Unit 9 Lesson 5 Notes   Name: _Key_____

Today we want to consider events that occur **consecutively** (one after another).

It is important to determine if one event will impact the outcome of the next event.

Independent Events: two events are independent if the possible outcomes of the 2nd event are not affected by the outcome of the 1st event.
    Example: Rolling a 1 on a die then rolling a 1 again.

Dependent Events: two events are dependent if the possible outcomes of the 2nd event are affected by the outcome of the 1st event.
    Example: Jimmy Fallon Egg Game

Jimmy Fallon vs. Bradley Cooper   https://www.youtube.com/watch?v=ZVUfnJipFh0

Player	Probability of Raw Egg	Result
Cooper	$4/12 = 1/3$	H
Fallon	$4/11$	H
Cooper	$4/10$	H
Fallon	$4/9$	H
Cooper	$4/8 = 1/2$	H
Fallon	$4/7$	RAW
Cooper	$3/6 = 1/2$	RAW
Fallon	$2/5$	H
Cooper	$2/4 = 1/2$	H
Fallon	$2/3$	H

⭐ $2/2 \Rightarrow$ CERTAIN going to be raw!

Predict whether the two events are independent (I) or dependent (D).

1. Robbing a bank and then going to jail. Dependent.

2. Adopting a dog and then planting a garden. Independent

3. Not paying your phone bill on time and then having your cell service cut off. Dependent

4. Tossing a coin and it landing on heads and selecting a Queen from a deck of cards. Independent

5. Tossing a coin twice and it landing on heads and then tails. Independent

6. Choosing an apple form a basket of fruit, not replacing it, and then choosing an orange. Dependent

7. Selecting a marble from a bag, replacing it, and then selecting a second marble. Independent

8. Choosing a red M&M from a bag, eating it, then choosing a blue M&M from the bag. dependent.

9. Drawing a diamond from a deck of cards, replacing it, and then drawing a 5. Independent.

10. Spinning a 10 on the Game of Life spinner, and then spinning a 10 again on your next turn. Independent.

I. To calculate the probability of two or more consecutive events __Multiply__ the probabilities of each event.

Multiplication Rule:

For any two __Consecutive__ events, A **and** then B,

$$P(A \text{ and } B) = P(A \cap B) = P(A) \cdot P(B)$$

Examples

1. There are 2 blue and 3 red jellybeans in a bag. What is the probability of pulling out a blue jellybean, putting it back, and then pulling out a red jellybean?

   a. Is this an example of independent or dependent events? Explain. Independent ⇒ Replacement.

   b. Calculate the probability. $P(\text{Blue and Red}) = \frac{2}{5} \cdot \frac{3}{5} = \frac{6}{25}$
   * Replacement

2. There are 2 blue and 3 red jellybeans in a bag. What is the probability of pulling out a blue jellybean, eating it, and then pulling out a red jellybean?

   a. Is this an example of independent or dependent events? Dependent ⇒ No Replacement

   b. Calculate the probability. $P(\text{Blue and Red}) = \frac{2}{5} \cdot \frac{3}{4} = \frac{6}{20} = 3/10$
   * no Replacement

3. There are 2 blue and 3 red jellybeans in a bag. What is the probability of pulling out a blue jellybean, eating it, and then pulling out another blue jellybean?

   a. Is this an example of independent or dependent events? dependent ⇒ No Replacement

   b. Calculate the probability. $P(\text{Blue and Blue}) = \frac{2}{5} \cdot \frac{1}{4} = \frac{2}{20} = 1/10$
   * No Replacement

4. A coin is tossed and a die is rolled. Find the probability of getting a tail on the coin and a 5 on the die.

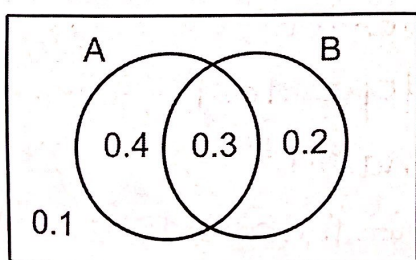   a. Is this an example of independent or dependent events? Independent ⇒ 1st event does not affect 2nd event.

   b. Calculate the probability. $P(\text{tail and } 5) = \frac{1}{2} \cdot \frac{1}{6} = 1/12$

II. Finding the probability of event A AND event B using a Venn Diagram or a Frequency Table.

To find $P(A \cap B)$ using a frequency table or a Venn Diagram, locate the __Intersection__ of the events.

5. Determine $P(A \cap B) = .3$

A
0.4 0.3 0.2
0.1
B

6. Determine $P(\text{Pizza} \cap \text{Water}) = 58/400 = 29/200$

Concession Stand Sales				
	Soda	Water	No Drink	Total
Hot Dog	50	62	46	158
Pizza	120	58	4	182
No Food	30	20	10	60
Total	200	140	60	400