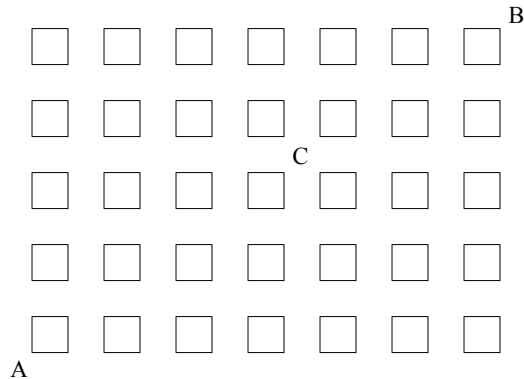


1. Let $S = \{a, b, c, d, e\}$. Explicitly list out all:
 - (a) 2-strings (ie, strings of size two drawn from the set S)
 - (b) 2-permutations
 - (c) 2-combinations
 - (d) 2-selections
2. How many subcommittees of 5 people can be formed from a committee of 5 women and 4 men:
 - (a) with no restrictions?
 - (b) if the subcommittee must consist of 3 women and 2 men?
 - (c) if the subcommittee must consist of more women than men?
3. Six friends are ordering hot dogs from a vendor – one hot dog for each person. The choices are: regular, super long, and chili.
 - (a) How many orders are possible?
 - (b) Suppose you get a discount if the order contains at least 2 chili dogs. How many orders will be discounted?
4. In how many ways may:
 - (a) 5 different candy bars be given to 10 children if no child may get more than one?
 - (b) 5 different candy bars be given to 10 children if any child may get any number of bars?
 - (c) 5 identical apples be given to 10 children if no child may get more than one?
 - (d) 5 identical apples be given to 10 children if any child may get any number of apples?
5. We will call any string of letters a “word”. How many 5-letter “words” can be formed from the letters of RELATIONS:
 - (a) with no repetition of letters?
 - (b) with repetition allowed?
 - (c) with an R in the word and no repetition allowed?
6. A company has 30 female employees, including 3 managers, and 50 male employees, including 6 managers. How many committees of 3 women and 3 men can be chosen if:
 - (a) there is at least one female manager and at least one male manager?
 - (b) there is at least one manager?
7. In how many ways can Ann, Bob, Carol, Dick, Elaine, and Fred line up for a picture if:
 - (a) there are no restrictions?
 - (b) Carol and Dick insist on standing next to each other?
 - (c) Carol and Dick insist on standing next to each other while Ann and Bob refuse to stand next to each other?
 - (d) all 3 girls are next to each other (the boys do not have to be next to each other)?
8. The digits 1, 2, 3, 4, 5, 6 are to be used to make four-digit numbers.
 - (a) How many such numbers can be made if repetition is allowed?
 - (b) How many such numbers can be made if repetition is not allowed?
 - (c) How many numbers in part (b) begin with 3?
 - (d) How many numbers in part (b) contain 2?

9. Consider a city with a grid of streets as shown below. How many routes are there from A to B that avoid intersection C?



10. How many different ways are there of selecting five persons from a group of seven persons and seating them in a row of five chairs?
11. How many different three-member subcommittees can be formed from a committee with 13 members?
12. Suppose that 3 freshmen, 5 sophomores, 4 juniors, and 2 seniors have been nominated to serve on a student advisory committee. How many different committees can be formed under the following circumstances?
- The committee is to consist of any four persons.
 - The committee is to consist of one freshman, one sophomore, one junior, and one senior.
 - The committee is to consist of two persons: one freshman or sophomore, and one junior or senior.
 - The committee is to consist of three persons from different classes.
13. How many different 7-digit numbers can be formed using the digits in the number 5,363,565?
14. In bridge a deal consists of distributing a 52-card deck into four 13-card hands. How many different deals are possible in bridge?
15. How many positive integer solutions $(x, y, z > 0)$ are there to the equation $x + y + z = 17$?

Think you're an expert yet? Try these mildly more difficult ones.

16. How many integers between 0 and 999999 inclusive, have their digits in non-decreasing order from left to right? Think of 001223 as a number between 0 and 999999 whose digits are in non-decreasing order from left to right.
17. We write one 5-digit number on a slip of paper (one side only). We include numbers that begin with 0s, for example, 00158. Since the digits 0, 1, and 8 look the same upside down, and since 6 and 9 are interchanged when a slip of paper is turned upside down, 5-digit numbers such as 61891 and 16819 can share the same slip of paper. If we want to include all possible 5-digit numbers, but allow this kind of sharing, how many different slips of paper do we need?