

Math 166 - Spring 2008

Week-in-Review #4

courtesy: Kendra Kilmer

(covering Sections 6.3-6.4)

- **Multiplication Principle:** The total number of ways to perform a large task is the product of the number of ways to perform each subtask.
 - **Permutation:** $P(n, r) = \frac{n!}{(n-r)!}$ Special case of the multiplication principle. ORDER MATTERS! Things in a row, titles of group members, etc.
 - $n!$ ways to arrange n distinct objects.
 - $\frac{n!}{n_1!n_2!\cdots n_r!}$ ways to arrange n non-distinct objects
 - **Combination:** $C(n, r) = \frac{n!}{r!(n-r)!}$ ORDER DOES NOT MATTER! Used when we are just selecting a subset of our original group.
1. There are six issues on the county election ballot. If a voter can mark YES, NO, or choose not to vote on each issue, how many ways can the ballot be marked?
 2. A group of 8 people are going on a trip in an 8 seater van that was rented. If Jack and Jill were the only people that signed the papers to drive the van, how many different seating arrangements are possible?
 3. Nick, an enthusiast of books, is doing some cleaning. He has found that he has two identical copies of *The Never Ending Story*, five identical copies of *There and Back Again*, and three identical copies of *Dreamcatcher*. How many different ways can he arrange these books on his shelf?
 4. A shipping carton has 30 games in it. If it is known that there are 8 defective games in the carton, how many ways can you select 4 games and get exactly 1 defective game?
 5. Johnny has been chosen to be one of the team captains for the weekly kickball game. There are 19 other kids in his class and he must choose 9 of them to be on his team. If he is good friends with 4 of the kids, how many ways can he choose his team so that he has at least 2 of his good friends on his team?

6. A National Honor Society Club consists of a president, vice-president, 3 treasurers, and 2 secretaries. The president and vice-president are to be chosen from 6 candidates, the 3 treasurers from 7 candidates, and the 2 secretaries from 12 candidates. How many different groups can be formed?

7. A women's softball conference consists of 7 teams. If all teams play each other three times in the season, how many conference games are there?

8. How many different ten digit numbers can be formed from three 2's, one 7, five 8's, and a 9?

9. Four Longhorns, five Aggies, and three Red Raiders travel to the Big 12 Basketball Tournament. If they all want to sit in the same row together, how many ways can this happen if each school wants to sit as a group?

10. A minimum of 15 voting members is required to pass any legislation at the Live Oaks Homeowners Association Meetings. If there are a total of 20 voting members in the neighborhood, in how many ways can this minimum be met?

11. How many 5 digit numbers can be formed from the numbers 0, 1, 2, 3, 4, 5, 6, 7 if zero cannot be the first digit, no digit can be repeated, and each number formed must be even?

12. In how many ways can 10 team members and two alternate members be selected for the Women's National Basketball Team from a group of 20 finalists?

13. A group of 30 freshmen, 35 sophomores, 45 juniors, and 50 seniors are entered into a lottery. If 25 students are randomly selected to win a prize, how many possible outcomes contain at least 2 freshmen?

14. Five students are sitting in the waiting room to see an advisor. In how many ways can these students be directed to the departments' ten advisors if each advisor handles no more than one student?

15. You have 5 different thin bottles and 5 different wide bottles that you are going to arrange in a row on a shelf. How many different arrangements of these bottles are possible if the thin bottles and the wide bottles alternate?

16. A fruit stand has 30 apples, 14 peaches, 6 plums, and 15 pears. If you randomly select 8 pieces of fruit, how many ways can you select exactly 4 plums or exactly 3 pears?

17. A club consists of 35 finance majors, 30 accounting majors, and 40 info majors. This club must elect a president and vice-president from the finance majors and then elect 2 representatives from each of the two remaining majors. How many ways can this be done?

18. A diagnostic test must be taken by all incoming freshmen at Genius University. The exam consists of twenty true-or-false questions, of which sixteen must be answered correctly to be admitted to the university. In how many different ways can an incoming freshmen who answers all the questions on the exam be admitted to the university?

19. A password is being made by using the letters A, B, C, D, E, F, G, and H. How many passwords consisting of 5 letters are possible if exactly two letters must be vowels? (Note: An example of a valid password is AABDB.)
20. Eight freshmen, five sophomores and twelve juniors all apply to attend a national conference. If three of these students are selected to attend the conference, how many ways can this be done if exactly two of the students have the same classification.
21. Your History exam is a 20 question multiple choice exam. Each question has 5 choices and only one of the choices is correct.
- (a) How many ways can a student answer all of the questions on the exam?
- (b) If the professor tells the class that only 3 questions have the answer A, only 4 questions have the answer B, only 5 questions have the answer C and only 2 questions have the answer D, how many ways can a student answer the exam if they use this information?
22. You have 5 identical red jackets, 4 identical blue jackets, 4 identical green jackets and 3 different maroon jackets to hang in a row in your closet. How many distinguishable arrangements of these jackets are possible?
23. A pizza place has 15 different toppings available for their pizza. How many different two topping pizzas are possible? Note that you can order two of the same toppings for your pizza.
24. How many ways can 10 people (4 boys and 6 girls) line up in a row for a picture where no boy is next to another boy?