DATA ANALYSIS UNIT – GUIDED LEARNING

Part 3:
Theoretical and Experimental Probability
Fairness

Algebra II - Fall Semester

The Data Analysis Unit is subdivided into 4 parts. Each part is worth 25 points for a total of 100 possible points. The final points earned will count as one test grade for the fall semester.

*****We will be using Desmos (www.desmos.com) and/or graphing calculator for these lessons.***

Click the lesson recording link and complete the notetaking guide below. You will also need to be using Desmos and/or graphing calculator as you listen to the lesson recording so you can practice what is demonstrated. The completed notetaking guide/experiment is due on __________. You will scan your work as a single PDF and submit it to your teacher.

Rubric:
(8 points) Part 1 of the Experiment
(12 points) Part 2 of the Experiment
(5 points) Part 3

By signing below, you are confirming that the work reflected in this guided learning unit is ***your work***. You are allowed to use a calculator or the Desmos application where appropriate. You are allowed to do additional research on any topic to gain a better understanding of the material.

Student Name ____

Parent Signature ____

*****Click here for the lesson!

Experiment: Rock/Paper/Scissors

This statistical experiment uses the classic two-person childhood game of rock/paper/scissors. You will gather sample data and compute experimental probabilities. There are two parts to this experiment. Part 1 uses 2 players and Part 2 uses 3 players.

Game Directions: Players start each round by saying, "rock, paper, scissors, shoot!" On "shoot," each player holds out their fist for rock, flat hand for paper, or their index and middle finger for scissors. Rock crushes scissors, scissors cut paper, and paper covers rock. See who wins each round! If you both uses the same sign, then it is a draw (tie).

Answer all questions using complete sentences.

At this time in the recording, pause the lesson recording, so you can collect your sample data.

PART 1

Step 1: Decide who is player A and who is player B. Play one round of the game. Mark a tally for the winner or draw (tie). Record this data below. Play a round at least 60 times. Then determine the winning percentage for both player A and player B as well as the percentage of draws.

	Tallies	**Percentage Outcomes**
Player A wins		
Player B wins		
Draw (tie)		

Step 2:

What did you notice about these percentages? ____

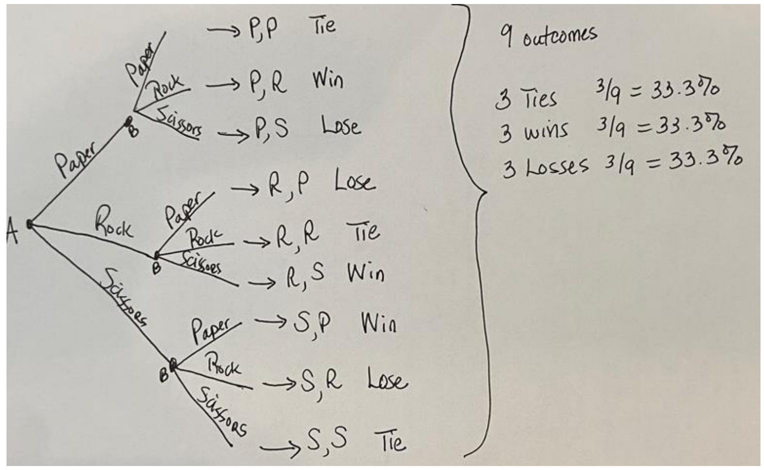
____

Do you think this is a fair game (each outcome had an equal chance of occurring)? Why or why not? __________________________

____

Start your lesson recording again now.

To the right, is a probability tree to represent the possible outcomes.



At this time in the recording, pause the lesson recording, so you answer the last questions in step 2 and can collect your sample data for part 2 of the experiment.

How does your experimental probability compare to the theoretical probability? ______________________________________

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Do you still think this came if “fair”? Why or why not? ____

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PART 2

Directions: This time you will need three players, A, B and C. Assign immediately who is Player A, B and C. Once decided, this cannot be changed. You will continue with the games Paper/Rock/Scissors BUT who wins is determined below.

If all three of you match, player A wins. If two of you match, player B wins. If none of you match, player C wins.

Step1: Record your tallies in the chart below. Play at least 60 times. Determine the experimental percentages of each outcome.

	Tallies	**Percentage Outcomes**
Player A wins		
Player B wins		
Player C wins		

Step 2: Answer the following questions.

