

PROBLEM 1. How many words can you make by rearranging the letters of the word *susurrus* if you do not care whether the words make sense?



PROBLEM 2. To form a password, you can either form a sequence of six digits from $\{0, 1, \dots, 9\}$ or a sequence of four letters from $\{a, \dots, z\}$.

- (i) How many possible passwords are there if no number or letter can be repeated?
- (ii) How many if repetitions are allowed?

PROBLEM 3. You are constructing a nine-layer ice cream cake and go to Cloud City Ice Cream to pick out the flavors. You decide on the following:

three layers of Dark Chocolate Salted Caramel
one layer of Caramelized Banana
two layers of Earl Grey Blueberry
one layer of Honey Lavender
two layers of Oregon Strawberry.

How many choices do you have for the arrangement of the layers?



PROBLEM 4. Five couples go to the theater and sit in the first row, which conveniently has exactly ten seats. How many ways can these people be seated if couples must sit together?

Challenge

Challenge problems are optional and should only be attempted after completing the previous problems.

PROBLEM. How many ways are there to choose an ordered pair of subsets (A, B) from $\{0, 1, \dots, 9\}$ such that $|A \cap B| = 1$?