Solution

Are there any totals in the problem? (Almost always there are.)

There plenty of totals, but they are given in terms of percentages. To decide how to proceed, let's write down precisely what we've been asked to calculate: namely, the percentage P of green mangoes (gx) to all the green fruit ($gx+gy$), that is, the number of green mangoes plus the number of green apples:

$$P = \frac{gx}{gx+gy} \times 100\% \,. \tag{1}$$

Now, before we can continue, we need the relationship between x and y, which was given to us in the form of a proportion:

$$\frac{x}{y} = \frac{.60(x+y)}{.40(x+y)} = \frac{3}{2} \,, \tag{2}$$

where the percentages have been converted to decimals.

Thus,

$$\begin{aligned} P &= \frac{gx}{gx+gy} \times 100\% = \frac{.20x}{.20x+.25y} \times 100\% \\ &= \frac{1}{1+\dfrac{.25y}{.20x}} \times 100\% = \frac{1}{1+\dfrac{25}{20}\dfrac{2}{3}} \times 100\% \\ &= \frac{1}{1+\dfrac{5}{6}} \times 100\% = 54.5\% \,. \end{aligned} \tag{3}$$