

Applications of Linear Systems:
Percent/Mixture Problems

Feb 23/2010

1. Percentages can be expressed as a fraction or a decimal.

$$25\% = \frac{25}{100} = 0.25$$

2. Use the wording of the question to help you choose your unknowns (variables).
3. Make sure your units are consistent.

Ex.1. One type of granola is 30% fruit, and another type is 15% fruit. What **mass** of each type of granola should be mixed to make 600 g of granola that is 21% fruit?

Let x represent ^{mass of} first type of granola (30%)
 Let y represent mass of the second type of granola. (15%)

$$x + y = 600 \quad (1)$$

$$0.30x + 0.15y = 0.21(600) \quad [\times 100]$$

$$30x + 15y = 21(600)$$

$$30x + 15y = 12600 \quad [\div 15]$$

$$2x + y = 840 \quad (2)$$

$$(1) : x + y = 600$$

$$\text{Subtract } \boxed{x = 240}$$

Sub $x = 240$ into (1)

$$240 + y = 600$$

$$\boxed{y = 360}$$

\therefore mix 240g of 30% and 360g of 15%

Ex.2. A chemistry teacher needs to make 10 L of 42% sulphuric acid solution. The acid solutions available are 30% sulphuric acid and 50% sulphuric acid, by volume. How many litres of each solution must be mixed to make the 42% solution?



Let x be the volume of 30% H_2SO_4 (aq.)
 Let y be the volume of 50% " "

$$x + y = 10 \quad (1)$$

$$0.3x + 0.5y = 0.42(10) \quad [\times 10]$$

$$3x + 5y = 42 \quad (2)$$

$$(1) : y = -x + 10 \quad (3)$$

sub (3) into (2)

$$3x + 5(-x + 10) = 42$$

$$3x - 5x + 50 = 42$$

$$\frac{-2x}{-2} = \frac{-8}{-2}$$

$$\boxed{x = 4}$$

Sub $x = 4$ into (3)

$$y = -4 + 10$$

$$\boxed{y = 6}$$

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Assigned Work:

p. 52 # 17, 23

p. 103 # 16