

## MIXTURE PROBLEMS

1. A grocer wishes to mix one-dollar coffee with 80-cent coffee to produce a mixture of 200 pounds to sell for 84 cents a pound. How many pounds of each kind should he use?

Hint: Try making a table like this:

Kind	Number of Pounds	Value in Cents
\$1 coffee	N	100n
80-cent coffee	200 - n	80(200 - n)
84-cent coffee	200	200 84

Why do we use  $200 - n$  to represent the number of pounds of 80-cent coffee?

Hence,  $100n + 80(200 - n) = 16,800$

Complete the solution.

2. A grocer wishes to mix \$1.20 tea with \$1.50 tea to make a mixture of 60 pounds worth \$1.30 a pound. How many pounds of each kind must he mix?
3. A merchant wishes to mix walnuts selling at \$2.25 a pound with almonds selling at \$2.40 a pound so as to make a mixture of 120 pounds worth \$2.30 a pound. How many pounds of each kind of nuts must he use?
4. How much water must be added to 12 quarts of a 10% solution of salt and water to reduce to a 6% solution?

Solution: First, do you know what we mean by a 10% solution of salt and water? It means that the solution contains 10% salt and 90% water.

We can write equations showing this relationship either in terms of the amount of salt in the two mixtures or in terms of the amount of water in the mixtures

### IN TERMS OF SALT

Amt of salt in original solution	Amt of salt in new solution
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$.10(12 \text{ qts})$        $.06(12 + x) \text{ qts}$   
 Since no salt was added to the original Solution nor taken away from it, then

$$\begin{aligned}
 .10(12) &= .06(12) + x \\
 1.2 &= .72 + .06x \\
 .48 &= .06x \\
 8 \text{ qts} &= x
 \end{aligned}$$

### IN TERMS OF WATER

Amt of water in original solution	Amt of water added	Amt of water in new solution
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$.90(12 \text{ qts}) + x \text{ qts}$        $.94(12 + x) \text{ qts}$   
 The amount of water in the new solution is made up of the water that was in the original solution plus what was added; so..

$$\begin{aligned}
 .90(12) + x &= .94(12 + x) \\
 10.8 + x &= 11.28 + .94x \\
 .06x &= .48 \\
 x &= 8 \text{ qts}
 \end{aligned}$$

5. A pharmacist has 4 quarts of a 15% solution of iodine. How much alcohol must he add to reduce it to a 10% solution?
6. How much water must be added to 30 quarts of a 75% solution of acid to reduce it to a 15% solution?
7. How much pure disinfectant must be added to 30 gallons of an 8% solution to increase its strength of 25%?
8. The radiator of an automobile already contains 12 quarts of a 10% solution of alcohol. How much alcohol must be added to make a mixture of 20% alcohol?
9. How much alcohol must be added in exercise 8 to make a mixture containing 25% alcohol?
10. How many quarts of milk containing 4% butter fat and how many quarts of cream containing 29% butter fat must be mixed to make 40 quarts of cream containing 20% butter fat?
11. How many quarts of a solution half of which is acid must be added to 10 quarts of a solution one-fifth of which is acid to form a solution which is three-tenths acid?