

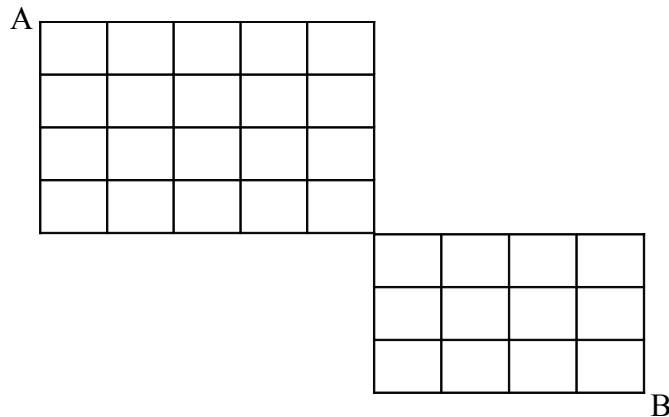
Name: _____

Date: _____

Combinatorics Assignment

Please show all work for full marks. Clearly indicate the question number and the final answer in your solutions, when appropriate. Due the class before the test. (15 marks total)

1. Jessie has 10 different books with no home. She has reorganized and found room for 6 on her bookshelf. How many ways can she choose 6 books and then arrange them in a row on her shelf?
2. Car licenses consist of 7 characters. The first character must be an X, Y, or Z. Each of the next 3 characters can be any letter from A to W inclusive. The 5th character must be a 1 or 9. The last two characters can be any digit from 1 to 9 inclusive. If there is no repetition of characters allowed, how many different license plates are possible? An example of this format is X B W K 9 3 1.
3. How many different ways are there to uniquely arrange the letters in the word MATHEMATICIAN?
4. How many even integers between 1 and 1000 do not contain repeated digits?
5. A standard deck of 52 playing cards has 4 different suits with 13 different cards represented in each suit. How many different 5-card hands are there that contain exactly three-of-a-kind (i.e. 3 cards of one rank, 1 card of a second rank, and 1 card of a third rank). An example of this is KKK5A.
6. From a group of 16 boys and 7 girls, 6 students are chosen to form a committee. (2 marks)
 - a) How many ways can the students be chosen so that there is at least 1 member of each sex represented?
 - b) How many ways can a president, vice-president, and four other students be chosen?
7. Solve algebraically using factorial notation: ${}_{n+2}C_n = 45$. (2 marks)
8. Moving only to the right and down, how many different routes are there from A to B?



9. Determine the 4th term in the standard expansion of $\left(2a - \frac{b}{3}\right)^7$.
10. Demonstrate how you can use both Pascal's Triangle and combinations to complete the expansion of $(x+y)^4$. Which method do you prefer? Why? (2 marks)
11. Find the coefficient of the term involving x^5 of $\left(x^2 - \frac{1}{x}\right)^{10}$. (2 marks)