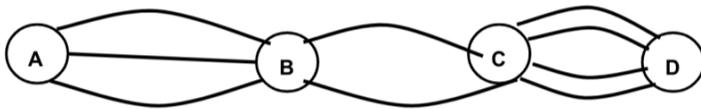


Combinatorics 2

From last week: We learned how to represent choices as ‘branches’ on a tree diagram. For example, we used the diagram below for both problems given.

Version A: There are four towns in Wonderland, labeled A, B, C, and D in the figure. Three roads connect A and B, two roads connect B and C, and 4 roads connect C and D. How many different routes can one take from A to D?

Version B: There are three different teacups, two different teaspoons, and four varieties of tea in the Wonderland Tea Shop. In how many ways can we assemble a gift set that consists of a cup, teaspoon, and package of tea.



Using the diagram above, we were able to find there are  $3 \times 2 \times 4 = 24$  choices to get from A to D (the “X” is multiplication). If we can find a way to use a diagram like the one above to represent problems, finding the answer will become much easier.

Now for this week:

1. In order to kiss Sleeping Beauty, Prince Charming needs to cross the Black Forest, go across the castle moat, and get to the top of the tower where Beauty is lying. The Prince can cross the forest on a horse, on a bike, or on foot. He can cross the moat on a boat, on top of a big turtle, or on jet skis. Finally, he can reach Beauty either by climbing a rope ladder to her window or by walking up the tower staircase. How many ways are there for Prince Charming to make this trip?
2. Kid’s Paradise is a restaurant with a great selection of dishes. The appetizers are candy corn salad and spinach leaves with candy bugs. The main dishes are jean belly chili, chocolate frog stew, smoked gummy bear paws, Easter egg omelet, pan-friend marshmallows, gummy ropes carbonara, and pasta in ice cream sauce. The desserts are baked apples with gummy worms, rock candy in rice paper, and scorpion lollipops. How many ways are there to choose a three-course dinner – appetizer, main dish, and dessert?

3. Every morning, princess Bella is supposed to perform a state duty. Her choices are either to visit Parliament or to have a press conference with journalists. Today, the princess is working on filling up her calendar for the upcoming week. How many ways are there for the princess to schedule her morning state duties for one week?
4. Jenny has a bag of chocolates, gummy bears, and lollipops. However she is only allowed three pieces of candy a day: one at breakfast, one at lunch, and one at dinner. Every morning Jenny makes a list of what candy she wants for that day and in what order. How many ways are there for Jenny to write this list?
5. One morning Jenny realizes she only has 2 lollipops, 1 chocolate, and 3 gummy bears left. How many ways could she write the list for that day?
6. King Arthur would like to design a flag with 4 vertical stripes. He has 4 colors to choose from: white, black, blue, green. If he is allowed to use each color only once, how many choices does he have? If he can use the same color multiple times (but not right next to each other) how many choices does he have?
7. There are 6 toys from which to choose and you are to choose 2 of them. In how many ways can you choose 2 toys from the 6 toys?
8. There are 12 pizza toppings from which to choose and you are to choose 3 of them. In how many ways can you choose 3 toppings from the 12?
9. There are 6 girls and 6 boys on Kourtney's t-ball team. In how many different ways can the coach select a team of 9 players? The team consists of 4 girls and 5 boys.