Sec 2.6 -Probability

Permutations, Combinations, and Binomial Probability Name:

Counting Principle: *The counting principle suggests if one event has m possible outcomes and a second independent event has n possible outcomes, then there are m x n total possible outcomes for the two events together.*
(This basically suggests Options · Options · Options…… will determine the number of possible outcomes.)

Permutations: *A collection of things, in which the* ***order does matter****.*

Combinations: A collection of things, in which the **order does NOT matter**.

Determine first which to use Counting Principle, Permutations, or Combinations. Then, determine the number of possibilities:

1. 10 friends are at a party and they decided the party was boring and decided to go to a club in two different cars. One of the friends, Susan, has an SUV that can carry 7 passengers. So, Susan, can take 6 more of the 9 friends with her. How many different **groups** of 6 people are possible from the 9 remaining friends?

Circle one of the following:		
counting principle	Permutations	Combinations

2. A person is playing a card game called '21' in which they receive 2 cards from a dealer. If the **order doesn't matter** how many 2 card hands are possible (52 cards in a deck)?

Circle one of the following:		
counting principle	Permutations	Combinations

3. There are 12 students are in a class. The students are instructed to line up on a set chorus stand. That has 3 rows. The front row can hold 5 people. How many possible **arrangements** are there for the front row using the 12 students?

Circle one of the following:		
counting principle	Permutations	Combinations

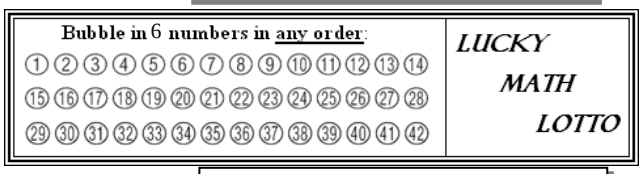
4. How many unique license plates tags can be created if each is 6 characters such that the first three characters can be any letter or number but no character is allowed to be repeated in the first three characters, and the last three spaces can be any letter or number?

Circle one of the following:		
counting principle	Permutations	Combinations

5. The Mrs. Georgia pageant is taking place and there are 20 contestants. How many different ways could the pageant have a winner and a runner up?

Circle one of the following:		
counting principle	Permutations	Combinations

6. The following shows a lottery card in which a participant bubbles in 6 numbers out of 42. How many different ways can a participant select a **group** of 6 numbers?



Circle one of the following:		
counting principle	Permutations	Combinations

7. A Chocolate Ice Cream Sunday is being prepared at Bruce & Stirs. At the ice cream shop there are 10 different types of ice cream that can be used, 3 different types of syrup, and 2 different types of nuts. How many different types of ice cream Sundays are possible if each contain **one** type of ice cream, one type of syrup, and one type of nut?

Circle one of the following:		
counting principle	Permutations	Combinations

8. A Chocolate Ice Cream Sunday is being prepared at Bruce & Stirs. At the ice cream shop there are 10 different types of ice cream that can be used, 3 different types of syrup, and 2 different types of nuts. How many different types of ice cream Sundays are possible if each contain **two** types of ice cream, one type of syrup, and one type of nut?

Circle one of the following:		
counting principle	Permutations	Combinations

9. **Binomial Probabilities** A student is taking a 4 question *true/false* quiz. The student doesn't know any of the answers and completely guesses on each question.
   a. Create a tree diagram with probabilities showing every possible outcome of Correct and Wrong answers.

   b. What is the probability that the student will make EXACTLY a 75% using your **tree diagram**?

   c. What is the probability that the student will make EXACTLY a 75% using your **combinations or the calculator**?

10. **Binomial Probabilities** A student is taking a 4 question *multiple choice* quiz with 4 choices each. The student doesn't know any of the answers and completely guesses on each question.
   a. Create a tree diagram with probabilities showing every possible outcome of Correct and Wrong answers.

   b. What is the probability that the student will make EXACTLY a 50% using your **tree diagram**?

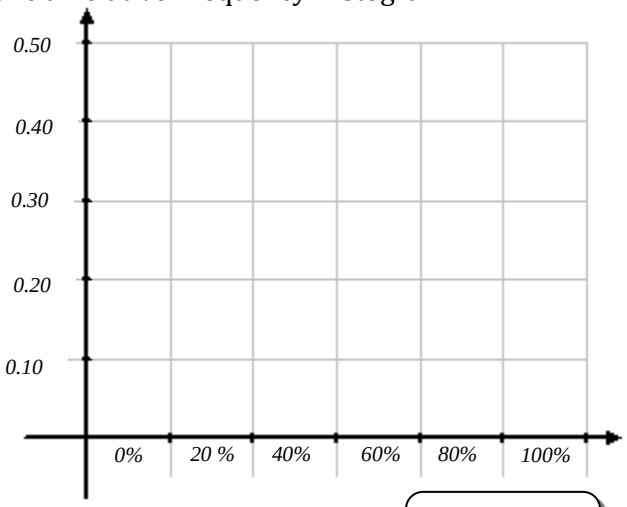
   c. What is the probability that the student will make EXACTLY a 0% using your **combinations or the calculator**?

11. A student is taking a 5 question *multiple choice* quiz (with 5 possible answers each). If the student COMPLETELY guesses on each question on the quiz fill out the following discrete probability distribution table. (PDF)

A.

Grade	Probability
0 %	
20%	
40%	
60%	
80%	
100%	

B. Make a Relative Frequency Histogram.



C. What is probability that the student will make a failing score (60% or below)? (CDF)

12. A surgical technique is performed on **seven** patients. You are told there is a 70% chance of success. Find the probability that the surgery is successful for:

a. Exactly five patients? $P(x = 5) =$

b. Less than five patients? $P(x \leq 4) =$

c. At least three patients? $P(x \geq 3) =$

13. A manufacture sells a can of fix-a-flat to repair flat tires. Using fix-a-flat to repair a tire works 78% of the time. A person driving an 18 wheeler ran over a bunch of nails. All of the tires went flat. However, luckily the driver has 18 cans of fix-a-flat.

a. What is the probability that all 18 tires are successfully repaired? (PDF)

b. What is the probability that exactly 10 tires are inflated (enough to drive)? (PDF)

c. What is the probability that at least 12 tires are inflated? (CDF)

14. Jeff creates a game in which the player rolls 5 dice.

a. What is the probability in this game of having exactly 2 dice land on six?

b. What is the probability in this game of having 3 or more dice land on six?

15. Mark creates a game in which 4 pennies are flipped at the same time.

a. 3 points is awarded if all 4 pennies lands heads up. What is the probability of all 4 pennies landing heads up?

b. 2 points is awarded if 3 pennies lands heads up. What is the probability of exactly 3 pennies landing heads up?

c. No points are awarded for anything else. What is the probability of getting no points?

d. Find the expected value of points for each play of the game.