Math Diversion Problem 698

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Theory like mist on eyeglasses — obscures facts.
— Charlie Chan

The problem is found at:

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Source: The Ether of Great Mathematical Ideas
Title:  Mixed-Rate Problem
 Presenter: Patrick
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1 The Problem

A footwear store sells only shoes and boots. The price of all pairs of shoes are the same, namely R_S, and the price of all pairs of boots are the same, namely R_B. Determine the price per pair of shoes and boots if, on Monday, the store sold 22 pairs of shoes and 16 pairs of boots for a total of \$650, and on Tuesday it sold 8 pairs of shoes and 32 pairs of boots for a total of \$760.

2 Solution

This time, the given information in the problem is sufficiently novel for us to include a figure.

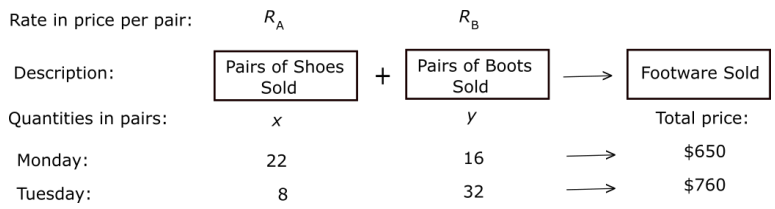

Figure 1. This graphic shows us the number of pairs of shoes and boots sold on two different days, and the net income from both of them. From this we can calculate the price per pair of shoes R_S and pair of boots R_B.

We can think of this problem as having supplied us with two equations of the form 'total is the sum of its parts' — one equation for the sales on Monday, and the other for the sales on Tuesday.

We have two unknowns to solve for, so we need two coupled equations to solve for them.

$$\text{Monday Sales:} \qquad R_S(22) + R_B(16) = 650\,, \tag{1a}$$

$$\text{Tuesday Sales:} \qquad R_S(8) + R_B(32) = 760\,. \tag{1b}$$

The solution to this system is $R_S = \$15$ per pair of shoes and $R_B = \$20$ per pair of boots.