COMBINATIONS

1. Explain the differences between P(n,r) and C(n,r).

2. Ten problems follow. Identify those problems in which order is important and those problems in which order is not important.

   a) How many ways can six runners finish a race with no ties?

   b) How many five-digit numbers can be formed using all of the digits from 1 to 5?

   c) Three of five people are chosen to go on a trip. In how many ways can they be chosen?

   d) Five people go to a hockey game. They can buy three seat tickets and two standing room only tickets. In how many ways can the three seat tickets be distributed?

   e) A bridge hand consists of 13 of 52 cards. How many different bridge hands are there?

   f) You want to order a medium-sized three topping pizza. There are eight toppings available. How many different pizzas can you order?

   g) Ten people shake hands with each other. How many handshakes take place?

   h) There are ten widgets on a shelf, one of which is defective. You buy five of the widgets at random. How many different selections of five widgets contain only good widgets? How many selections contain the defective widget?

3. Solve each of the problems listed in question 2.

4. a) Which number is larger, P(10,3) pr C(10,3)? How many times larger?

   b) Which is larger, P(n,r) or C(n,r)? How many times larger?

5. Evaluate
   a) C(8,3) b) C(10,5) c) C(3,8) d) C(n,1) e) C(n,2) f) C(n, (–1))

6. Which is the largest?
   C(5,4) C(6,3) C(7,2) C(8,1)

7. Evaluate
   a) C(1000,0) b) C(1000,1) c) C(1000,999) d) C(1000, 1000)

8. Find the value(s) of n for which C(6,n) takes on its largest value; its smallest value.

9. a) How many different pairs of cards can be drawn from a full deck of 52 cards? (A pair means any two cards here)

   b) How many pf these pairs contain only face cards, that is, jacks, queens, or kings?

   c) How many of the pairs contain no face cards?

   d) How many of the pairs contain at least one face card?

10. How many triangles can be constructed which have their vertices on the points in an octagon (draw an octagon to help you)?

11. a) In how many ways can ten people be divided up into two teams of five?

    b) In how many ways can 14 people be divided into three groups of five, five, and four people?

12. a) In how many different ways could a team of three students be chosen from Lin's Finite Mathematics class of 25 students to compete in the County Mathematics contest?

    b) In how many of these cases would Lin be a member of the team?

    c) In how many of these would Lin NOT be a team member?

13. The school gardening club consists of five boys and five girls. How many working groups of four people can be formed with

    a) no restrictions b) four boys
    c) three boys and a girl d) two boys and two girls
    e) a boy and three girls e) four girls

14. In how many ways can the five starting positions on a basketball team be filled from these groups?

    a) ten players who can play any position
    b) two players who play only centre and eight others who play any position
    c) two centres, four forwards, and four others who play guard

15. A committee of students and teachers is being formed to study the issue of student parking privileges. Fifteen staff members and 18 students have expressed an interest in serving on the committee. In how many different ways could a five-person committee be formed if it must include at least one student and one teacher?