

PC MORE SYSTEMS PROBLEMS:

key

1. A coffee merchant has two types of coffee beans, one selling for \$9 per pound and the other for \$15 per pound. The beans are to be mixed to provide 100 lb of a mixture selling for \$13.50 per pound. How much of each type of coffee bean should be used to form 100 lb of the mixture?

Let  $x = \#$  pounds \$9 coffee  
 $y = \#$  pounds \$15 coffee

25 lbs \$9  
 75 lbs \$15

Q:  $x + y = 100 \rightarrow y = 100 - x$

V:  $9x + 15y = 13.50(100)$

so  
 $9x + 15(100 - x) = 1350$   
 $9x + 1500 - 15x = 1350$   
 $-6x = -150$   
 $x = 25$

2. A candy merchant wants to mix peanuts selling at \$2.20 per pound with cashews selling at \$5.40 per pound to form 120 lb of a mixed-nut blend that will sell for \$3 per pound. What amount of each type of nut should be used?

let  $p = \#$  pounds peanuts  $c = \#$  pounds cashews

$p + c = 120 \rightarrow p = 120 - c$

$2.20p + 5.40c = 120(3)$

so  $2.20(120 - c) + 5.40c = 360$   
 $264 - 2.20c + 5.40c = 360 \rightarrow 3.2c = 96$   
 $c = 30$

30 lbs cashews, 90 lb peanuts

3. Miguel has \$3000 more invested in a mutual fund paying 5% interest than in a savings account paying 3%. If he received \$310 in interest for 1 year, how much did he have invested in the two accounts?

let  $x = \$$  in 5% acct  
 $y = \$$  in 3% acct

$\begin{cases} .05x + .03y = 310 \\ x = y + 300 \end{cases}$

x	y
3000	0
3100	100
3200	200

so  $x = y + 3000$

$.05(y + 3000) + .03y = 310$

$.05y + 15 + .03y = 310$

$.08y = 295$   
 $y = 3687.50$   
 $x = 6687.50$

4. A jet flew east a distance of 1800 mi with the jetstream in 3 h. Returning west, against the jetstream, the jet took 4 h. Find the jet's speed in still air and the rate of the jetstream.

	$r =$	$t =$	$d$
w/ jetstream	$r + j$	3	1800
agst	$r - j$	4	1800

$r =$  speed in still air  
 $j =$  rate of jetstream

$$\begin{aligned} 3r + 3j &= 1800 \rightarrow 12r + 12j = 7200 \\ 4r - 4j &= 1800 \rightarrow 12r - 12j = 5400 \end{aligned}$$

$$24r = 12,600$$

$$r = 525 \text{ mph} \quad j \Rightarrow 3(525) + 3j = 1800 \rightarrow$$

5. 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 liters of each solution must be mixed to make the 42% solution?

$x =$  # liters of 50%  
 $y =$  # L of 30%

$$\begin{aligned} 3j &= 225 \\ j &= 75 \text{ mph} \end{aligned}$$

Q:  $x + y = 10 \rightarrow y = 10 - x$

$$.50x + .30y = .42(10) \rightarrow .50x + .30(10 - x) = 4.2$$

$$.50x + 3 - .30x = 4.2$$

$$.20x = 1.2$$

$$x = 6 \text{ liters}$$

6 liters 50%

4 liters 30%

6. A boat traveled 24 miles downstream in 2 hours. The return trip took twice as long. What is the speed of the boat in still water?

	$r$	$t$	$d$	
down	$b + c$	2	24	$b =$ speed boat
up	$b - c$	4	24	$c =$ speed current

$$2b + 2c = 24 \rightarrow$$

$$4b - 4c = 24$$

$$4b + 4c = 48$$

$$4b - 4c = 24$$

$$8b = 72$$

$$b = 9 \text{ mph}$$

$$c = 3 \text{ mph}$$