Name:_____   Date:_____

## Assign 7: Combinatorics and Permutations Challenge Assignment:

1. 3 pennies are placed on a 8 by 8 checker board. The pennies are placed in a way such that none of them share the same column. However, the 3pennies can be placed so that either 2 of them share the same row or none of them share the same row. How many different ways can the pennies be placed?

                                                                    Answer:_____

2. Twenty (20) people come to a party. We know that 11 of the people are friends with everyone else who came to the party. Also, the other 9 people each have exactly 13 friends at the party. (Assume that if "A" is a friend of "B", then B is a friend of A. Assume also that A is never a friend of A.) Each person shakes hands with each of his/her friends. What is total number of handshakes

                                                                    Answer:_____

3. A combination for a simple bicycle lock is a sequence (a, b, c), where a, b, and c can be any of 0, 1, 2, 3, 4, 5, 6, or 7, but adjacent numbers in the combination are different. For example (5, 0, 7) is a legitimate combination, as is (5, 0, 5), but (2, 4, 4) is not allowed. How many combinations (combos) are possible, altogether?
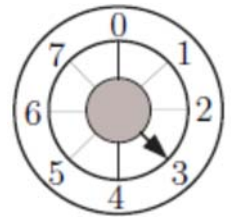
                                                                    Answer:_____

4. How many strictly increasing sequences of positive integers begin with 1 and end with 7? Two such sequences are 1, 7 and 1, 4, 6, 7

Answer:_____

5. In a school cafeteria, there are 2 different soups, 3 different main meals courses, and 3 different desserts. You are allowed to take at most one soup, at most one main course, and up to three desserts (but you cannot have two or more servings of the same dessert). How many different meals could you have? Include in your count the "meal" in which you eat nothing.

Answer:_____

6. ichie has one penny, two nickels, and three dimes. How many different amounts of money can he make using one or more of these six coins?

Answer:_____

7. Six soccer teams are competing in a tournament in Waterloo. Every team is to play three games, each against a different team. (Note that not every pair of teams plays a game together.) Judene is in charge of pairing up the teams to create a schedule of games that will be played. Ignoring the order and times of the games, how many different schedules are possible?

Answer:_____

8. How many 3 letter words can be made using letters chosen from the letters in "CANADA"? For example, "ADN" is an acceptable word, as are "AAA" and "DAA". But "NCC" is not acceptable, since it has two C's while "CANADA" has only one.

Answer:_____

9. The picture below shows 7 stools arranged in a row. Initially they were all unoccupied. Alfie chose a stool at random and sat down. Then Beti chose an empty stool at random and sat down. What is the probability that Alfie and Beti chose stools that are next to each other? Express your answer as a common fraction.

○ ○ ○ ○ ○ ○ ○

Answer:_____

A six-team league has a schedule that requires each team to play every other team four times. The total number of games in the league schedule is:

(A) 36   (B) 60   (C) 72   (D) 120   (E) 144