Statistical Reasoning Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

WS 7.1: Randomness, Probability Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Day: \_\_\_\_\_\_

**Simulation -**

We can do a simulation several ways: use a physical model (coins, dice, spinner, etc.), use a Random Digit Table, or use the random number generator on the TI-84.

**Example:** Suppose you know very little probability. You want to figure out the estimated probability that in a family of four children, there are exactly 3 girls. We will use a single die to simulate this problem.

 **Step 1:** What is the simplest event? Define its outcomes and corresponding probabilities?

 **Step 2:** Assignment digits to represent these outcomes.

 (Since the probability or a girl or boy is the same, we want to assign half of the numbers on the die to girls and half to boys. We can do this several ways, so you must make clear the method you are using.)

 **Step 3:** Describe what will constitute one trial — in this case, how many rolls will we make

before stopping. Also, decide how many trials will do.

 **Step 4:** Answer the question. Complete the table, showing the frequency for each possible

number of girls.

Based on our simulation, how many times did you get exactly 3 girls in each trial?

**The estimated probability of having exactly 3 girls in a family of 4 children is \_\_\_\_\_ out of \_\_\_\_\_ \_\_\_\_\_\_\_\_\_%**

**Simulation Revised**: Thanks to modern technology, a couple can now increase the chance of having a baby of the desired gender. Suppose the chance of having a girl is now increased to 80%. Repeat the same simulation as on the previous page. Now, what is the estimated probability that the couple has exactly 3 girls in a family of 4 children?

**Step 1:** ………………………………………………………………………………………………………………………

**Step 2:**  ………………………………………………………………………………………………………………………

**Step 3:** ………………………………………………………………………………………………………………………

**Step 4:** ………………………………………………………………………………………………………………………

.Probability Rules:

1. Name an event which is certain to occur. What is the probability?
2. Name an event which is certain to not occur. What is the probability?
3. If the probability it will rain tomorrow is 0.40, what is the probability that it will not rain tomorrow?
4. Which of the following can be considered a probability of an event?

 ¾ –¼ 0.89 1.32 –0.23 0 –0.6 1 54% 125%





5. If a die is rolled one time, find these probabilities.

 a. getting a 3

 b. getting an odd number

 c. getting a number greater than 2

 d. getting a number less than 5

 e. getting a number greater than 6

 f. getting a number greater than 4 or an odd number

 g. getting a number greater than 4 and an odd number

6. If two dice are rolled one time, find these probabilities.

 a. getting a sum of 4 ……………

 b. getting doubles ……………

 c. getting a sum of 2, 3, or 4 ……………

 d. getting a sum greater than 8 ……………

 e. getting a sum less than or equal to 4 ……………

 f. getting a sum of 7 or 11 ……………

7. The school band sells tickets as a fund raiser. At the end of the fund raiser, one ticket will be drawn and the holder will win a 52-inch television. The band sells 500 tickets at $3.00 each. If Joe buys 5 tickets, what is the probability that Joe wins the television?

 ……………

 8. A mail order company collected the following data for one day on the number of items ordered per order.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No. of Items X | 1 | 2 | 3 | 4 | 5 | 6 | 7 or more |
| Probability | 0.10 | 0.19 | 0.28 | 0.21 | 0.08 | 0.07 | 0.07 |

First, rewrite the problem in notation. Then find the probability that a randomly selected order was for the number of items stated.

 Rewrite Probability

 a. 5 or more items P(X ≥ 5) 0.08 + 0.07 + 0.07 =

 b. fewer than 4 items \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 c. more than 3 items \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 d. 3 or fewer items \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. A couple plans to have three children. Assume that the probability of a boy or girl is 0.5

 a. Write the sample space for all possible outcomes if we are interested in the gender of the child. For instance, one possible family would be BGG, [Note that birth order matters]

 ………………………………………………………………………………………………………………………

 Find the probability of getting:

 b. all boys …………… c. all children of the same gender ……………

 d. exactly two boys …………… e. at least one boy ……………