Working in your groups, you will do a series of experiments to help you address this Challenge: For any number of boxes in a row, can you write down a formula for the number of ways that they fill the boxes with stars and candy bars.

Note: In this challenge, if you have one box, one way is to have a star in the box. Another way is to have a candy bar in this box. Also in this challenge, the order that the candy bars and the stars appear in is important. For example, if you have two boxes, a candy bar in Box 1 and a start in Box 2 is not the same as a star in Box 1 and a candy bar in Box 2.

1. Start with the paper with two boxes (labeled Box 1 and Box 2), two stars, and two candy bars. How many ways can you fill the boxes with stars and candy bars? (Note: You will only use two of the four items that you have to fill the boxes with).
2. Now use the paper with four boxes (labeled Box 1, Box 2, Box 3, and Box 4), four stars, and four candy bars. How many ways can you fill the four boxes with stars and candy bars?
3. Using the information from the previous two parts and without using the papers with boxes, the stars, or candy bars, as a group make a guess about how many ways you can fill three boxes with stars and candy bars.

4. Now use the paper with three boxes (labeled Box 1, Box 2, and Box 3), three stars, and three candy bars. How many ways can you fill the three boxes with stars and candy bars?
5. Using the information from the previous four parts and without using the papers with boxes, the stars, or candy bars, as a group make a guess about how many ways you can fill five boxes with stars and candy bars.

6. Now use the paper with five boxes (labeled Box 1, Box 2, Box 3, Box 4, and Box 5), five stars, and five candy bars. How many ways can you fill the five boxes with stars and candy bars?
7. Using the data that your group has collected, write down a formula for the number of unique ways to fill the boxes with stars and candy bars, given $X$ boxes.
Hint: You have done this for $X = 2, X = 3, X = 4,$ and $X = 5.$