Math 4 Honors Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lesson 5-4: *Counting and Multiplication Rules for Probability* Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Learning Goal:**

* *I can use counting methods to determine probabilities.*

**Write all final probabilities as fractions in lowest terms!**

When events are equally likely, the probability of event *A*, or *P*(*A*), is =

1 a. Yes or No? \_\_\_\_\_\_\_ Total number of possible outcomes = \_\_\_\_\_\_.

 b. There are \_\_\_\_\_\_ favorable outcomes. List them: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 c. Probability = \_\_\_\_\_\_\_\_ Put the fraction in lowest terms.

2 a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ different ways to fill out a ticket. Show work.

 b. There is only \_\_\_\_\_ way to fill out a “Match + 1” ticket. The probability is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 c. The probability of getting a “Match 5” winner is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 d. The probability of getting a “Match 4 +1” winner is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Show work.

3 a. There are \_\_\_\_\_\_\_\_ outcomes possible. Show work.

 b. Use any method for these. Show work if by adding or multiplying probabilities.

 *P*(four heads) = \_\_\_\_\_\_\_\_\_ *P*(exactly one head) = \_\_\_\_\_\_\_\_ *P*(at least 3 heads) = \_\_\_\_\_\_\_

 \*\*\***Multiplication Rule for *Independent* Events**: ***P*(*A* and *B*) = *P*(*A*) × *P*(*B*)\*\*\***

4 a. *P*(girl’s name on 1st draw and boy’s name on 2nd draw) = \_\_\_\_\_\_\_\_. Show work by multiplying the

 probabilities (fractions) for each event:

  in lowest terms.

 b. There are 100 total possible outcomes (10 × 10). Of the total, 24 (4 × 6) are favorable. So the

 probability is .

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5 a. You cannot use the Multiplication Rule for independent events in this question because the events

 here are not independent. Since the first slip of paper is *not returned* to the hat before the second slip

 is drawn, the result of the first draw *affects* the probability of the second draw.

 \*\*\***General Multiplication Rule:** ***P*(*A* and *B*) = *P*(*A*) × *P*(*B* given *A*)\*\*\***

 b. i. Event *A*: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *P*(*A*) = \_\_\_\_\_\_\_\_\_\_

 ii. Event *B*: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *P*(*B*|*A*) = \_\_\_\_\_\_\_\_\_\_

 iii. *P*(girl’s name on 1st draw and boy’s name on 2nd draw) = \_\_\_\_\_\_\_\_.

 Show work by multiplying the probabilities for each event.

 c. Total # of possible outcomes = \_\_\_\_\_\_\_\_ Total # of favorable outcomes = \_\_\_\_\_\_\_\_

 *P*(girl’s name on 1st draw and boy’s name on 2nd draw) = \_\_\_\_\_\_\_\_\_

 d. The probability in question #5 should be \_\_\_\_\_\_\_\_\_\_\_\_\_ since you are drawing from a smaller # of

 slips of paper for the second draw.

 e. *P*(4 girls drawn) = \_\_\_\_\_\_\_\_\_ General Multiplication Rule: 

 Multiplication Principle of Counting: 

6 a. *P*(1st and 2nd people are Native Americans) = \_\_\_\_\_\_\_ Show work.

 b. *P*(neither of the 1st two people is Native American) = \_\_\_\_\_\_\_\_ Show work.

 c. *P*(exactly one of the 1st two is Native American) = \_\_\_\_\_\_\_\_ Show work.

**Summarize the Mathematics**

a. You can define probability this way when the outcomes are \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_.

b. “With replacement” means that the events are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is the same as

 “With repetition.”

c. When events are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, use the rule *P*(*A* and *B*) = *P*(*A*) × *P*(*B*). Otherwise, use the

 General Multiplication Rule *P*(*A* and *B*) = *P*(*A*) × *P*(*B*|*A*).

d. When using the General Multiplication Rule for probability, you multiply separate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

 When using the Multiplication Principle of Counting, you calculate the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ separately to form the ratio.

**Check Your Understanding**

a. *P*(even on 1st roll, *n* > 4 on 2nd, *n* < 6 on 3rd) = \_\_\_\_\_\_\_\_\_\_ Show work using either method.

b. *P*(three even #’s) = \_\_\_\_\_\_\_\_\_\_\_ Show work using either method.

**Lesson 5-4 Homework**



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