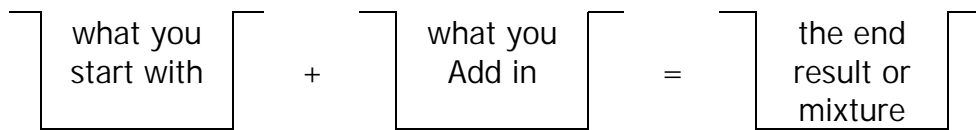


Solving Mixture Problems: The Bucket Method
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Mixture problems occur in many different situations. For example, a store owner may wish to combine two goods in order to sell a new blend at a given price. A chemist may wish to obtain a solution of a desired strength by combining other solutions. In any case, mixture problems may all be solved by using the bucket method.

The key to the bucket method is setting up the buckets correctly. Generally, the buckets will be set up as follows:



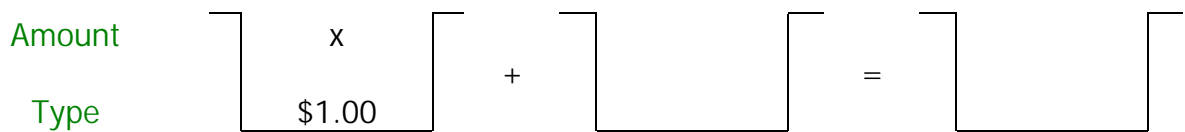
Each bucket must contain two values:

- An amount (liters, tons, pounds, ounces, grams, etc.)
- A type (usually either a percent or a price)

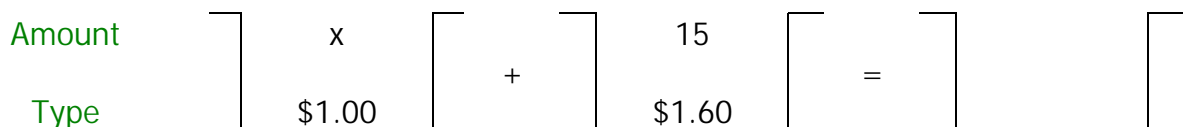
Once all of the buckets are "filled" with an amount and a type, an equation may be determined.

Example 1: How many pounds of coffee worth \$1.00 per pound must be mixed with 15 pounds of coffee worth \$1.60 per pound to obtain a blend worth \$1.20 per pound?

Solution: Let x = number of pounds of \$1.00 per pound coffee (this is what we are starting with, so it goes in the first bucket)



Next, enter the values for the coffee that you are adding in (15 pounds of coffee worth \$1.60 per pound).



And finally, enter the values for the desired mixture or blend (coffee worth \$1.20 per pound).

Amount	x	+	15	=	
Type	\$1.00		\$1.60		\$1.20

Notice that all of the buckets are not "filled." To get the missing value, think of the problem this way: if we started with 3 pounds of the \$1.00 blend and added in 15 pounds of the \$1.60 blend then we would have a total of 18 pounds. So the missing value is found by adding the first two amounts. Therefore, we have:

Amount	x	+	15	=	x+15
Type	\$1.00		\$1.60		\$1.20

Now that our buckets are filled, we simply multiply the two values in each bucket, making sure that we keep the operation (the plus sign and the equal sign) between each product.

$$(1.00)(x) + (1.60)(15) = (1.20)(x+15)$$

$$\begin{array}{r} x + 24 = 1.2x + 18 \\ -x - 18 \quad -x - 18 \\ \hline 6 = .2x \end{array}$$

$$\frac{6}{.2} = \frac{.2x}{.2}$$

$$x = 30$$

Thus, we should start with 30 pounds of the \$1.00 blend coffee. ■

The next example is different from the first for a couple of reasons. First of all, it deals with a different type in our buckets, namely percents instead of prices. The second difference is that, at first glance, the problem does not look like it has enough given information (numbers) to fill the buckets up.

Example 2: How much water must be added to 14 oz of a 20% alcohol solution to obtain a 7% alcohol solution?

Solution: Let x = the number of ounces of water that we are adding in. Since we are starting off with 14 oz of a 20% alcohol solution, we have:

Amount	14	+		=	
Type	20				

We are adding in x ounces of pure water. That means that the percentage of alcohol in the water is 0%.

Amount	14	+	X	=	
Type	20		0		

We wish our end result to be 7% alcohol, so:

Amount	14	+	X	=	x+14
Type	20		0		7

With our buckets filled we can now get:

$$(14)(20) + (0)(x) = (7)(x+14)$$

$$280 + 0 = 7x + 98$$

$$\begin{array}{r} 280 = 7x + 98 \\ -98 \quad \quad - 98 \\ \hline 182 = 7x \end{array}$$

$$\frac{182}{7} = \frac{7x}{7}$$

$$x = 26$$

Thus, we should add in 26 oz of pure water. ■