

Math Diversion 971

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Chancellor, all presidents are faced with difficult decisions.

It is by their *decisions* that they are judged.

— Cardinal Barusa

[Doctor Who, *Deadly Assassin*]

Source: <https://www.algebra.com/algebra>

Title: Question 842253: A Mixed-Rate Problem

Presenter: Patrick

1 Problem

A reservoir containing 1 million gallons of water has been tainted with arsenic. Scientists conducted several tests and found that the solution in the reservoir is 2% arsenic. Although scientists realize that the arsenic can't be removed from the supply, they do understand that they can reduce the percentage to safe levels. A safe level of arsenic is .001% How much water must be added to the reservoir to make the water safe to drink?

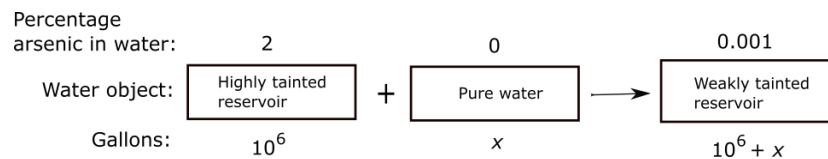


Figure 1. We'll have to add a lot more than a million gallons of water.

2 Solution

This problem is rather easy, but a bit interesting.

Balance on arsenic:

$$2 \times 10^6 = 0.001(10^6 + x), \quad (1)$$

which has the solution $x \approx 2$ billion gallons.