

Math 107

Fall 2016

Lecture 14

Mixtures:

$$\begin{array}{c} \text{Type A} \\ \$3/\text{lb.} \\ 20-x \end{array} + \begin{array}{c} \text{Type B} \\ \$5/\text{lb.} \\ x \end{array} = \begin{array}{c} \text{Mixture} \\ \$3.50/\text{lb.} \\ 20 \text{ lb.} \end{array}$$

we need 20 lb. of mixture

$$3(20-x) + 5x = 3.50(20)$$

Solve for x .

Two acid Solutions

$$\begin{array}{c}
 \left(\begin{array}{c} 40\% \\ \text{Acid} \end{array} \right) + \left(\begin{array}{c} 70\% \\ \text{Acid} \end{array} \right) = \left(\begin{array}{c} \text{Mixture} \\ 50\% \\ \text{Acid} \end{array} \right) \\
 40 - x \qquad \qquad \qquad x \qquad \qquad \qquad 40 \text{ liters}
 \end{array}$$

$$40\%(40-x) + 70\%x = 50\%(40)$$

we have unlimited supply of two different brand of coffee. \$7/lb. & \$4/lb.
we need 21 pounds at \$5/lb.

$$\begin{array}{c}
 \left(\begin{array}{c} \text{Type A} \\ \$7 \end{array} \right) + \left(\begin{array}{c} \text{Type B} \\ \$4 \end{array} \right) = \left(\begin{array}{c} \text{Mix} \\ \$5 \end{array} \right) \\
 x \text{ lb.} \qquad \qquad \qquad 21 - x \qquad \qquad \qquad 21
 \end{array}$$

$$7x + 4(21-x) = 5(21)$$

$$7x + 84 - 4x = 105 \quad \rightarrow 3x = 21$$

$$3x + 84 = 105$$

$$3x = 105 - 84 \quad \rightarrow x = 7 \quad 7 \text{ lb. @ } \$7/\text{lb.}$$

$$14 \text{ lb. @ } \$4/\text{lb.}$$

I need 40 lb. of candy @ \$4/lb.
 we have unlimited supply of two types of Candy. One @ \$3/lb. and another one @ \$5/lb.
 How many pounds of each?

$$\begin{array}{c} \$3 \\ \hline x \text{ lb.} \end{array} + \begin{array}{c} \$5 \\ \hline (40-x) \text{ lb.} \end{array} = \begin{array}{c} \$4 \\ \hline 40 \text{ lb.} \end{array}$$

20 lb.
of each

$$\begin{aligned} 3x + 5(40-x) &= 4(40) \\ 3x + 200 - 5x &= 160 \end{aligned} \quad \rightarrow \begin{aligned} -2x + 200 &= 160 \\ -2x &= 160 - 200 \\ -2x &= -40 \\ x &= 20 \end{aligned}$$

we have two supplies of alcohol solutions. One is pure alcohol & the other one is 40% alcohol. we need 50 liters of 70% alcohol.
 How many liters of each?

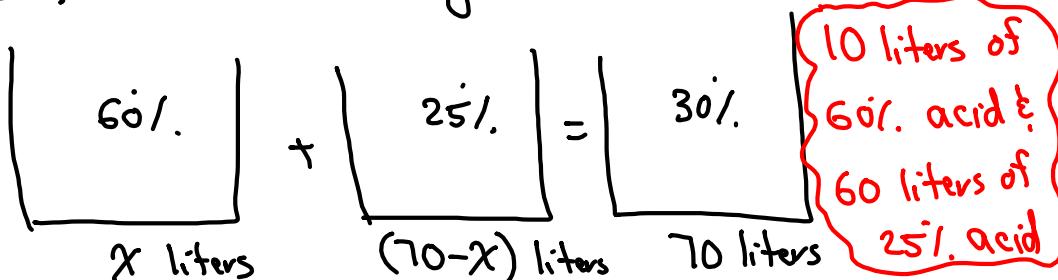
$$\begin{array}{c} 100\% \\ \hline x \end{array} + \begin{array}{c} 40\% \\ \hline 50-x \end{array} = \begin{array}{c} 70\% \\ \hline 50 \end{array}$$

25 liters
of each

$$\begin{aligned} 100\% x + 40\%(50-x) &= 70\%(50) \\ 100x + 40(50-x) &= 70(50) \\ 100x + 2000 - 40x &= 3500 \end{aligned} \quad \rightarrow \begin{aligned} 60x &= 3500 - 2000 \\ 60x &= 1500 \\ x &= \frac{1500}{60} \\ x &= 25 \end{aligned}$$

we need 70 liters of 30% acid.

we have unlimited supply of 25% acid & 60% acid. how many liters of each?



$$60\% \cdot x + 25\% \cdot (70-x) = 30\% \cdot 70 \quad \rightarrow 35x = 2100 - 1750$$

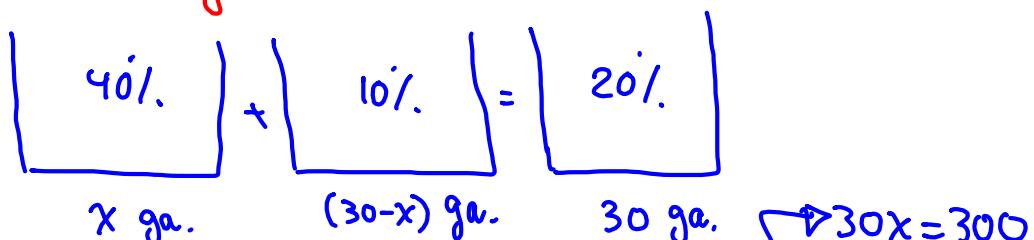
$$60x + 25(70-x) = 30(70)$$

$$\underline{60x} + \underline{1750} - \underline{25x} = 2100 \quad \rightarrow 35x = 350 \quad x=10$$

we need 30 gallons of 20% alcohol.

we have unlimited supply of 40% & 10% alcohol.

How many gallons of each?



$$40\% \cdot x + 10\% \cdot (30-x) = 20\% \cdot (30) \quad \rightarrow 30x = 300$$

$$40x + 10(30-x) = 20(30)$$

$$40x + 300 - 10x = 600$$

$$30x = 600 - 300$$

$$\boxed{x=10}$$

10 gallons of 40% & 20 gallons of 10%.

Find how many liters of each using the drawing below?

4 liters @ 70%
8 liters @ 40%

$$\begin{array}{c} \boxed{4\text{ l.}} + \boxed{70\%.} = \boxed{50\%.} \\ (12-x)\text{ liters} \qquad x \text{ liters} \qquad 12 \text{ Liters} \end{array} \rightarrow 480 + 30x = 600$$

$$40\%. (12-x) + 70\%. x = 50\%. (12)$$

$$40(12-x) + 70x = 50(12)$$

$$480 - 40x + 70x = 600$$

$$30x = 600 - 480$$

$$30x = 120$$

$$x = 4$$