# Math Diversion Problem 856

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> Don't ever take a fence down until you
> know the reason it was put up.
> — Chesterton

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Source:  Intermediate Algebra for College Students,
      3rd Ed. Prentice-Hall  (2002), p. 169.
Title:  A Mixed-Rate Problem
  Presenter:   R. Blitzer
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## 1 Problem

A heat-loss survey by an electrical company indicated that a wall of a house containing 40 $ft^2$ of glass and 60 $ft^2$ of plaster lost 1920 BTU of heat (in a given time period). A second wall containing 10 $ft^2$ of glass and 100 $ft^2$ of plaster lost 1160 BTU of heat. Determine the heat lost per square foot of glass and plaster in that house.

## 2 Solution

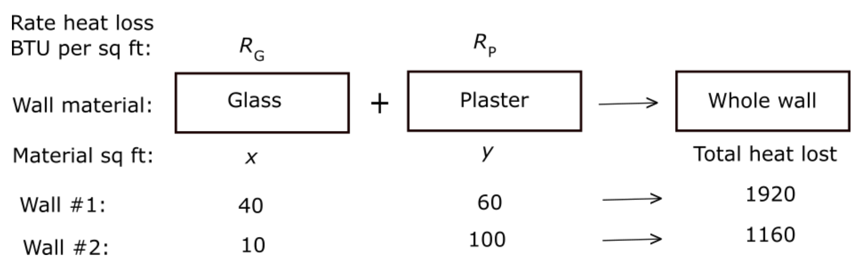


Figure 1. Heat leakage through glass and plaster.

Somehow this clever heat-loss technician is able to measure the heat lost through an entire wall. He then measures the square footage of the glass and plaster of this wall, and repeats for another wall, and then uses algebra to infer the heat loss through just the glass or just the plaster.

We can do this ourselves. The total heat lost for both walls is equal to the sum of the heats lost through their glass parts and their plaster parts:

$$\begin{aligned} 1920 &= 40x + 60y\,, \\ 1160 &= 10x + 100y\,, \end{aligned} \tag{1}$$

where $x = R_G$ and $y = R_P$. This makes it easier to copy the text into the solver, which gives back $x = R_G = 36$ [BTU] and $y = R_P = 8$ [BTU].