Name: _____ Erin Bendul

Binomial Probability

In a binomial experiment there are two mutually exclusive outcomes, often referred to as "success" and "failure". If the probability of success is *p*, the probability of failure is 1 - *p*.

Goal: The students will understand the concept of theoretical vs. experimental probability during a hands-on activity, and apply their knowledge of binomial probability in future learning.

Objectives: Given a coin and a cube, students will find the theoretical probability of a specific outcome, and then perform the experiment to find the experimental probability.

Students will collect data to find the percent of success vs. the percent of failure, and use this data to determine the theoretical probability of a specific event occurring, using the Bernoulli trails. Then, students will perform the experiment in order to determine the experimental probability of the same event occurring.

Materials:

- Dice
- Coin
- Data Chart

Procedure:

1. Separate the class into groups of between 3-4 students.
2. Assign each group a problem where they must calculate the theoretical probability of flipping a coin and rolling a dice to arrive at a specific outcome.
3. Once students have determined the theoretical probability for their event occurring, distribute one die and one coin to each group.
4. Give each group a data collecting sheet and have the members of the group assign each other a specific task. (someone to record data, someone to roll the dice, someone to flip the coin)
5. Ask students to perform 25 trails and record the information.
6. Inform students that a trial consists of flipping a coin once and rolling a dice once.
7. Ask students to compare their findings related to the theoretical and the experimental probability occurring.

Example of problem:

A coin is tossed and a six-sided die is rolled. Find the probability of getting a head on the coin and a 6 on the die.

How do you think you would find the theoretical probability of this event occurring?

_____
_____.

What is the theoretical probability?

_____
_____.

Conduct the experimental probability using the table below.

Coin																								
Dice																								
(H and 6)																								

What did you find the experimental probability to be?

_____
_____.

Will everyone's experimental probability be the same? Why or why not?

_____
_____.

What can you say about the theoretical probability versus the experimental probability?

_____
_____.

Second Experiment:

1. Explain to students that in order to conduct an activity using Bernoulli Trials properly, they must collect data to use.
2. Their data will represent the probability of success and the probability of failure.
3. Next, have students use this data to determine the theoretical probability a particular event will occur using the Bernoulli Formula.

Example of problem:
You are sitting in the lobby of your school waiting for your next class to begin. What is the probability that out of the next 100 people who walk through the door, exactly 20 of them will be wearing a shirt or sweatshirt with the MSMC logo printed on it?

Students must use the information gathered during the data collection in order to complete the calculations.

What formula must we use to calculate the theoretical probability?

_____
_____.

Why must we collect data related to the percent of success and the percent of failure before beginning our calculations?

_____
_____.

How would we mathematically represent “at most 3 out of 5 students are wearing MSMC logo shirts”?

_____
_____.

What do we notice about “at least” and “at most” when we add them together?

_____
_____.