

# Math Diversion Problem 910

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In the middle of difficulty lies opportunity.  
— John Archibald Wheeler

Source: <https://www.algebra.com/algebra/homework/word/mixtures/Mixture-problems.lesson>  
Title: Dilution Problem  
Presenter: Patrick

## 1 The Problem

The general heuristics for solving all these next few problems will be as follows in the footnote:<sup>1</sup>

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How much water should be added to 200 milliliters of a 10% salt solution to get a 2% salt solution? (Concentrations here are mass-to-volume concentrations, measured in g/mL units, grams of the salt per 1 milliliter of the solution volume).

## 2 Solution

Let's make a diagram to help out.

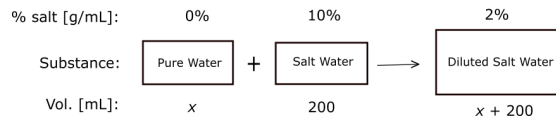


Figure B1. Pure water is added to salt water to dilute it.

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<sup>1</sup>1) Make a diagram.  
2) Account for conserved quantities.  
3) Solve system of equations to get the answer.

- 1) Conservation of volume is already accounted for in the diagram.
- 2) Next, we write down the conservation of salt equation:

$$(0.0)(x) + (0.10)200 = (0.02)(x + 200). \quad (1)$$

The solution for  $x$  is 800 mL.