§1.2 #13

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Solve the formula for the H_1.

$$\frac{1}{H}=\frac{1}{H_1}+\frac{1}{H_2}+\frac{1}{H_3}$$

LCD $= HH_1H_2H_3$

M1 Put everything over LCD. Then throw away the LCD. (Later, when we do "<" & ">" we can't throw away LCD.)

M2 Clear fractions.

$$\frac{3}{5}=\frac{x}{5}$$

$$3=x$$

$$\frac{1}{H}\cdot\frac{H_1H_2H_3}{HH_2H_3}=\frac{1}{H_1}\cdot\frac{HH_2H_3}{HH_2H_3}+\frac{1}{H_2}\cdot\frac{HH_1H_3}{HH_1H_3}+\frac{1}{H_3}\cdot\frac{HH_1H_2}{HH_1H_2}$$

$$\frac{H_1H_2H_3}{LCD}=\frac{HH_2H_3+HH_1H_3+HH_1H_2}{LCD}$$

$\frac{A}{B}=\frac{C}{B}\Rightarrow A=C$

$$H_1H_2H_3=HH_2H_3+HH_1H_3+HH_1H_2$$

$$-HH_1H_3-HH_1H_2=\quad -HH_1H_3-HH_1H_2$$

$$H_1H_2H_3-HH_1H_3-HH_1H_2=HH_2H_3$$

$$H_1(H_2H_3-HH_3-HH_2)=HH_2H_3$$

$$\frac{H_1H_2H_3}{H_1}$$

$$H_1=\frac{HH_2H_3}{H_2H_3-HH_3-HH_2}$$

$$H_1\cdot 7=HH_2H_3$$

$$\frac{7H_1}{7}=\frac{HH_2H_3}{7}$$

$$H_1=\frac{HH_2H_3}{7}$$

The owner of a health-food store sells dried apples for $1.30 per quarter-pound, and dried apricots for $1.70 per quarter-pound. How many pounds of each must he mix together to get 40 lb of a mixture that sells for $1.61 per quarter-pound?

He must mix ☐ lb of apples and ☐ lb of apricots.
(Type integers or fractions.)

Lexicon !

Let x = the amt of dried apples (lbs)
y = " " " " apricots (lbs)

Want: 40 lbs that sells for 1.61 / ¼-lb

$ for 40 lbs $(40 \text{ lbs})\left(\frac{\$1.61}{\frac{1}{4}\text{ lb}}\right)\left(\frac{4\left(\frac{1}{4}\text{ lbs}\right)}{1\text{ lb}}\right)$

$\$(40)(4)(1.61)$

$ From apples

$(x \text{ lbs})\left(\frac{\$1.30}{\frac{1}{4}\text{ lb}}\right)\left(\frac{4\left(\frac{1}{4}\text{ lbs}\right)}{1\text{ lb}}\right) = \$(1.3)(4)x$

$(y \text{ lbs})\left(\frac{\$1.70}{\frac{1}{4}\text{ lb}}\right)\left(\frac{4\left(\frac{1}{4}\text{ lb}\right)}{1\text{ lb}}\right) = \$(1.7)(4)y$

Money for 40 lbs of mix $ = $

$(1.3)(4)x + (1.7)(4)y = 40(1.61)(4)$

40 lbs Total $x + y = 40$ Auxiliary Equation

$y = 40 - x$

$1.3x + 1.7y = 40(1.61)$

$1.3x + 1.7(40-x) = 40(1.61)$

$1.3x + 1.7(40) - 1.7x = 40(1.61)$

$1.3x - 1.7x = 40(1.61) - 1.7(40)$

$-.4x = 40(1.61) - (1.7)(40)$

$x = \frac{40(1.61) - 1.7(40)}{-.4} = 9 = x$

$\Rightarrow y = 40 - 9 = 31 = y$

Need 30 L of 60% acid solution

Has 40% and 70% acid solutions

Let x = Amt of 40% Acid (L)

y = " " 70% " (L)

Amt of Acid = Amt of Acid

$.4x + .7y = (.6)(30\text{ L})$

$.4x = \left(\frac{40\text{ L Acid}}{100\text{ L 40\% Acid}}\right)(x\text{ L of 40\% Acid})$

$\left(\frac{60\text{ L of Pure Acid}}{100\text{ L of 60\% Acid}}\right)(30\text{ L of 60\% Acid})$

Breaking-in on unit analysis.

$.7y = \left(\frac{.7\text{ L pure Acid}}{1\text{ L 70\% Acid}}\right)(y\text{ L 70\% Acid})$

Liters of pure acid is the units.

TOTAL Pure $.4x + .7y = (.6)(30)$

(concentration)(volume) = Amt of pure stuff

TOTAL VOL. $x + y = 30$

I have 20% Alcohol & 60% Alcohol and I want 50 gallon of 44% Alcohol

Let x = amt of 20% Alcohol (in gal)

y = ... 60% .. .. ..

Pure Alcohol : $.2x + .6y = .44(50)$

Total Volume : $x + y = 50 \Rightarrow y = 50 - x$

.2x units $\left(\frac{.2 \text{ gal pure Alc.}}{1 \text{ gal 20\% Alc}}\right)$ (x gal 20% Alc)

Solve the formula for the H_1.

$$\frac{1}{H} = \frac{1}{H_1} + \frac{1}{H_2} + \frac{1}{H_3}$$

80 mi/hr @ halfway pt.

Want 60 mph avg.
How fast for 2nd half of trip to come out @ 60 mph avg?

$D = rt$

	r	t	D
1st half	$80 \frac{mi}{hr}$	t_1	$\frac{1}{2}D$
2nd half	x	t_2	$\frac{1}{2}D$

$\frac{1}{2}D = 80t_1 = xt_2 = \frac{1}{2}D$

Average rate must be $60 \frac{mi}{hr}$

$$\frac{80 + x}{2} = 60$$

→ solve for x.

Name
S1.1
~~START~~ 121