Counting Methods: Tree Diagrams, Fundamental Counting Principle

Solve the problems below using the method in the problem. If no method is given, then use the method you think would be best for the problem.

A, B, C

1. A pizza shop makes pizzas in three sizes (small, medium and large) with two types of crust (thick and thin) and four toppings (sausage, pepperoni, ham and mushroom). How many different one-topping pizzas can be made at this restaurant? Use a tree diagram.

A, B, C

2. Police use photographs of various facial features to help witnesses identify suspects. One basic identification kit contains 195 hairlines, 99 eyes/eyebrows, 89 noses, 105 mouths, and 74 chins/cheeks. The developer of the identification kit claims that it can produce billions of different faces. Is this claim correct? Use the method you think is most reasonable.

A, B, C

3. Three coins will be tossed in the air. How many different outcomes of heads and tails are there?

A, B, C

4. In the game of Yahtzee, five 6-sided dice are used. How many different outcomes are possible when rolling these 5 dice?

| B, C |

5. The combinations for the lockers at your school consist of 3 numbers. Each number in the combination can be a number from 0 through 29. How many locker combinations are possible?

| C, Acc |

6. A multiple choice test consists of 8 questions. Each question has four choices (a-d). How many ways are there to answer the eight questions? Use a tree diagram.

| B, C, Acc |

7. Social Security numbers contain 9 digits. All social security numbers are equally likely. How many different social security numbers are possible? Considering the current population of the United States is about 300 million people, should this system remain sufficient for the near future?

| B, C, Acc |

8. A password for an ATM card must consist of a 4-digit integer such as 3855. How many different passwords are possible in this configuration?

| Acc |

9. Suppose, in the previous problem, that no digits can be repeated. Now how many passwords are possible?

Acc

10. How many different 7-digit phone numbers are possible if the 1st digit cannot be a 0 or 1?

Acc

11. The standard configuration for a New York license plate is 3 digits followed by 3 letters.

    a. How many different license plates are possible if digits and letters can be repeated?

    b. How many different license plates are possible if digits and letters cannot be repeated?

Acc

12. Telephone area codes consist of 3 digits (ours is 508). When the area code system was first created in the 1940's, area codes were all in the form NYX, where N is any number 2–9, Y is 0 or 1, and X is any number 1–9. How many different area codes were possible then?

Acc

13. In 1995, the rapid need for more telephone services (due to the increased use of fax machines, data modems and mobile phones) forced a change to the area code system. In order to provide more options, the middle digit was expanded from the original 0-1 to 0-8. How many more area codes were made available due to this expansion?

A,B

14. You are ordering a fruit smoothie. You have a choice of a small, medium or large smoothie, and you can include one of the following fruits: strawberries, bananas, or oranges. How many different choices of smoothies do you have? Use a tree diagram.

A, B, C, Acc

15. A store that sells inflatable chairs offers the two following styles: a low-back chair and a high-back chair with arms. The chairs come in the following colors: black, clear, orange, lime and purple. The chairs can have a cup holder or no cup holder. Make a tree diagram to find all the different kinds of inflatable chairs at the store.

A, B, C, Acc

16. The same store as in question #15 receives a shipment of inflatable chairs. Each box contains one of every kind of chair. If you randomly chose a chair from a box, what is the probability that the chair is black?

A 17. A bag contains one of each of the following muffins: blueberry, cranberry, bran, corn, carrot, and chocolate chip. A muffin is randomly chosen from the bag, then a second muffin is randomly chosen. Make a tree diagram to find the number of ways two muffins can be chosen.

A 18. A bowl contains white stones numbered 1 to 3 and red stones numbered 1 to 2. Draw a tree diagram to represent total outcomes for selecting two stones.