Name:_____   Date:_____

6.5 Counting Using the Sticks and Stones Method

1. If I have 10 identical stones, how many ways can I split them into 4 groups?

2. If "a", "b", and "c" are whole numbers, how many combinations of (a,b,c) are there such that:
    $$a+b+c=9$$

3. How many ways can four whole numbers (a,b,c,d) add to 15?

4. Sandy wants to buy four donuts from Tim Hortons. She has 15 different flavours to choose from. How many different combinations of donuts can she buy her four donuts?

5. Tom walks to a buffet to pick his food. There are 5 types of meat, chicken, beef, pork, lamb, and fish. If Tom is to have 6 servings in total, how many ways can he select his food?

6. Tom is eating at the same buffet and again there are 5 types of meat: Chicken, Beef, Pork, Lamb, and Fish. If Tom is to have "UP TO" 6 servings, how many ways can he select his food?

7. Tom really like his buffet and is eating at the same place again. This time, he can have up to 6 servings of each type of meat. How many ways can he select his food?

8. Suppose "a", "b", "c", and "d" are natural numbers, how many different combinations of (a,b,c,d) are there such that $a+b+c+d=15$?

9. On a basketball team of 12 players, six players took 45 shots altogether. How many ways can the 45 shots be distributed to these 6 players?

10. You are ordering a dozen doughnuts (12) and need to choose from among four flavors: glazed, powdered, cream-filled, and jelly-filled. How many different doughnut orders are possible if you must choose at least one of each flavour?

11. David has 25 coins in his pocket. He can have nickels, dimes, pennies, or quarters. How many different combinations of coins can he have?

12. Each of the numbers from 1 to 10 are placed in a bag and three numbers are taken out WITHOUT replacement. How many ways can the three numbers drawn add to a sum of 20?

13. Each of the numbers from 1 to 10 are placed in a bag and three numbers are taken out "WITH" replacement. How many ways can the three numbers drawn add to a sum of 20?

14. Suppose Tom goes to a different buffet to eat. If there are "X" types of meat to choose from and he can have up to "Y" servings in total, how many can he select his food in terms of "x" and "Y"?

15. Let a,b,c be three different whole numbers. What is the number of triple pairs (a,b,c) such that the equation is true? $a+b+c \leq 18$

16. Given that $0 \leq x_1 \leq x_2 \leq x_3 \leq x_4 \leq 6$, how many ways are there to select (x_1, x_2, x_3, x_4) ?

17. Four standard six sided dice are rolled. How many ways can you get a sum of 12?

18. Given that $0 \leq x_1 \leq x_2 \leq x_3 .... \leq x_6 \leq 20$, where $x_1, x_2, ...$ and x_6 are whole numbers. How many different combinations of $(x_1, x_2, x_3, x_4, x_5, x_6)$ can there be?

19. Suppose we have 5 integers that add up to 25. The first number must be greater or equal to 1. The 2nd number must be greater or equal to 2. The third number must be greater or equal to 3, fourth number greater or equal to 4, and the fifth number greater or equal to 5. How many combinations are there for the five numbers? $(x_1, x_2, x_3, x_4, x_5)$

20. The polynomial $(a+b+c+d)^{15}$ is expanded. How many terms in the expansion contains all four variables "a", "b", "c", and "d"?

21. Suppose "a", "b", "c", and "d" are all positive odd integers. How many different combinations of (a,b,c,d) are there such that a+b+c+d = 98

22. There are nine chairs in a row and 6 chairs are to be seated by students. 3 Professors arrive at the chairs before any students show up. Professors "X", Y", and "Z" decides to sit down before any students arrive. How many ways can the professors choose their seats if each professor must be in between two students? AHSME 1994

23. A giant spider has eight legs and needs to wear 8 socks and 8 shoes. The spider needs to wear a sock before it puts a shoe on any of its legs. How many different orders can the spider put on all 8 socks and shoes.

24. When 7 fair standard 6-sided dice are thrown, the probability that the sum of the numbers on top faces is 10 can be written in the form of: $P(x) = \dfrac{n}{6^7}$. If "n" is a positive integer, what is the value of "n"?

25. Liz went to a buffet where they served 5 types of dessert. For the 1st type of dessert you are only allowed 1 serving. For the 2nd type of dessert you are allowed up to 2 servings. For the 3rd type of dessert, you are allowed up to 3 servings. Same pattern applies to the fourth and fifth type of dessert. If Liz is to have 10 servings altogether, how many ways can he order her desserts?