

COUNTING PROBLEMS

1. How many five digit numbers can be obtained given that the ten-thousands place cannot be zero?
2. Ten cars are in a race. How many ways can we have first, second, and third.?
3. How many ways can a true-false test be answered if there are 4 questions.? 6 questions.? N questions.?
4. A bucket contains golf balls. Five are red, two are yellow and four are white. How many line arrangements are possible if:
 - a) all the balls are used.
 - b) one yellow must be on each end
 - c) a red one is in the middle.
5. How many different words, real or imaginary, can be formed by using all of the letters in the word "grammar".
6. How many different arrangements are there if three boys and two girls stand in a line?
7. How many four-symbol telephone numbers are possible if the first two must be letters, which can not be repeated, and the last two are digits that must be different?
8. A gas station has five cars pull in at the same time. In how many ways can the cars be serviced by one attendant.
9. How many ways can a baseball team (9 players) be selected from 14 boys:
 - a) if 4 specified boys must be selected.
 - b) if there are no restrictions.
10. A baseball manager is preparing a batting order. In how many ways can this be done if the team consists of 9 players? If the catcher must bat eighth and the pitcher must bat ninth?
11. In how many ways can six things be chosen from nine different things?
12. How many different seven card poker hands are possible from a deck of 52 cards.

COUNTING PROBLEMS (Cont.)

13. License plates are to be made for the state of Maine consisting of two letters and five digits. How many different license plates can be made?
14. A bucket contains 9 golf balls. In how many ways can 2 golf balls be selected?
15. A shipment is received containing ten items, two of which are defective. Determine how many ways a subset of two items can be chosen such that:
 - a) the defective item is not selected.
 - b) one defective item is selected.
16. A man has a nickel, dime, quarter, and a half-dollar in his pocket. How many ways can the waitress be tipped if he gives her at least two coins? How many different non-zero tips may the waitress be given?
17. How many ways can 5 pictures be arranged in a row? How many arrangements are possible if only two of the pictures are used?
18. In how many ways can 6 out of 10 people be assigned to 6 seats in a row?
19. A couple has narrowed down the choice of names for a new baby to three first names and five middle names. How many different first and middle name arrangements are possible?
20. How many different homes are available if a builder offers a choice of 6 basic plans, three roof styles, and two exterior colors?
21. An auto manufacturer produces 7 models, each available with 4 different upholstery fabrics, 5 interior colors, and 6 exterior colors. How many varieties of the auto are available?
22. A concert is to consist of 5 works: 2 modern, 2 classical, and one piano concerts. In how many ways can the program be arranged?
23. How many different license plate numbers can be formed using three letters followed by three digits if no repeats are allowed? How many if there are no repeats and either letters or number come first?

COUNTING PROBLEMS (Cont.)

24. A contractor wishes to build six houses, each with a different design. In how many ways could he place these homes on a street if:
- the lots are in a row?
 - four are on one side of the street and two are on the other side?
25. A group has 30 members. If a committee of 5 is to be selected, how many committees are possible?
26. Suppose a student has 5 different reasons for failing Math and 4 different reasons for failing English; using 1 reason for each failure, how many different stories can the student give the Dean?
27. There are 5 rotten apples in a crate of 25 apples:
- How many samples of 3 apples can be chosen?
 - How many samples of 3 could be chosen if all 3 are rotten?
 - How many samples of 3 could be drawn in which there is one rotten apple and two good ones?
28. A group of 3 students is to be selected from a group of 10 students to participate in a special class.
- In how many ways can this be done?
 - In how many ways can the group that will not participate be selected?
- ✓ 29. Joe's Burgers sells hamburgers with cheese, lettuce, relish, tomato, mustard or catsup. How many different hamburgers can be made using any three of the extras?
30. How many two-card hands can be dealt from a deck of 52 cards?
31. How many different bridge hands (13 cards each) can be dealt from a regular deck of 52 cards?
32. Five cards are marked with the numbers 1, 2, 3, 4, and 5, then shuffled, and two cards are picked. How many different ways can the two cards be chosen?

COUNTING PROBLEMS (Cont.)

33. Marbles are drawn, without replacement, from a bag containing 15 marbles:
- a) How many samples of two marbles can be drawn?
 - b) How many samples of four marbles?
 - c) How many samples of two marbles can be drawn in which both are blue, if the bag contains 3 yellow, 4 white and 2 blue marbles?
34. A city council is composed of 5 liberals, 4 conservatives. A delegation of three is to be selected to attend a convention.
- a) How many delegations are possible?
 - b) How many delegations could have all liberals?
 - c) How many delegations could have 2 liberals and 1 conservative?
- ✓ 35. A group of 7 workers decide to send a delegation of 2 to the supervisor to discuss their problems.
- a) How many delegations are possible?
 - b) If there are 2 women and 5 men in the group, how many delegations would include at least 1 woman?
36. How many 4-letter "words" can be formed from the letters ABCDEF? If no letters are repeated?
- ✓ 37. If the game of Scrabble a player tries to make words from certain letters. Suppose that a player has the letters C, S, O, T, R, and E. In how many different ways may any three letters be arranged?
38. Suppose that a certain city decides to have automobile license plates with numbers that do not have repetitive digits. How many different plates can be made if the plate is to have four digits?
39. The ordinary telephone number has 4 digits plus a three digit exchange number. If the number 0000 is prohibited, how many numbers can one exchange accommodate?
40. How many 9-man batting orders can a coach obtain from 10 men?
41. How many ways can a team of 3 astronauts be selected from a group of 20 astronauts?

COUNTING PROBLEMS (Cont.)

42. How many bridge hands are possible containing four spades, four hearts, four clubs, and one diamond?
43. How many straight lines can be drawn through five points in a plane if:
- no three are collinear?
 - three are collinear?
44. In how many ways can three boys and three girls sit in a row if:
- they can sit anywhere?
 - the boys and girls must alternate?
45. How many ways can a basketball team of 5 players be selected from a squad of 12 players?
46. How many ways can you get 5 red cards from a standard deck of playing cards?
47. In how many ways can a 5-man appellate court render a majority decision?
48. Suppose that there are 60 Democrats and 40 Republicans in the 100 member U. S. Senate. How many ways can you select a 5 member committee consisting of 3 Democrats and 2 Republicans?
49. An employer has 4 female applicants and 6 male applicants for 5 vacant positions:
- How many ways can he hire 3 females and 2 males?
 - How many ways can he hire 4 females and 1 male?
 - How many ways can he hire 5 males?
 - How many ways can he hire 5 people?
 - How many ways can he hire a majority of females?
50. Find the number of two digit number that can be formed from the digits 1, 2, 3, 4, 5 if:
- digits can be repeated?
 - digits cannot be repeated?
 - digits must be even?
 - digits must be odd?
 - the ones digit must be even and the tens digit must be odd?