Math Diversion 989

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> Since the mathematicians have invaded the theory of
> relativity, I do not understand it myself anymore.
> — Albert Einstein

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Source: https://www.algebra.com/algebra
Title: Question 286358: A Mixed-Rate Problem
 Presenter: Patrick
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1 Problem

An urn is filled with coins and beads. All the coins are either silver or gold. Twenty percent of the objects in the urn are beads. Forty percent of the coins in the urn are silver. What percent of the objects in the urn are gold coins?

2 Solution

The parts are beads, silver coins, and gold coins. Cue the figure.

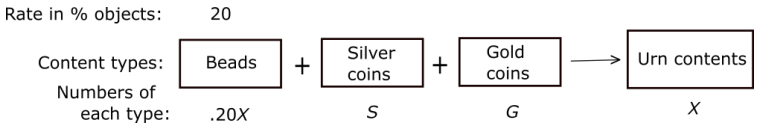

Figure 1. We have to deal with a few constitutive relations this time.

We are asked to find the percentage of gold coins in the urn (compared all objects in the urn), which is given by

$$P = \frac{G}{X} \times 100\% \,, \tag{1}$$

where X be the sum of all the objects in the urn.

The overall total gives us (for beads, silver coins, and gold coins)

$$X = B + S + G\,. \tag{2}$$

But B is 20% of X, leaving $0.80X = S + G$, or

$$0.80X = C\,, \tag{3}$$

where C stand for the number of all coins. Since the silver coins are 40% of all coins, the gold coins are 60%.

$$.60C = G\,. \tag{4}$$

Using (3) and (4) we can write a simple relation between X and G: Multiply (3) by 0.60 and use (4) to get

$$.60(.80)X = G\,, \tag{5}$$

which gives us that G takes 48% of the total contents of the urn.