Counting Methods

There are several methods for counting the number of possibilities in a situation.

EXAMPLE **Make a list to find the number of possible lunch specials.**

Pair each soup with each sandwich.

Chicken soup with turkey sandwich

Chicken soup with tuna sandwich

Chicken soup with cheese sandwich

Tomato soup with turkey sandwich

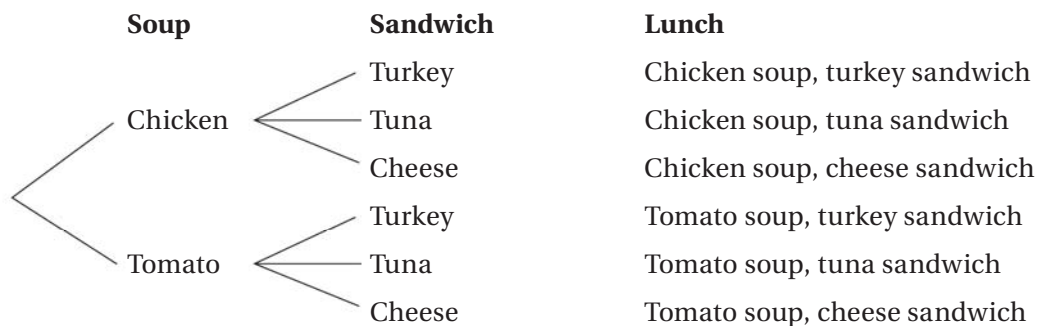Tomato soup with tuna sandwich

Tomato soup with cheese sandwich

Count the number of lunch specials in the list.

▶ There are 6 possible lunch specials.

Lunch Special $6.95	
Choose 1 soup and 1 sandwich.	
Soups	**Sandwiches**
Chicken	Turkey
Tomato	Tuna
	Cheese

EXAMPLE **Draw a tree diagram to find the number of possible lunch specials given the choices in the example above.**

Arrange the soups and sandwiches in a tree diagram.

Soup	Sandwich	Lunch
Chicken	Turkey	Chicken soup, turkey sandwich
	Tuna	Chicken soup, tuna sandwich
	Cheese	Chicken soup, cheese sandwich
Tomato	Turkey	Tomato soup, turkey sandwich
	Tuna	Tomato soup, tuna sandwich
	Cheese	Tomato soup, cheese sandwich

▶ There are 6 possible lunch specials.

Another way to count the number of possible lunch specials described in the examples above is to multiply. Since there are 2 choices of soup and 3 choices of sandwich, there are $2 \times 3 = 6$ possible lunch specials. This method uses the counting principle.

The Counting Principle

If one event can occur in m ways, and for each of these ways a second event can occur in n ways, then the number of ways that the two events can occur together is $m \cdot n$.