

Worksheet on Counting (Katherine E. Stange)

1. How many different types of burritos can you make, if you must choose meat/veggie, then you can choose black/pinto for the beans, and finally you can pick guacamole/sourcream/none for the topping?
2. How many different ways could we pick a triathlon team from our class of 27 students? That means picking one cyclist, one swimmer and one runner.
3. I wish to put seven different cats into two different bags. How many ways could I do it?
4. How many different ways could we form a committee from our class of 27 students? A committee is any subset of the students in our class, except the empty set (in other words, a committee has at least one person on it). We don't consider ordering in committees, so (Ted,Joe,Mike) is the same as (Mike,Joe,Ted).
5. How many different ways could you form a chaired committee from our class of 27 students? A chaired committee has at least 1 person on it, and one of the people on it is designated the chair.
6. Problem 8.16 on padlocks from *Mathematics, A Discrete Introduction* by Scheinerman, copied here:



8.16. A padlock has the digits 0 through 9 arranged in a circle on its face. A combination for this padlock is four digits long. Because of the internal mechanics of the lock, no pair of consecutive numbers in the combination can be the same or one place apart on the face. For example 0-2-7-1 is a valid combination, but neither 0-4-4-7 (repeated digit 4) nor 3-0-9-5 (adjacent digits 0-9) are permitted.

How many combinations are possible?

7. How many ways can you arrange 13 people (7 girls and 6 boys) in a row, with the requirement that boys aren't next to each other and girls aren't next to each other?

8. How many ways can you arrange n girls and m boys in a row, with the requirement that boys aren't next to each other and girls aren't next to each other?
9. How many ways can n women and n men be paired off into heterosexual relationships?
10. How many ways can n women and n men be paired off? (Here, same-sex pairs are allowed.)
11. How many ways can you choose a committee of exactly 4 people from this class of 27?
12. How many ways can you choose n things from a collection of m things?
13. Suppose one puts n points on a circle, and joins each pair by a line. Slide the points around a bit so that none of these line segments meet more than two at a time (i.e. no three meet at one point inside the circle).
 - (a) How many lines are there?
 - (b) How many regions is the circle cut up into? Hint: Count them via diagrams for at least 6 points before you make a conjecture.