Extra Counting Problems

1) A menu in a Chinese restaurant lists 10 dinners in column A and 7 dinners in column B. A family wants to order a total of 4 dinners. How many selections are possible if

a) there are no restrictions?
b) they want to order 3 column A dinners and 1 column B dinner?
c) they want at least one column A dinner?
d) they want at most 2 column B dinners?

2) A lock has a dial with 30 numbers. To open the lock you must turn the dial to 3 numbers in a specific order. How many sequences of 3 numbers are possible if

a) there are no restrictions?
b) no number can be repeated?
c) the first two numbers are different?
d) all numbers are even?
e) the first two numbers are even, the third is odd, and no number is repeated?
f) the three numbers must be 27, 4, and 16 in any order?
g) there are exactly two 10's?

3) License plates in several states consist of 7 characters, where a character is either a letter or a digit. How many such license plates are possible if

a) there are no restrictions?
b) no character may be repeated?
c) the middle character must be a letter?
d) there is at least one letter on the license plate?
e) the first three characters are letters, the last 3 characters are digits, and no character is repeated?
f) there are 3 letters and 4 digits on the license plate?
g) the characters are L, Q, X, A, 1, 0, and 5 in any order?
h) the license plate has exactly 3 A's on it?
i) there are 2 A's, 2 G's and three 5's?

4) A high school debating team consists of 7 boys and 8 girls. In how many ways can the advisor pick 3 of them to represent the school in a debate if

a) there are no restrictions?
b) there must be at least one boy and at least one girl?

5) A telephone number is a seven-digit number where the first digit cannot be 0 or 1. How many phone numbers are there if

a) no digit can be repeated?
b) the phone number contains the digits 0, 1, 2, 3, 4, 5, and 6?
c) the first three digits cannot be 911?
d) the digits alternate between odd and even?
e) the phone number contains at least one 3?
f) the phone number contains two 2's, three 4's, one 7, and one 8?
g) the phone number contains exactly one 0?

6) There are 20 students in a class and each student must get a grade of A, B, C, D, or F. In how many ways can the grades be assigned to the 20 students if

a) there are no restrictions?
b) the teacher wants to give four of each grade?
c) the teacher wants to give 3 A's, 4 B's, 6 C's, 4 D's, and 3 F's?
d) the teacher wants to give at least one A?
e) the teacher wants to give at most one F?

7) A grocery store stocks 30 different kinds of cereal of which 10 are unsweetened. In how many ways can you choose 5 different kinds of cereal if

a) there are no restrictions?
b) you want exactly 3 of your choices to be unsweetened?
c) you want at most 2 of your choices to be sweetened?
d) you want at least 2 of your choices to be unsweetened?

8) A McDonald's manager has 6 burger cooks, 5 fry cooks, 10 cashiers, and 4 people to clean up. He needs 2 burger cooks, 1 fry cook, 5 cashiers, and 2 clean-up people for the first shift. In how many ways can he choose these people?

9) The pool for a jury consists of 15 men and 20 women. In how many ways can a jury of 12 people be chosen from this pool if

a) there are no restrictions?
b) there must be at least 5 men and 5 women on the jury?
c) there is at least one man on the jury?
d) there are exactly 4 men on the jury?

10) Thirty qualified people apply for 18 identical state jobs: 10 from the western part of the state, 8 from the central part, and 12 from the eastern part. In how many ways can these jobs be filled if the state hires

a) the same number of people from each part of the state?
b) at most one from the east?
c) at least one from the west?
d) exactly 5 from the central part?

11) For a cross country meet each school is allowed to enter 5 runners. Weaver High has 17 runners on its team of which 8 are seniors. In how many ways can the Weaver coach pick his 5 entries if

a) there are no restrictions?
b) he may enter at most 2 seniors?

12) A "word" is to be formed using the letters in the word REMEMBER. How many arrangements are there if

a) there are no restrictions?
b) the E's must be together?
c) the R's must be separated by at least one letter?
d) the "word" must begin with R and end with E?
e) the "word" must begin and end with the same letter?

13) A label for a name tag consists of 5 letters. How many such labels are possible if

a) there are no restrictions?
b) no letter may be repeated?
c) the label consists of 2 A's, 1B, 1C, and 1 D?
d) the label contains no vowels?
e) the label contains at least one W?

14) A cookbook contains 8 salad, 12 meat, 10 vegetable, and 15 dessert recipes. How many dinners are possible using recipes from this book if
a) the dinner is to consist of 1 salad, 1 meat, 1 vegetable, and 1 dessert?
b) the dinner is to consist of 2 salads, 1 meat, 4 vegetables and 3 desserts?

15) During a game of Scrabble you have 7 tiles on your rack. On these tiles are the letters X, A, Z, E, J, R, and V. You want to use exactly 5 of the tiles to get a triple word score. How many 5-letter "words" are possible if
a) there are no restrictions?
b) there must be at least one vowel?

16) In your dance class you have learned 15 different moves. For a recital you must perform 4 or 5 of these moves in sequence. How many different presentations are possible if
a) there are no restrictions?
b) no move may be used more than once?
c) the first and last move must be the same?

17) A bar code for merchandise consists of 10 rectangles. There are 2 possible lengths and 4 possible widths for each rectangle. How many bar codes are possible?

18) If there are 3 empty tables in a restaurant for 2, 4, and 5 people respec- tively, in how many ways can a party of 11 people split up to sit at these three tables?

19) Consider the set of digits 1, 3, 4, 5, 7, 8, 9. If digits cannot be repeated, how many 5-digit numbers can be formed from this set if
a) the number must be odd?
b) the number must be less than 70,000?
c) the first digit is odd or the last digit is even?
d) the number contains at least one 5?

20) A group of students consists of 10 seniors, 12 juniors, 11 sophomores, and 7 freshmen. 8 students are chosen at random to form a committee to prepare for a dance. In how many ways can this be done if
a) there are no restrictions?
b) there must be the same number of students from each class?
c) all members must be from the same class?
d) the committee consists of 3 seniors, 2 juniors, and 3 underclassmen?
e) the committee contains at least one freshman?

21) To start a game of Mastermind you place four colored pegs in four holes in a row. You are given a large supply of red, yellow, green, black, white, and blue pegs. In how many different ways can you start this game if
a) there are no restrictions?
b) you don't want to repeat a color?

c) you want to use 1 red, 1 green, and 2 blue pegs?

d) you want to use at least 1 red peg?

e) you don't want any black pegs?

f) you want to use at most 1 red peg?

22) When play begins a cribbage hand contains 4 cards from a standard deck. How many cribbage hands contain

a) exactly 2 face cards?

b) 4 cards of the same suit?

c) exactly one pair?

d) a sequence of four cards? Ace is low in cribbage.

e) no pairs?

f) at least one pair?

23) A gin rummy hand contains 10 cards dealt from a standard deck. How many gin rummy hands contain

a) at least one face card?

b) 4 spades, 3 clubs, 2 diamonds, and 1 heart?

c) a 5-card sequence in one suit, a 3-card sequence in another suit, and no other cards in these two suits? Ace is low.

d) a four of a kind, a three of a kind, and a pair?

e) 3 pairs and 4 other cards none of which has the same rank?