So far we had ① $x + y = 20,000$

② $3x + 7y = 120,000$

Solving by substitution:

① $y = 20,000 - x$ ② $3x + 7y = 120,000$

Sub ① into ②: $3x + 7(20,000 - x) = 120,000$

$3x - 7x + 140,000 = 120,000$

$-4x = -20,000 \rightarrow x =$ \$5000 invested @ 3%

$y = 20,000 - x \longrightarrow y =$ \$15,000 invested @ 7%

#27) Look again at the gold + lead mixture.

The difference with this, compared to the spice + cinnamon tea mixture is that x and y both have something to do with each ingredient.

Rather than x being just gold or lead, it's the alloy ① amt; y is the amt. of alloy 2.

Thus, the key is x = grams of alloy 1 (total)

y = grams of alloy 2 (total)

Since alloy 1 is 10% gold + alloy 2 is 30% gold, the sum of $.10x + .30y$ = grams of gold in a third alloy,

Likewise, $.15x + .40y$ = grams of lead in a third alloy,

where alloy 1 is 15% lead + alloy 2 is 40% lead.

We are given total g gold (60) in the third alloy & we have " g lead (88) in the third alloy.

The mix of alloys for each metal is the shown by the system:

$$.10x + .30y = 60$$
$$.15x + .40y = 88$$

Proceed by moving the decimal (x 100):

$$① \quad 10x + 30y = 6000$$
$$② \quad 15x + 40y = 8800$$

You can reduce the first by 10. and the second by 5.

$$① \quad x + 3y = 600$$
$$② \quad 3x + 8y = 1760$$

Multiply the first by -3

$$① \quad -3x - 9y = -1800$$
$$② \quad 3x + 8y = 1760$$

$$-y = -40 \longrightarrow y = 40 \text{ g of alloy 2}$$

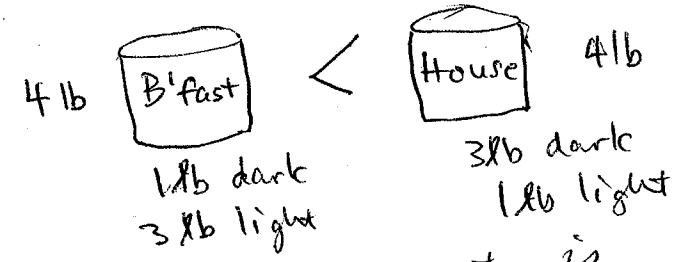
Since ① $x + 3(40) = 600$, then

$x = 480$ g of alloy 1

Ch. 4 Sec 4.4 HW #17, 20, 22, 27, 28

#17) Here's a good problem in mental math.

We have 4 lbs of coffee, 2 blends. One blend is more expensive, so its ingredients must cost more. Since each blend uses the same two ingredients (dark + light roast coffee), ~~the more with~~ the more expensive blend must have the higher amount of the more expensive ingredient.



Hence, the dark roast is more expensive.

Using algebraic expressions, letting

x = cost per lb dark

y = cost per lb light

compare the total values

$1x + 3y$ (B'fast) $< 3x + 1y$ (House)

Combining like terms: $2y < 2x \rightarrow x > y$ //

#20) In many mixture problems, the general equation is:

Total value of mixture = Amount$_A$ · Unit price$_A$ + Amount$_B$ · Unit price$_B$

In this problem, we substitute the given info to get for the two mixtures:

x = lbs cinnamon tea
y = lbs spice tea

① $\$40 = 10x + 5y$

② $\$54 = 12x + 8y$

What do x & y represent? The unit prices of the cinnamon & spice teas, respectively. (x is cinnamon, y is spice)

This system has 2 eqns, 2 unknowns, & each can be reduced by their coeffs' common factors:

① $8 = 2x + 3y$

② $27 = 6x + 4y$

Solve by any method to get the answer.

Elimination $-3(8 = 2x + 3y)$ ①

$\rightarrow$ $-24 = -6x - 3y$ ①

$27 = 6x + 4y$ ②

$\$3 = y$

$\$2.50 = x$