1. A team is made from five boys and five girls.
   a) How many different ways can a captain, assistant captain and two other players be chosen?
   
   b) If the captain and assistant captain must be a boy and a girl, how many different ways can the four-person team be chosen?

2. A committee consists of ten people.
   a) How many ways can a subcommittee of three people be selected from the committee?
   
   b) How many ways can an executive subcommittee consisting of a treasurer, president and secretary be elected from the committee?

3. From a deck of 52 cards, how many 5-card hands can be formed in each case?
   a) There are only aces or face cards.
   
   b) There are only numbered cards (no letters).
   
   c) There are 2 clubs and 3 diamonds.
   
   d) There are at least 4 red cards.
   
   e) There are exactly 3 fives.
   
   f) There are exactly 2 queens and exactly 2 hearts
4. From a deck of 52 cards, how many 5-card hands can be formed in each case?
   a) There is exactly one pair.
   
   b) There are exactly 2 pairs.
   
   c) There is exactly 3 of a kind.
   
   d) There is exactly 4 of a kind.

5. The Super 7 lottery requires you to choose 7 numbers from 1 to 47. The 649 lottery requires you to choose 6 numbers from 1 to 49. To win, the numbers chosen must match the numbers drawn by the lottery corporation.
   a) Winning which of the two lotteries do you think is more likely?
   
   b) How many ways are there to match all the numbers in each lottery?
   
   c) How many ways are there to match exactly 4 numbers in each lottery?

6. From an intersection (point A) you must travel 12 blocks west and 9 blocks north (point B). Assuming all routes are possible,
   a) How many pathways consisting of 21 blocks are possible?
   
   b) If you must pass through the intersection 7 blocks west and 4 blocks north of point A, how many pathways consisting of 21 blocks are possible?
7. There are 8 boys and 12 girls in a drama club. How many ways can a committee of 5 be selected in each case:
   a) There must be at least 2 boys.
   
   b) There must be at least 2 girls.
   
   c) There must be more girls than boys.

8. In a student council election, there are 3 candidates for president, 3 for secretary, and 2 for treasurer. If you may vote for at least one position, and vote for one of the candidates for that position, how many different ways can a ballot be marked?

9. A multiple choice test has 15 questions, with 5 possible answers for each question.
   a) If you guessed the answer to each question, how many different ways would there be to answer the test?
   
   b) If you knew that there were exactly 3 A's, B's, C's, D's and E's, how many answer keys are possible?

10. A lock combination can contain 3 numbers from 0 to 59. How many combinations are possible if the first number is a multiple of 5, the second number is a multiple of three, and the third number must be different than the first two?
11. Solve:
   a) \( nC_2 = 15 \)
   
   b) \( 3(nC_4) = nP_3 \)
   
   c) \( \frac{4!(n - 5)!}{(n - 3)!} = 4 \)
   
   d) \( 12C_x = 12C_y \)

12. 9 horses run a race.
   
   a) How many ways can a gambler bet on the first three finishing order?

   b) If two horses are tied, how many finishing orders are possible?

   c) If only 6 horses ran the race, but there were 9 numbered stalls, how many starting arrangements were possible?
13. You and six others are sitting in a row at a theatre. How many seating orders are possible if
   a) There are no restrictions.
   b) You are sitting beside your friend.
   c) You are not sitting beside your friend.
   d) You are sitting beside your friend, but at the end of the row.
   e) You are at one end and your friend is at the other end of the row.
   f) There are 3 couples and each couple is sitting together.

14. How many flavours of gelato are there if there are 1521520 ways of making triple scoop cones (three different flavours)? (Order not a factor)

15. a) Expand: \((x + 1)^{10}\)
   
   b) Expand: \((3x - \frac{y}{2})^9\)
   
   c) Find the middle term in the expansion of \((a + 2b)^{12}\)