

APPLYING SYSTEMS OF EQUATIONS

The Natural Remedy Company makes 3 different essential oil blends:

Mixture Problem

- Blend A: 2 mL of peppermint oil; 3 mL of geranium oil = 5 mL
- Blend B: 4 mL of geranium oil; 1 mL of citrus oil = 5 mL
- Blend C: 3 mL of peppermint oil; 2 mL of citrus oil = 5 mL

The company has received a supply of 38 mL of peppermint oil, 110 mL of geranium oil, and 32 mL of citrus oil. How many 5 mL bottles of each blend can they make in order to use up all the supplies that have arrived?

Let A be the # of bottles of Blend A
 B be the # of bottles of Blend B
 C be the # of bottles of Blend C

Organize the info in a chart:

	Peppermint	Geranium	Citrus
Blend A	2 mL	3 mL	0
Blend B	0	4 mL	1 mL
Blend C	3 mL	0	2 mL
TOTAL	38 mL	110 mL	32 mL

Equations for the ingredients.

- ① Peppermint oil: $2A + 0B + 3C = 38$ mL
- ② Geranium Oil: $3A + 4B + 0C = 110$ mL
- ③ Citrus Oil: $0A + 1B + 2C = 32$ mL

Eliminate C:

$$\begin{aligned} \text{① } 2(2A + 0B + 3C = 38) &\rightarrow 4A + 0B + 6C = 76 \\ \text{③ } -3(0A + 1B + 2C = 32) &\rightarrow 0A - 3B - 6C = -96 \end{aligned}$$

Eliminate B:

$$\begin{aligned} \text{② } 3(3A + 4B = 110) &\rightarrow 9A + 12B = 330 \\ \text{④ } 4(4A - 3B = -20) &\rightarrow 16A - 12B = -80 \end{aligned}$$

$$\text{④ } 4A - 3B = -20$$

$$\begin{aligned} 25A &= 250 \\ \boxed{A} &= 10 \end{aligned}$$

Sub $A=10$ into ②:

$$\begin{aligned} 3A + 4B &= 110 \\ 3(10) + 4B &= 110 \\ 30 + 4B &= 110 \\ 4B &= 80 \\ \boxed{B} &= 20 \end{aligned}$$

Sub $A=10, B=20$ into ①

$$\begin{aligned} \text{① } 2A + 3C &= 38 \\ 2(10) + 3C &= 38 \\ 20 + 3C &= 38 \\ 3C &= 18 \\ \boxed{C} &= 6 \end{aligned}$$

You can make
 10 bottles of A
 20 bottles of B
 6 bottles of C

To Do:

- ① Group work (Systems of Equations)
- ② p38|6 p42|15 p43|19 a+c