

Combinatorics!



Fairview Elementary Math Club

<https://kaplandm.github.io/FVE/>

Bracelets

You are making bracelets. Each has five beads: three red, two blue. You wonder how many different sequences you can make. For example:

BBRRR

RRBBR

How many can you find? (How do you know there aren't more?)

What about for other numbers of red and blue beads?

Dancing

You have five animals



Chicken Owl Squirrel Bee Marmot

You want them to dance with each other, two at a time.

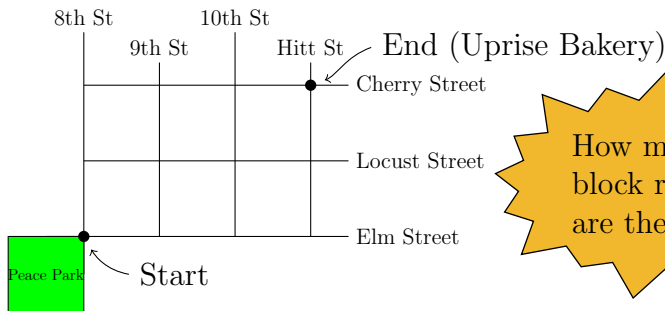


How many different pairs are possible?

How many are possible with six animals? Other numbers?

Walking to lunch

You've enjoyed playing in Peace Park all morning, and now you're hungry for a slice of quiche from Uprise Bakery.

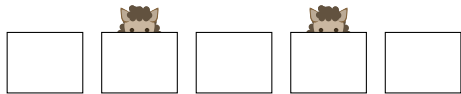


How many 5-block routes are there??

You want the shortest route (5 blocks), but there are so many possible! Ex: walk up (U) 2 blocks to Cherry, then right (R) 3 blocks to Hitt: UURRR. Or: take Elm to 10th, then up to Cherry, then to Hitt: RRUUR.

Sheep-in-a-box

Your two sheep are playing a hiding game. There are five boxes in which they can hide.

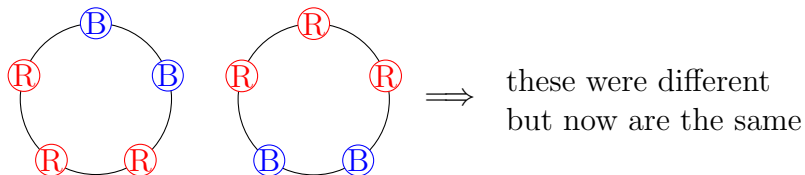


In how many different ways can the two sheep hide among the five boxes?

What about with other numbers of boxes? (Or sheep?)

Bracelets again

Earlier, we thought about how many “bracelets” could be made using three red and two blue beads, but we treated them as straight lines, when really bracelets loop around. For example, as a straight line, **BBRRR** and **RRBBR** differ, but when you put them around your wrist, they become the same! (The three red are next to each other; there is no “end” or “beginning” anymore.)



How many different bracelets are there after you put them on your wrist? What about for other numbers of colors/beads?

Dancing again

Remember your five animals?



Chicken Owl Squirrel Bee Marmot

This time, each pair has a “lead” dancer. So Bee dancing with Squirrel as lead is now different than Squirrel dancing with Bee as lead.

How many different pairs are possible now?

Why is this (more? less?) than before? (This is the difference between permutations and combinations.)

How many different pairs are possible with six animals?

Other numbers?