

Math Diversion 1073

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If you're not in love with the Truth, you could be
talked into believing almost anything.

— Author

Source: [http://advancedmathtutoring.com/
a-hard-sat-math-mixture-word-problem](http://advancedmathtutoring.com/a-hard-sat-math-mixture-word-problem)
Title: Ratios
Presenter: Patrick

1 Problem

A cylindrical glass is filled with three different juice mixtures. First, $1/4$ of the glass is filled with a mixture that is half apple juice and half orange juice. Then, the glass is filled to the 80% mark with a mixture that has twice as much orange juice as apple juice and twice as much apple juice as pineapple juice. The remainder of the glass is filled with pineapple juice. What percent of the final mixture is apple juice? [Ans. 28.8%]

2 Solution

This is a typical double-proportion problem, in which we have 'apple juice : orange juice : pineapple juice', or A:O:P. We just need to be careful when interpreting the information given to us.

First, we'll invent on the fly a new volume called the 'glass full'. The volumic quantities given below the rectangle are given as fractional amount of 1 glass full. Mix 2 is added to the glass up to the 80% amount. This means that the quantity of Mix 2 is given as $.80 - 1/4 = 11/20$, since it already had $1/4$ glass full of Mix 1 in it. I converted $1 : 2 : 1/2$ to $2 : 4 : 1$ since it is easier for me to deal with, yet leaves the ratios the same.

Let's look at the graphic now.

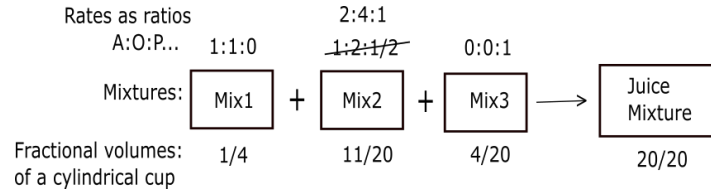


Figure 1. The ratios of Mix 2 were given as $1 : 2 : 1/2$, but by multiplying through by 2 we can clear it of fractions.

Now we just add up all the fractions of apple juice contributed from each Mix (rate \times quantity):

$$\left(\frac{1}{2}\right)\left(\frac{1}{4}\right) + \left(\frac{2}{7}\right)\left(\frac{11}{20}\right) + \left(\frac{0}{1}\right)\left(\frac{4}{20}\right) = \frac{79}{280}. \quad (1)$$

This is roughly .282 in decimal form, corresponding to about 28.2%.