

Lesson: Permutations and Combinations

Third Grade Objective 4.02: Determine the number of permutations and combinations of up to three items.

Lesson

Permutations are all possible ways of doing something or putting things (numbers, items, letters) in a sequence. It is important to remember that **order does matter** when thinking of a permutation.

Your street address is a permutation. Say you live at 123 Sycamore Street. The numbers in your street address are 1, 2, and 3. If you changed the **order**, and said 231 Sycamore Street, you'd be at a different address!

With **combinations**, the order doesn't matter. You could have a combination of coins in your pocket. You can take them out of your pocket and line them up on a table in order from greatest to least - 25 cent, 10 cent, 10 cent, 10 cent, 5 cent, 5 cent, 1 cent. You could shuffle the coins around in your hand and line them up in a different order and you would still have the same coins, so order doesn't matter here.

If Bobby, Jake and Alyssa are standing in line at the ice cream truck, how many different ways can they line up (order does matter, so this is a permutation)?

- 1) Bobby-Jake-Alyssa
- 2) Jake-Alyssa-Bobby
- 3) Alyssa-Bobby-Jake
- 4) Bobby-Alyssa-Jake
- 5) Jake-Bobby-Alyssa
- 6) Alyssa-Jake-Bobby

If the ice cream truck has three different flavors of ice cream and each child gets to choose two scoops (scoops can be the same flavor), how many different ways can each child get his/her ice cream? The scoops will be in a cup so it won't matter which flavor is scooped first.

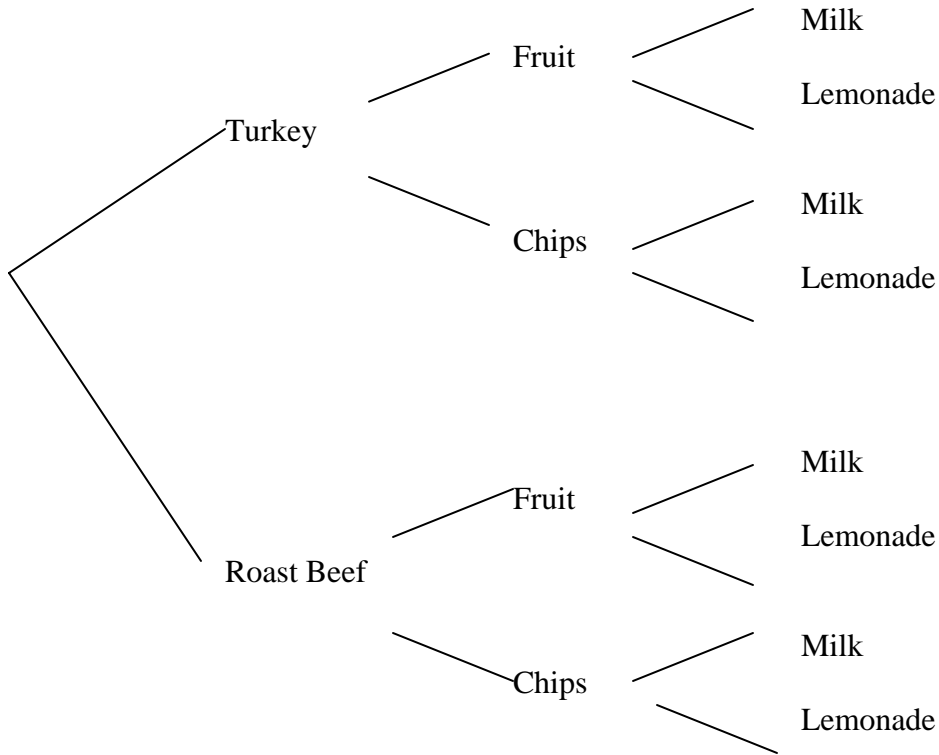
Flavor choices: chocolate (C), vanilla (V), strawberry (S)

Different combinations:

CC
VV
SS
CV
CS
VS

You wouldn't list chocolate/vanilla AND vanilla/chocolate because the order doesn't matter so listing them both would be a repeat.

Bryan's mother is making lunch. She asks Bryan and his friends what they would like to eat. Bryan's mother is making sandwiches and the boys can choose either turkey or roast beef and then they can choose fruit or chips to go with their sandwich. They also need to choose milk or lemonade as their drink.



Let's count the possibilities –

1. Turkey, fruit, milk
2. Turkey, fruit, lemonade
3. Turkey, chips, milk
4. Turkey, chips, lemonade
5. Roast Beef, fruit, milk
6. Roast Beef, fruit, lemonade
7. Roast Beef, chips, milk
8. Roast Beef, chips, lemonade

