

HOMEWORK – Mrs. Sym Metree’s kindergarteners

Name _____

Solve each problem and **answer with a sentence**. Unless otherwise stated, consider “reversed” permutations as different.

1. Eight kindergarteners Alex, Beth, Caroline, Danny, Emily, Frank, Gordon, and Helen (4 girls and 4 boys) are sitting in a row. In how many different ways can they sit, if anyone can be next to anyone else?
2. The same kids from exercise 1 are sitting in a row, but now two boys Frank and Danny want to sit next to each other. In how many different ways is this possible?
3. The same kids are sitting following the rules of exercise 2. However two girls, Emily and Beth also want to sit next to each other but none of the two will sit next to Gordon. How many possible arrangements are possible?
4. The same eight kids are now playing “Ring Around the Rosie”, and so they form a circle. In how many distinguishable ways can they stand, if everyone can stand next to anyone else? (Notice: two arrangements are to be considered the same if, for each person, the person to his/her left and right are the same in both arrangements).
5. While they are still playing in a circle, their teacher, Mrs. Sym Metree, notices that boys and girls are alternating (that is a boy is standing between two girls and viceversa). In how many ways could they have done so?
6. Mrs. Metree goes back to her room and takes out her room-keys. They are in a key-ring with nine other keys (10 keys in total). She decides that from today on, she will change the disposition of the 10 keys in her key-ring every day (including weekends). After how many days will she be finished (that is she will have tried every possible permutation?). Remember that key-rings can be “flipped over”.
7. Mrs. Metree is now in her room with her kindergarteners. She asks her students “Can you spell “MUMMY” for me?”. To her horror, she receives every possible permutation of the letters and each student gives her a different answer. How many students does she have in her room?
8. Mrs. Metree is now asking the students to practice their hand-shakes. Each student in her room (use the number that you found in exercise 7) must shake hands with every other student. How many hand-shakes will be there?
9. Finally, Mrs. Metree needs to divide the class in groups of four people each. In how many ways can this be done if every student can be in the same group with every other student?