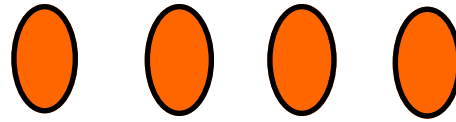
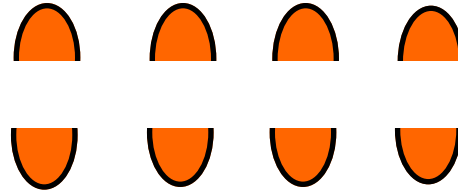


Answers to Problems in Reasoning 2

1. Take another pill from bottle B and add it to the other three pills. You then have 4 pills, 2 from each bottle, as shown at the right.



The next step is to cut all of the pills in half, being careful to keep the top half of all of the pills separate from the bottom half of the pills, again, as shown at the right.



Now take and swallow the top of all the pills. Even though you don't know which pills are from bottle A and which are from B, you will get two halves from A and two halves from B, thus swallowing a whole A pill and a whole B pill. Save the bottom halves for the next night.

2. In order to have the smallest number of weights a good strategy to pursue is to avoid duplication. Try to have only one way to weigh any item. For instance, if you have two 1-ounce weights, you can weigh 1-ounce of cold cuts with either of them, which is duplication. Slightly more subtle is the situation with a 1-ounce weight and a 2-ounce weight. On a balance scale, you can weigh 1-ounce of cold cuts by using just the 1-ounce weight OR by putting the 2-ounce weight on one side and the 1-ounce weight on the other, along with the cold cuts.

Assuming you start with a 1-ounce weight, the next weight should be 3 ounces. Using these two weights, you can weigh 1, 2, 3, or 4 ounces of cold cuts with no duplication. Just by testing for duplication, you will see that the third weight should be 9 ounces. There are already two patterns that you can see forming. The more obvious pattern from just looking at the numbers is powers of 3. The pattern that ties in to the procedure you are using is to choose a weight that is 1 ounce more than double the sum of all previous weights. Using this pattern to find the next weight, you see that it should be $2 * (1 + 3 + 9) + 1$, which is 27. Not surprisingly, $1 + 3 + 9 + 27 = 40$, so this combination of weights will allow you to measure any number of ounces from 1 to 40.

3. Buy one tire. Use the new tire and the spare and two of the old tires. When they wear out after 4000 miles, replace them with the other two original tires and complete the trip.