More counting problems.

1. You are part of a group of 13 people waiting to buy tickets for the next movie about the X-Men. The theater manager decides that you will all form one line with the order picked at random. Of course, that means that all possible ways the line can be formed are equally likely to be the final order. How many ways can the line be formed, and what is the probability that you will find yourself at the front of the line?

2. You are travelling by airplane to another city. Before you boarded the airplane, you checked six (6) different pieces of luggage. Sadly, two of the six pieces of luggage will be lost by the airline. The six pieces of luggage are (1) a hat box, (2) a large suitcase, (3) a small suitcase, (4) a duffle bag, (5) a box of books, and (6) a makeup case. How many different sets of four luggage pieces are possible for you to have at the end of your trip.

3. For a new "code" used by a network of spies, every word in the English language will be turned into a unique set of six letters. For example, the word "hot" might be coded as "xoopsp". As you can see, each letter can be used more than once. How many different words could be coded in this way, given that there are 26 letters in the English alphabet?

4. A row of tacos includes 3 plain, 4 with mild sauce, 5 with hot sauce, and 6 with "fire" sauce. Five of the 18 tacos will be picked at random. What is the probability that the five selected tacos will be "mild, mild, fire, hot, fire" in that order? (show how you got your answer)

5. A local Pet store has 7 cats and 4 dogs waiting to be adopted. Each animal is distinct from all of the others. Tomorrow, 3 people will come to the store and adopt one of these pets. How many possible ways could the 3 adoptions occur? (Example: Dog3, Cat6, Cat2)

6. A small rural town has 116 people. The safety of the town's water supply is suspect because mercury was used in gold mining 120 years ago. Blood tests will be done on 30 people from the town to see if mercury is present at unsafe levels in their blood. How many different groups of 30 people are possible for the study designers to choose?

7. In problem #6, 8 of the town's 116 people have high mercury levels in their blood. What is the probability that none of these 8 people end up in the sample of 30 selected for study?