Math Diversion 714

P. Reany

July 11, 2025

Small moves, Ellie. Small moves.
— from the movie, *Contact*

The problem is found at:

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Source: The Ether of Interesting Math Ideas
Title: Working with percentages
 Presenter: Patrick
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1 The Problem

Let S be the subpopulation of a county of all members of age 25 years old and older. Calculate the percent of people in S that have a college degree if

1. The percent of males in S with college degrees is 26%, and the percent of females in S with college degrees is 16%.
2. The percentage females in S is 55%.

2 Solution

Let m be the number of males in S, and let f be the number of females in S. The cardinality of S is $T = m + f$.

In the figure below, we have a standard 'total is the sum of its parts' graphic.

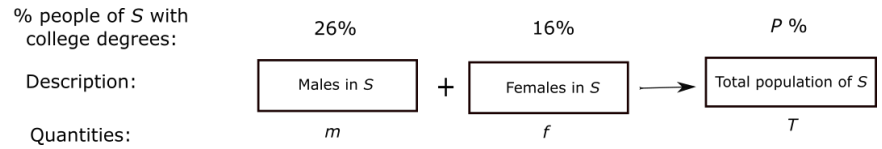

Figure 1. Males and females of S, and the percentages of each with college degrees.

First, let's be clear what we are asked to solve for. We need the percent of the people in S that have a college degree. As always, the percent P is the part over the whole times 100%. One number we will need is the total number of people in S who have college degrees, and that is solved as the sum of its parts, given from the figure:

$$\text{no. of people in } S \text{ with college degrees} = .26m + .16f\,. \tag{1}$$

We'll also need to convert m and f as functions of T. We were told that 55% of S are females, so we can conclude that $f = .55T$, which implies that $m = .45T$

Now, on to the percentage we need.

$$\begin{aligned} P &= \frac{\text{no. people in } S \text{ with degrees}}{\text{no. people in } S} \times 100\% \\ &= \frac{.26m + .16f}{T} \times 100\% \\ &= \frac{.26(.45T) + .16(.55T)}{T} \times 100\% \\ &= [.26(.45) + .16(.55)] \times 100\% \\ &= 20.5\%\,. \end{aligned} \tag{2}$$