Math 2 – Unit 5 - Experimental & Theoretical Probability

Name: _____ Hour: _____

Experimental Probability: $P(E) = \frac{\#\ of\ times\ that\ event\ E\ occurs\ in\ the\ experiment}{\#\ of\ total\ possible\ outcomes}$

Rochambeau – Experimental Probability

Rules to the game:

Simultaneously on the count of three, each person gives a hand sign- rock (fist), paper (flat hand with palm down), scissors (two fingers spread). Students will work in groups of four. Three students will play the game and one student recording. They will play the game 10 times. Record the number of times there are three matching signs, two matching signs or no matching signs.

Your team will play Rochambeau. The recorder should record the winner for each game. Need to play **at least 10 games**. Points will be assigned as follows:

- Player A gets a point each time all three players match.
- Player B gets a point each time two of the three players match.
- Player C gets a point each time none of the players match.

GAME	# OF MATCHES	WINNER OF GAME
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

List the names of the people in your team alphabetically. The first person on the list is Player A, the next is Player B, the third is Player C, and the fourth is the recorder. Write down who has each role.

Player A: Player C:

Player B: Recorder:

After you have played 10 times calculate the probability of Player A winning, Player B and Player C. Give as a fraction and a decimal.

1. Probability (Player A/3 Matches) =

2. Probability (Player B/2 Matches) =

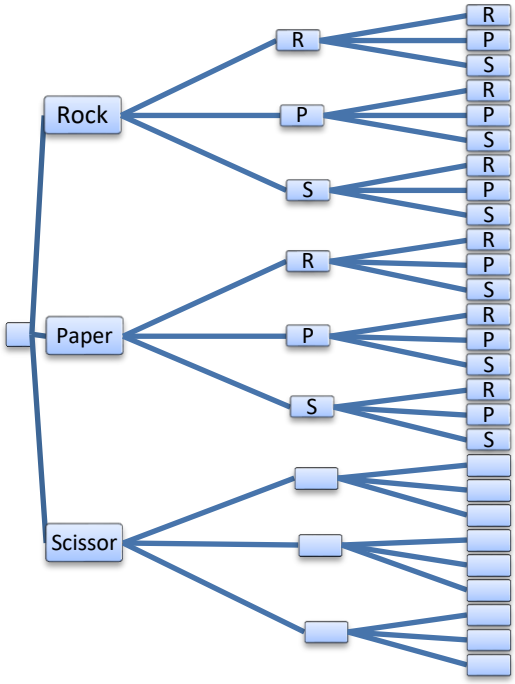
3. Probability (Player C/No Mathces) =

Theoretical Probability: $P(A) = \frac{\#\ of\ outcomes\ favorable\ to\ A}{\#\ of\ total\ possible\ outcomes}$

Rochambeau – Theoretical Probability:

Tree Diagram

4. Jenna is Player A on her team and she has decided to make a tree diagram to help her calculate the probability that she will win. The diagram she started is shown below. Work with your team to complete this diagram. Use the table to summarize the outcomes.



RRR
RRP
RRS
RPR
RPP
RPS
RSR
RSP
RSS
PRR
PRP
PRS
PPR
PPP
PPS
PSR
PSP
PSS

5. How many outcomes are in the sample space of three players?
6. How many outcomes are there where Player A wins? Put a CIRCLE around the outcomes where Player A wins.
7. How many outcomes are there where Player B wins? DON'T put anything around outcomes where Player B wins.
8. How many outcomes are there where Player C wins? Put a BOX around the outcomes where Player C wins.

From your sample space calculate the following probabilities. Give as a fraction and a decimal rounded to the nearest thousandth. Compare 9-11 to your experimental probabilities from when you played the game.

9. Probability (Player A/3 Matches) =
10. Probability (Player B/2 Matches) =
11. Probability (Player C/No Matches) =
12. What is the probability of getting at 2 Rocks?
13. What is the probability of not getting Scissors?
14. What is the probability of not getting Paper or Rock?

Another Method to do Theoretical – Two-Way Table

List the sample space for the possible combinations of ROCK, PAPER, and SCISSORS if two people are playing. List the event from Player A first, then Player B second.

		Player B		
		Rock	Paper	Scissors
Player A	Rock	RR	RP	RS
	Paper			
	Scissors		SP	

Now, combine the above sample space with the possible combinations of ROCK, PAPER, and SCISSORS with a third player, Player C. List the event from Player A and B first, then Player C second.

		Player C		
		Rock	Paper	Scissors
Players A & B	RR	RRR	RRP	RRS
	RP	RPR	RPP	RPS
	RS	RSR	RSP	RSS
	PR			
	PP		PPP	
	PS			
	SR			
	SP			SPS
	SS	SSR		

Which method did you like better to create your sample space?

Are their advantages or disadvantages to each method?

Practice Problems ☺

1-9. You roll a six-sided die once. Find the following *theoretical* probabilities:

1. P(4) =

2. P(odd) =

3. P(not 5) =

4. P(less than 3) =

5. P(greater than 6) =

6. P(not odd) =

7. P(1 or 2) =

8. P(less than 6) =

9. P(9) =

You roll a six sided die 60 times. Here are your results:

Six-sided Die Results					
					
11	14	7	10	6	12

10-18. Find the following *experimental* probabilities:

10. P(4) =

11. P(odd) =

12. P(not 5) =

13. P(less than 3) =

14. P(greater than 6) =

15. P(not odd) =

16. P(1 or 2) =

17. P(less than 6) =

18. P(9) =

19. Were any of the theoretical probabilities were the same as the experimental probabilities?

20-25. You have a bag of 3 yellow, 9 red and 8 blue marbles. You randomly draw one marble from a bag. Find the following *theoretical* probabilities:

20. P(yellow) =

21. P(blue) =

22. P(not red) =

23. P(white) =

24. P(yellow or red) =

25. P(yellow, red or blue) =