lulumath

Using Systems of Equations to Solve a Word Problem #3

Video Notes

Video Link

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Omar has a bottle of 50% isopropyl alcohol and realizes that a solution of 70% alcohol is effective against bacteria and viruses. He finds a bottle of 91% isopropyl alcohol. How much of each bottle should he use to make 205 mL of 70% isopropyl alcohol?

1. Identify what you know.
2. Identify what you WANT to know.
3. Draw a picture or diagram (if you need to). (What do I not know?)
4. Write specific let statements.
5. Write your equations.
6. Solve!
7. Ask yourself if your answer makes sense.

Let volume of 50% alcohol = x
Let volume of 91% alcohol = y

$$x + y = 205$$
$$0.5x + 0.91y = 0.7(205)$$
$$0.5x + 0.91y = 143.5$$

$$-0.5(x + y = 205) \longrightarrow -0.5x - 0.5y = -102.5$$
$$0.5x + 0.91y = 143.5 \longrightarrow 0.5x + 0.91y = 143.5$$

$$\frac{0.41y}{0.41} = \frac{41}{0.41}$$

$$x + y = 205$$
$$x + 100 = 205$$
$$x = 105$$

$$y = 100$$

∴ Omar needs <u>105</u> mL of 50% alcohol and <u>100</u> mL of 91% alcohol to make 205 mL of 70% alcohol

$105 + 100 = 205$ mL

$105(0.5) + 100(0.91) = 205(0.7)$
$52.5 + 91 = 143.5$
$143.5 = 143.5 ✓$