Exploring the World of Math

Name: _____ Date: _____

Test 5: Combinations, Permutations and Samplings

1. Terry is a web designer. He wants to display three index pages. We will call them R, S and T. Record all the combinations that we can arrange the index pages?

2. Dina is arranging the folders in the file cabinet. The files are called 1, 2, 3 and 4. How many different combinations can we make?

3. Roger, a Vet tech helps tag deer for one week. They tag 16 on Monday, 28 on Tuesday, 9 on Wednesday, 22 on Thursday and finish with 18 on Friday. The next month, the spotter counts 15 tagged deer out of 72 as they were crossing Jones creek. Estimate the herd size.

4. You have an 10-character password that can contains 26 capital letters, 26 lower case letters, 10 numbers and 5 special characters. You can use letters, numbers or special characters more than once. How many passwords permutations are there?

5. The customer folders in the office have enough room to write four capital or lower case characters which could be letters A through Z or a through z followed by three numbers 0 through 9. An example is ABcd999. How many permutations can we have if we can repeat any letter or number?

6. You have 5-character pin for your bank account where you can only use numbers. How many tries can the hacker use to break your secret number? If the hacker can try five passwords a second, how long until they break into your account?

7. A person orders a triple dip ice cream from a dairy farm that serves 26 different flavors. How many days can we visit the dairy farm before repeating any combination?

8. You are playing the lottery that has eight balls drawn and the numbers on the 54 balls are 1 through 54 What is the probability that you can win with one ticket? With ten tickets? (Hint: this problem is setup similar to the ice cream problem)

Tree Diagrams

9. A woman has given birth five times. Create a tree diagram showing the combinations of the possible offspring with the results.

10. What is the probability of having all males?

11. What is the probability of having just three males?

12. What is the probability of having only one female?

13. If a woman has eight children, what is the probability of having all males?

14. Leaving your house, there are two directions you can drive (**N**ortheast and **S**outhwest). At the end of the street there are three directions to that bring you to work. We will call them (**F**irst, **B**road, **M**ain). There are multiple entrances to work when the three routes converge and you can arrive to the building by four paths (r**1,** r**2,** r**3**). Create a tree diagram showing the combinations.

15. How many unique routes are there to work?

16. You hear that there is one accident on the way to work, what is the probability of picking the stopped route?

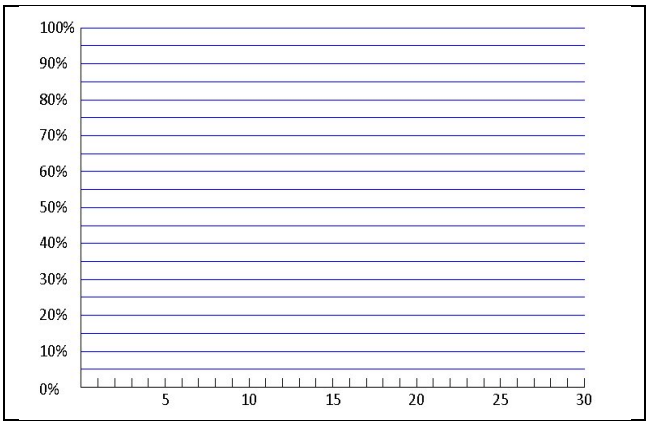
17. How many routes take you on Oak street?

18. Barry is going to a restaurant the serves 3 appetizers, 4 soups and 4 salads, 6 main entrées and 6 desserts.
    a. How many permutations of the meals can we have if we choose from the soups, entrées and the desserts?

    b. How many permutations of the meals can we have if we choose from the appetizer, soup or salad or both, entrées and the desserts?

19. Our favorite singer is performing in a concert we will attend. The singer has 25 popular songs they chose to sing. She will only perform 12 songs at the concert. How many different set lists can be made for the concert?

20. We have three equal choices as we decide what elevator to go to the 20th floor. We call the elevators, 1, 2, and 3. After a month of riding the three elevators, what is the probability of having elevator 1 door open first when we are in the lobby? Draw the diagram. The line is going towards what percent?



21. We have a group of six men and six women.
    a. How many ways can they be arranged in a line?

    b. If the first person is a woman, what is the number of ways we can arrange the line?

    c. If we alternate the line with one woman then one man, how many ways can we arrange the line?

22. At our organization, we have 18 members.
    a. How many different ways can we choose a President, VP, a Treasurer, a Secretary and a Sergeant at Arms?

    b. How many unique groups can be chosen to go to the conference without just rotating members in positions?