



Math Olympiad and Problem Solving Programs
E220 - Intermediate Math Competitions
Problem Set 7.2 - Combinations

Name:

Date:

1. (a) $\boxed{66}$ (b) $\boxed{70}$ (c) $\boxed{84}$
2. $\boxed{30}$
3. $\boxed{840}$
4. $\boxed{\binom{14}{2}\binom{6}{2} = 1365}$
5. $\boxed{792}$
6. $\boxed{28}$
7. $\boxed{210}$
8. This problem involves two steps. First, we find all the arrangements were three girls can sit in 6 seats so that there is at least one space between them. Let X mean an occupied seat, and O be an empty seat. So we can do: XOXOXO, XOXOOX, XOOXOX, OXOXOX. So there are four arrangements. Now we can seat each girl in one of the seats in $3! = 6$ ways. So there are $4 \times 6 = \boxed{24}$ combinations
9. This problems is a more complicated version of the last problem. We must find all the arrangements were there is at least one boy between the two girls. Let B mean boy and G mean girl. So we start listing the possibilities: GBGBBBBBBBBB, GBBGBBBBBBBB, GBBBBGBBBBBBBB, and so on. There are 36 possibilities. Now we use factorials to figure out the seatings for the ten boys and 2 girls. There are $10!$ ways to arrange the boys, and $2!$ ways to arrange the girls. Multiply them all together, and you get $\boxed{2 \times 36 \times 10!}$
10. $\boxed{180}$