What did you notice about these experimental percentages? ____

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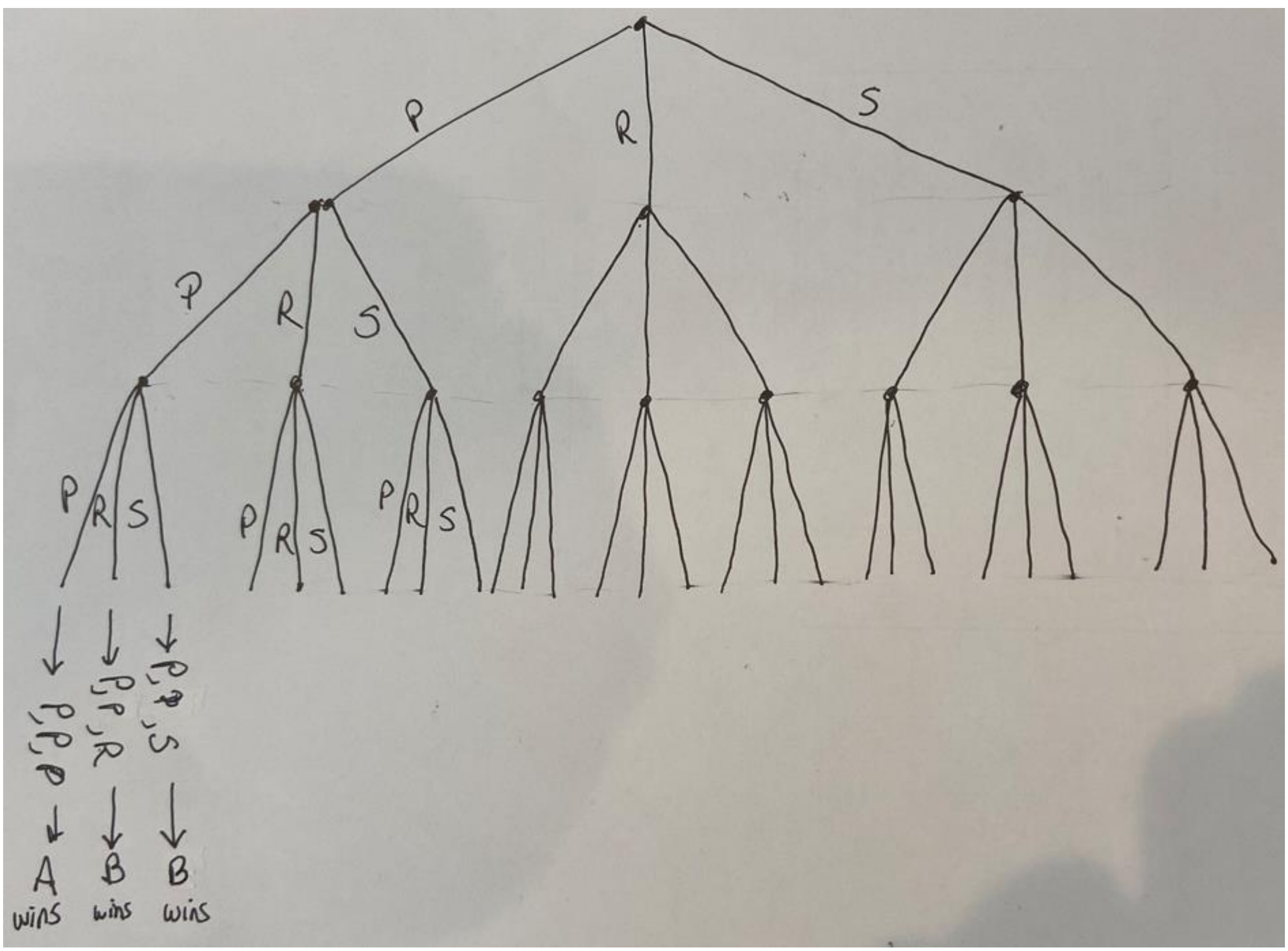
Do you think this is a fair game (each outcome had an equal chance of occurring)? Why or why not? __________________

____

Start your lesson recording again now.

Step 3: Finish completing the probability tree for this scenario. There should be 27 outcomes.

Pause your lesson recording again now.



Step 4: Determine the theoretical percentage of wins for each player. How many times a player wins and divide by 27 (total number of possible outcomes).

Player A: _____________________ Player B: _____________________ Player C: _____________________

How do YOUR experimental probability percentages from part 2 of this experiment compare to the theoretical probability percentages? ____

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Note: In a face-to-face classroom, over a period of 10 or more years, 9181 games were played, Player A won 14.4%, Player B won 64.6% and Player C won 21% of the time.

Do you think this is a fair game (each outcome had an equal chance of occurring)? Why or why not? _____________________

____

Part 3:

Most games are considered fair. Think about one of your favorite "simple" childhood games. Briefly describe the rules. If it takes you pages to explain the rules, pick a simpler game. ____

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Thinking about the game you described, what could you change in the directions to make it become a mathematically **unfair** game?

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Why is this version of the game considered **unfair**? Give a mathematical reason for your answer.

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