Name_____ Period _____ Date _____

Multicolored Dice   STEM Sims

Lesson 1: Multicolored Dice
For this lesson, you are presented with a pair of multi-colored dice. Each die has three red faces, two green faces, and one blue face. Are you ready to do some rolling?

Doing the Science
Part 1: Possible Outcomes
1.   Open the Multi-Colored Dice Sim.
2.   Show all of the possible color combinations when rolling the two dice. (There are six possible color combinations.) To do so, select one of the white squares on a die—as you select the die, the square will cycle through the three colors (Red-Blue-Green).
3.   When you have the color you want on the square, move to the next square and repeat the process for the next square.
4.   Repeat this process for all six possible combinations. When you are successful in filling all the squares, the Sim will congratulate you and tell you to click anywhere on the screen to continue.

Part 2: Predicting the Outcome
1.   Predict which of the six possible outcomes will occur most often. To do so, select the empty box next to the color combination you think will show up most often when the two dice are rolled many times. Select the box to cycle through the numbers 1, 2, and 3.
2.   Select the pairs that you think will occur most often, second most often, and third most often.
3.   Select the dice to roll the pair. The first nine rolls are manual (one at a time) and then the simulation will automatically complete 100 total rolls.
4.   The simulation will report on the success you had with your predictions.
5.   If you select the die on the left at the top of the screen, you will have the option of rolling 100 automated rolls, but the counters will be reset to zero first. If you select the die on the right, you will complete 100 rolls automatically adding to the count of the first set of rolls. (Suggestion: select the die on the right.)

Part 3: Creating the Sample Space
1.   After you have completed at least 200 rolls of the dice, the simulation will ask you if you would like to explore how frequently each color combinations occurs.
2.   Select "Yes" and you will see a 6x6 array of pairs of dice. The colors are shown across the top and on the right side.
3.   When you select one of the empty pairs, a pop-up window will appear showing all possible outcomes. If the top color in the array is RED and the side color is RED, then RED-RED is the proper choice. Select RED-RED. The simulation will fill in the blank pair and tell you if you are correct when you complete the entire array.
4.   Record in Table 1 the entire completed array results.
5.   Count the total number of pairs in the entire array. For each color combination, divide the number of pairs expected for a given color combination by the total number of pairs in the array. Record this value as either a fraction or a decimal in Table 1 under Probability.

Table 1.

Color Combination	Number of Pairs Expected	Probability
Red-Red		
Green-Green		
Blue-Blue		
Red-Green		
Red-Blue		
Green-Blue		

Do You Understand?

1.   How successful were you in predicting the outcomes of the various dice rolls?

2.   Describe what technique you used in predicting the outcomes.

3.   In the simulation, each of the two die had three red squares, two green squares, and one blue square. Imagine that the simulation was changed so that each of the two die in the simulation had four red squares, one green square, and one blue square. Complete table 2 below. Hint: Make up a sample space similar to the one in the simulation.

Table 2.

Color Combination	Number of Pairs Expected	Probability
Red-Red		
Green-Green		
Blue-Blue		
Red-Green		
Red-Blue		
Green-Blue		