1) A chemistry experiment calls for a 30% sulfuric acid solution. If the lab supply room has only 50% and 20% sulfuric acid solutions on hand, how much of each should be mixed to obtain 12 liters of a 30% solution? Answer: 4 and 8.

\[
\begin{align*}
20\% & \quad \text{X} \\
50\% & \quad 12-x \\
30\% & \quad 12 \\
\end{align*}
\]

\[20x + 50(12 - x) = 30(12) \Rightarrow 20x + 600 - 50x = 360 \Rightarrow -30x = -240 \Rightarrow x = 8 \text{ liters of 20\% solution}
\]

2) How many gallons of a 3% salt solution must be mixed with 50 gallons of a 7% solution to obtain a 5% solution? Ans: 5

\[
\begin{align*}
\text{3\%} & \quad \_ \\
\text{7\%} & \quad 50 \\
\text{5\%} & \quad \_ \\
\end{align*}
\]

3) To make low fat cottage cheese, milk containing 4% butterfat is mixed with 10 gallons of milk containing 1% butterfat to obtain a mixture containing 2% butterfat. How many gallons of the richer milk is used. Answer: \(x = 5\)

\[
\begin{align*}
\text{4\%} & \quad \_ \\
\text{1\%} & \quad 10 \\
\text{2\%} & \quad \_ \\
\end{align*}
\]

4) A 100% concentrate is to be mixed with a mixture having a concentration of 40% to obtain 55 gallons of a mixture with a concentration of 75%. How much of the 100% concentrate will be needed? Answer: \(x = 32.08 \text{ gallons}\)

\[
\begin{align*}
\text{100\%} & \quad \_ \\
\text{40\%} & \quad x \\
\text{75\%} & \quad 55 \\
\end{align*}
\]
5) A grocer mixes peanuts that cost $2.49 per pound and walnuts that cost $3.89 per pound to make 100 pounds of a mixture that costs $3.19 per pound. How much of each kind of nut is put into the mixture? \textit{Answer: 50 pounds of peanuts and 50 pounds of walnuts must be used to obtain 100 pounds costing $3.19 per pound}

\[
\begin{align*}
\frac{2.49}{x} + \frac{3.89}{100-x} &= \frac{3.19}{100} \\
2.49x + 3.89(100 - x) &= 3.19(100) \\
2.49x + 389 - 3.89x &= 319 \\
-1.40x &= -70 \\
x &= 50 \\
\end{align*}
\]

6) 1 ounce of the mixture containing 6% salt is to be mixed with 2 ounces of a mixture which is 15% salt, in order to obtain a mixed solution. What is the percentage of salt in the resulting solution?

7) 400 tickets were sold to a ballgame. Adult tickets were $2, Child tickets were $3. Tickets sold totaled $1050. How many of each ticket were sold.

\[
\begin{align*}
\text{Adult tickets} + \text{Child tickets} &= \text{Total tickets} \\
\end{align*}
\]

8) I want to make the perfect 12-ounce cup of chocolate milk. It requires that the mixture is 42% chocolate syrup. What I have right now is 8 ounces of milk/syrup mixture that I know contains 30% syrup. What must the syrup concentration be in the remaining mixture that I must add in order to achieve perfection?

\[
\begin{align*}
\text{Milk/syrup mixture} + \text{Remaining mixture} &= \text{Perfect chocolate milk} \\
\end{align*}
\]
9) What is the strength of a salt solution that contains 12 gallons of salt and 18 gallons of pure water?

9. ___________

10) If 1 quart of orange juice concentrate is added to 4 qt of a solution that is 20% concentrate in water, what is the percent of concentrate in the new solution?

10. ___________

\[
\frac{1}{4} + \frac{4}{1} = \frac{5}{4}
\]

11) A lawn-and-garden dealer wants to make a new blend of grass seed by using 200 pounds of $0.45 per pound seed and some $0.65 per pound seed. How much of the $0.65 seed does the dealer need to make a $0.55 per pound blend?

11. 200 pounds

\[
\frac{200}{0.45} + \frac{x}{0.65} = \frac{200 + 0.55x}{0.55}
\]

12) A 5-gallon radiator containing a mixture of water and antifreeze was supposed to contain a 50% antifreeze solution. When tested, it was found to have only 40% antifreeze. How much must be drained out and replaced with pure antifreeze so that the radiator will then contain the desired 50% antifreeze solution?

11. 5/6 of a gallons

\[
\frac{5}{5} - \frac{2}{5} + \frac{5}{6} = \frac{5}{5} + \frac{1}{6}
\]