

Dexter needs to obtain 500 mL of an 11% acetic acid solution. He will mix 5% and 15% solutions in his laboratory to get what he needs. How much of each solution should he use?

Step 1- Make and fill in a table using Percent • Total = Amount You Have

We will make the entire table first.

| | Percent | Total | Amount You Have |
|-----|---------|-------|-----------------|
| 5% | | | |
| 15% | | | |
| 11% | | | |

We will write the percents as decimals.

| | Percent | Total | Amount You Have |
|-----|---------|-------|-----------------|
| 5% | 0.05 | | |
| 15% | 0.15 | | |
| 11% | 0.11 | | |

We know the exact total amount for one of these solutions- the 11% solution. Let's fill that in.

| | Percent | Total | Amount You Have |
|-----|---------|-------|-----------------|
| 5% | 0.05 | | |
| 15% | 0.15 | | |
| 11% | 0.11 | 500 | |

We need to put values in for the totals of the 5% solution and 15% solution, but we don't know what either one of them was. What will we do?

Let's make $x = \text{total of 5\% solution}$.

That means $500 - x = \text{total of 15\% solution}$.

| | Percent | Total | Amount You Have |
|-----|---------|-----------|-----------------|
| 5% | 0.05 | x | |
| 15% | 0.15 | $500 - x$ | |
| 11% | 0.11 | 500 | |

Now we can multiply Percent • Total to fill in the Amount You Have.

| | Percent | Total | Amount You Have |
|-----|---------|-----------|-----------------|
| 5% | 0.05 | x | $0.05x$ |
| 15% | 0.15 | $500 - x$ | $0.15(500 - x)$ |
| 11% | 0.11 | 500 | 55 |

Step 2- Make an equation by adding two solutions together to equal the third.

$$\text{5\% solution} + \text{15\% solution} = \text{11\% solution}$$

$$0.05x + 0.15(500 - x) = 55$$

Step 3- Solve the equation

$$0.05x + 0.15(500 - x) = 55$$

$$0.05x + 75 - 0.15x = 55$$

$$-0.10x = -20$$

$$x = 200$$

$$\text{(which means } 500 - x = 300\text{)}$$

Step 4- Answer the question from the problem

200 mL of 5% solution

300 ml of 15% solution