Applications of Linear Systems

Goal: To solve application problems using a system of two equations and two unknowns.

Polya's Four steps in Problem Solving

1. Read/understand problem (name unknown(s) using units of measure)
2. Develop a plan (set up equation(s))
3. carry out plan (solve equation(s))
4. look back (does answer make common)

3.3 ex

1 2 3 4 5 6 7

Ex. Score: 0 of 1 pt **HW Score:** 0% (0 of 7 pts) **0 of 7** complete

The Coffee Counter charges $8.00 per pound for Kenyan French Roast coffee and $10.00 per pound for Sumatran coffee.

How much of each type should be used to make a 22 pound blend that sells for $9.00 per pound?

1. $\begin{cases} x = \text{lbs of kenyan coffee} \\ y = \text{lbs of sumatran coffee} \end{cases}$

2. $\begin{cases} x + y = 22 \\ 8x + 10y = 9(22) \end{cases}$

$8x$: cost of x lbs of ken. coff. $10y$: cost of y lbs of sum. coff.

3. $-8(x + y = 22)$

$8x + 10y = 198$

$-8x - 8y = -176$

$2y = 22$

$y = 11$ lbs

$x + 11 = 22$

$x = 11$ lbs.

4. ✓ We need 11 lbs of both types of coffee.

$2y = 22$

$y = 11$ lbs

3.3 (4)

Doreen Schmidt is a chemist. She needs to prepare 28 ounces of a 13% hydrochloric acid solution. Find the amount of 14% solution and the amount of 7% solution she should mix to get this solution.

How many ounces of the 14% acid solution should be in the mixture?

x = oz of 14% solution

y = oz of 7% solution

$x + y = 28$

$0.14x + 0.07y = .13(28)$

0.14x: oz of pure acid from 14% solution; 0.07y: oz. of pure acid from 7% solution; .13(28): oz. of pure acid in mix

$x = 100$

$.14(100) = 14$

$-7[x + y = 28]$

$100[0.14x + 0.07y = 3.64]$

$14x + 7y = 364$

$-7x - 7y = -196$

$7x = 168$

$x = 24$ oz.

$24 + y = 28$

$y = 4$ oz.

She needs 24 oz. of 14% acid solution and 4 oz. of 7% solution

3.3 (6)

Alvin paddled for 2 hours with a 6-km/h current to reach a campsite. The return trip against the same current took 8 hours.

Find the speed of the boat in still water. Distance = Rate • Time

	D = R • T			
Downstream	d	r+6	2	→ $d = (r+6)2$
Upstream	d	r-6	8	→ $d = (r-6)8$

let r = speed of boat in still water (km/h)

$$\frac{(r-6)\cdot 8}{2} = \frac{(r+6)\cdot 2}{2}$$

$$4(r-6) = r+6$$

$$4r - 24 = r + 6$$

$$-r \qquad -r$$

$$3r - 24 = 6$$

$$+24 \quad +24$$

$$3r = 30$$

$$r = 10 \text{ km/h}$$

The boat goes 10 km/h in still water.