

Enrichment 6-7

Dinner at a Chinese Restaurant

Mathematicians are fond of Chinese food. So firmly entrenched in mathematics is the role of the Chinese restaurant that the *choice principle* is known as the Chinese Restaurant Principle. A typical Chinese restaurant will often feature a Special Dinner, in which the customer has the choice of ordering one appetizer and one entree.

1. If there are 8 appetizers and 11 entrees, how many different Special Dinners are there?
2. If there are 12 appetizers and 7 entrees, how many different Special Dinners are there?
3. If there are A appetizers and E entrees, how many different Special Dinners are there?
4. There are 12 appetizers: 4 are soups, 6 contain meat, and 2 do not. In how many different orders can 3 different appetizers be brought to the table?
5. In how many different orders can 5 different appetizers of the 12 be brought to the table?
6. Do Exercises 1–5 involve permutations or combinations?
7. Assume that 3 customers arrive and order different appetizers from a choice of 12 appetizers.
 - a. Does this problem involve permutations or combinations?
 - b. Why?
 - c. In how many possible ways can this be done?
8. Suppose that 5 customers arrive, and each orders a different appetizer from a choice of 12 appetizers. In how many ways can this be done?
9. Suppose that 7 customers arrive, and each orders a different appetizer from a choice of 12 appetizers.
 - a. In how many ways can this be done?
 - b. Why is this answer the same as the number of ways that 5 customers can order different appetizers?