Exploring the World of Math

Name: _____ Date: _____

Test 5: Combinations, Permutations and Samplings

1. Michael is an interior designer. He has three vases. We will call them M, N and P. Record all the combinations that we can arrange the vases?

2. A bowling league scheduler has four teams in the finals. We call the four teams W, X, Y and Z. Record all the combinations that we can arrange the teams.

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

5. You have 4-character pin for your debit card where you can only use numbers. How many tries can the hacker use to break your secret pin? If the hacker can try four passwords a second, how long until they break into your account?

6. The customer folders in the office have enough room to write five capital or lower case characters which could be letters A through Z or a through z followed by two numbers 0 through 9. An example is ABcde10. How many permutations can we have if we can repeat any letter or number?

7. A person orders a triple dip ice cream from a dairy farm that serves 38 different flavors. How many days can we visit the dairy farm before repeating any combination?

8. You are playing the lottery that has six balls drawn and the numbers on the 59 balls are 1 through 59 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 four times. Create a tree diagram showing the combinations of the possible offspring with the results.

10. What is the probability of having all females?

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

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

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

14. Leaving your house, there are two directions you can drive (**E**ast and **W**est). At the end of the street there are three directions to that bring you to work. We will call them (**O**ak, **B**rice, **C**assidy). 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,** r**4**). Create a tree diagram showing the combinations.

15. How many unique routes are there to work?

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

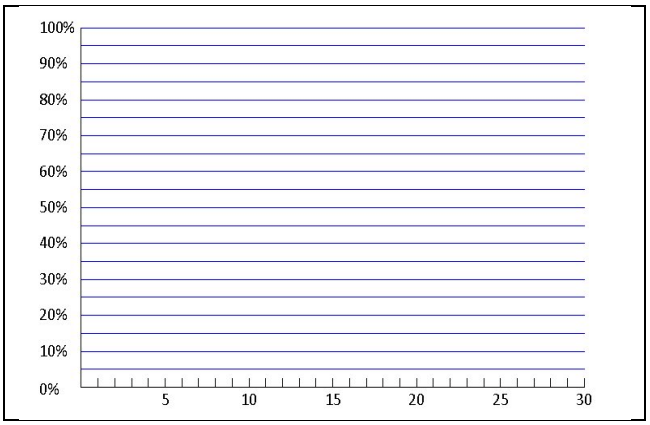
17. How many routes take you on Oak street?

18. Barry is going to a restaurant the serves 5 appetizers, 3 soups and 4 salads, 8 main entrées and 3 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, entrées and the desserts?

19. Our favorite singer is performing in a concert we will attend. The singer has 32 popular songs they chose to sing. She will only perform 16 songs at the concert. How many different set lists can be made for the concert?

20. In our travels in the county, we are always driving through the Main and 1st Street intersection. The lights are equally timed. What will the diagram look like if we consider whether the light is red or green? What percentage will the graphing line eventually get close to?



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

    b. If the first person is a man, 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 15 members.
    a. How many different ways can we choose a President, VP, a Treasurer and a Secretary?

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