



Problem of the Week

Grade 7 and 8

Wine Wine Wine

Solution

Problem

Vino is a winemaker. One day he filled a 45 litre container with wine. He removed 9 litres of wine and replaced it with 9 litres of water. Next he removed 9 litres of the mixture and replaced it with 9 litres of water. Determine the ratio of wine to water in Vino's final mixture.

Solution

We need to determine the amount of wine and the amount of water in the final mixture.

Vino starts with 45 litres of wine and no water. After removing 9 litres of wine and adding 9 litres of water, he has $45 - 9 = 36$ litres of wine and 9 litres of water. So $\frac{36}{45} = \frac{4}{5}$ of the new mixture is wine and $\frac{9}{45} = \frac{1}{5}$ of the new mixture is water.

He then removes 9 litres of the new mixture, $\frac{4}{5}$ of which is wine and $\frac{1}{5}$ of which is water. So Vino removes $\frac{4}{5} \times 9 = \frac{36}{5}$ or $7\frac{1}{5}$ litres of wine and $\frac{1}{5} \times 9 = \frac{9}{5}$ or $1\frac{4}{5}$ litres of water.

Before adding another 9 litres of water he has $36 - 7\frac{1}{5} = \frac{180}{5} - \frac{36}{5} = \frac{144}{5}$ or $28\frac{4}{5}$ litres of wine and $9 - 1\frac{4}{5} = \frac{45}{5} - \frac{9}{5} = \frac{36}{5}$ or $7\frac{1}{5}$ litres of water.

After adding the additional water he has $9 + 7\frac{1}{5} = 9 + \frac{36}{5} = \frac{45}{5} + \frac{36}{5} = \frac{81}{5}$ or $16\frac{1}{5}$ litres of water.

The final ratio of wine to water is $28\frac{4}{5} : 16\frac{1}{5} = \frac{144}{5} : \frac{81}{5} = 144 : 81 = 16 : 9$.

\therefore the final ratio of wine to water is 16:9.

