

# Math Diversion Problem 945

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I was trying to reduce the number of string theories by showing  
that some were inconsistent, but what happened instead  
was to reduce the number of string theories by showing  
that they were different limits of each other.

— Edward Witten

[*Closer to the Truth* (13 Mar 2021)]

Source: [https://www.algebra.com/algebra/homework/word/mixtures/  
Advanced-mixture-problems.lesson](https://www.algebra.com/algebra/homework/word/mixtures/Advanced-mixture-problems.lesson)

Title: A Mixed-Rate Problem

Presenter: Patrick

## 1 Problem

**Problem 5 from the webpage:** A certain concrete mixture contains 5.00% cement and 7.00% sand. How many kilograms of this mixture and how many kilograms of sand should be combined with 255 kg of cement to make a batch that is 16.0% cement and 18.0% sand?

## 2 Solution

Let's make a diagram to help out.

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% cement:	5.00		0		100		16.0				
% sand:	7.00		100		0		18.0				
Substance:	<table border="1"><tr><td>Mix #1</td></tr></table>	Mix #1	+	<table border="1"><tr><td>Sand</td></tr></table>	Sand	+	<table border="1"><tr><td>Cement</td></tr></table>	Cement	→	<table border="1"><tr><td>Mix #2</td></tr></table>	Mix #2
Mix #1											
Sand											
Cement											
Mix #2											
Mass [Kg]:	x		y		255		x + y + 255				

Figure C2. Conservation of mass is already accounted for.

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Our first equation comes from the conservation of cement:

$$0.05x + 0.0y + (1.00)(255) = (0.16)(x + y + 255). \quad (1a)$$

Our second equation comes from the conservation of sand:

$$0.07x + 1.00y + (0.0)(255) = (0.18)(x + y + 255). \quad (1b)$$

The solution is

$$x = 1561 \text{ Kg}, \quad (2a)$$

$$y = 265 \text{ Kg}. \quad (2b)$$