CCGPS Precalculus Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Unit 7 Review - Probability

**Combinations and Permutations**

1. **12P4 2. 8P5**
2. **14C11 4.**
3. You are ordering a pizza. The three-topping pizza costs $8. If there are 18 toppings to choose from, 4 different crusts, and 2 different sauces, how many different 3-topping pizzas can you order?
4. A radio station is playing 10 different songs. If 2 of the songs are going to be played twice, and one of the songs is going to be played 4 times, how many ways can the station fill 15 song slots?
5. Triangles are often labeled by placing a different letter at each vertex. In how many different ways could a given scalene triangle be labeled using any of the 26 letters of the alphabet?
6. You are picking a hand of 5 cards from a standard deck of playing cards. What is the probability that your hand has 2 10s and 3 Jacks?
7. At South High School, 55 students entered an essay contest. From these students, 10 are selected as finalists. How many different ten-student rankings could be made from the 55 entrants?

**Expected Value**

1. A student pays $2 to play the following game. He tossed three coins. If he gets exactly two heads he wins $7. If he gets exactly one head he wins $5. Otherwise, he loses his money. On average, how much should he win or lose per play of the game?
2. At Tucson Raceway Park, your horse, Stick-in-the-mud has a probably of  of coming in first place, a probability of of coming in second, and a probability of  of coming in third. First place wins $4500, second place $3500, and third place $1500. It costs you $1000 to enter the race. What is the expected value of the race to you? Is it worthwhile for you to enter the race? Explain.
3. A social club has a drawing every Friday night. The probability of winning the first prize of $100 is 0.002. The probability of winning the second prize of $80 is 0.01. How much should the club charge for tickets to enter the drawing so that the club breaks even?

4. You plan to invest in a certain project. There is a 35% chance that you will lose $30,000, a 40% chance that you will break even, and a 25% chance that you will make $55,000. What is the expected value in this problem, and what does it mean in terms of your investment?

**Binomial Distribution**

1. Find P(5) if n = 12 and p = .40 (show setup)
2. Find P(X < 7) if n = 20 and p = .85
3. Find P(X ≥ 9) if n = 25 and p = .35
4. Find P(3 < X < 6) if n = 10 and p = .42
5. Find P(3 ≤ X ≤ 6) if n = 10 and p = .42
6. If a dark-haired mother and father have a particular combination of genes, each of their babies have a ¼ probability of having light hair.
   1. What is the probability of any one baby having dark hair?
   2. If they have 3 babies, calculate P(0), P(1), P(2), and P(3), the probabilities of having 0, 1, 2, and 3 dark-haired babies.
   3. Plot the graph of this probability distribution. Does this distribution have a special name?
7. Statistics show that about 8% of all males are color-blind. Supposed 20 males are selected at random.
   1. Find the probability that 2 of the males are color-blind.
   2. Find the probability that more than 5 of the males are color-blind.
   3. Find the probability that less than 3 of the males are color-blind.
   4. Find the probability that between 4 and 7 (inclusive) of the males are color-blind.
8. Large tractor-trailer trucks usually have 18 tires. Suppose the probability that any one tire will blow out on a given cross-country trip is 0.03.
   1. Find the probability that none of the 18 tires blow out.
   2. Find the probability that 1 of the tires blows out.
   3. Find that probability that more than 2 of the tires blow out.
   4. If a trucker wants to have a 95% probability of making the trip without a blowout, what must be the reliability of each tire?