Grade 8 Math Assignment: Probability

Part 1: Rock, Paper, Scissors - The Study of Chance

Purpose
An introduction of the basic information on probability and statistics

Materials:
- Two sets of hands
- Paper
- Pencil

After this activity, you will be able to determine whether or not the game is fair and be able to interpret and display the data obtained. You will also be able to see that probability is used often in society. You will be able to distinguish between theoretical and experimental probabilities.

Procedures:

NOTE: We are ***NOT* playing Rock, Paper, Scissors, Lizard, Spock

1. As a pair you will play ñ*Rock, Paper, Scissors"* 18 times.
2. A rock is a closed fist. Paper is flat hand, and scissors is a ñpeace signò
3. Two fist pumps and on the third reveal the symbol.
4. A rock beats scissors. Paper beats rocks, and scissors beats paper.
5. Keep score of who wins and who loses and the ties in the chart below.
6. Calculate the total wins, losses and ties and report to the teacher.
7. Copy the class results on the back of this assignment.
8. Calculate mean, median, mode and range for wins, losses and ties of the class results.

Individual Results

Player	RESULTS																	
A																		
B																		

Class Results

Event	Mean	Median	Mode	Range
Player A Wins				
Player B Wins				
Tie				

Discussion Questions

1. Create a chart to show all possible outcomes for ***one*** game between any two players.

2. Using your chart above, answer the following questions to determine if the game is fair.

    a. How many outcomes does a game have?

    b. ***CLEARLY*** label each possible outcome on your diagram as to win for A, B, or TIE.

    c. How many wins for player A.

    d. Find the probability A will win in any round. Write this probability as a reduced fraction.

    e. Repeat part c and d for Player B.

    f. Explain whether this game is fair or not based on probability.

3. When you were playing what was Player Aôs results as a fraction? Player Bôs?

4. Compare/contrast the actual fractions with the mathematical probabilities you calculated in c-e of question 2. Explain any differences/similarities.

5. The two methods above are called Theoretical and Experimental Probability. Which one is which? How do you know?

6. Research a definition of Theoretical and Experimental probability. Write it down here.

7. Research and briefly explain ***5 (five)*** real life situations where probability is used.

Part 2: Theoretical and Experimental Probability

Experimental probability:

$$P(\text{event}) = \frac{\text{Number of times event occurs}}{\text{Total number of trials}}$$

Example:

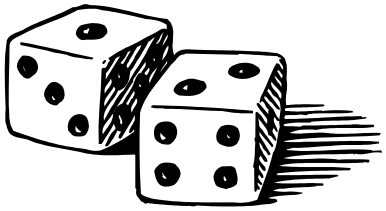
You tossed a coin 10 times and recorded a head 3 times, a tail 7 times

$$P(\text{head}) = \frac{3}{10}$$

$$P(\text{tail}) = \frac{7}{10}$$

Theoretical probability:

$$P(\text{event}) = \frac{\text{Number of favorable outcomes}}{\text{Total number of possible outcomes}}$$

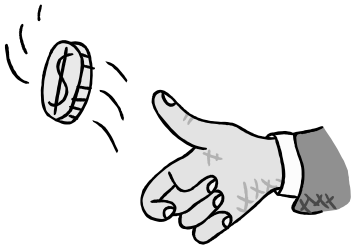


Example:

Toss a coin and getting a head or a tail is $\frac{1}{2}$.

$$P(\text{head}) = \frac{1}{2}$$

$$P(\text{tail}) = \frac{1}{2}$$



What Are My Chances?

You will be evaluating games of chance to help you understand probability. For each game of chance, predict what will be the most frequent outcome. Then run the experiment 10 times. For each trial, record the actual outcome in the Result row. If this matches your predicted outcome, put a check mark in the Prediction row.

1. Flip a Coin

Prediction for most frequent outcome: Heads Tails

Result										
Prediction										

2. Roll 1 Die

Prediction for most frequent outcome: 1 2 3 4 5 6

Result										
Prediction										

3. Pick a Card Color

Prediction for most frequent outcome: Red Black

Result										
Prediction										

4. Pick a Card Suit

Prediction for most frequent outcome: Clubs (!) Spades (‡) Diamonds (D)Hearts (D)

Result										
Prediction										

5. Pick an Exact Card

Prediction for most frequent outcome: _____ (e.g., 3D)

Result										
Prediction										

6. In which game of chance were your predictions most accurate? Why do you think that?

7. Complete the table below with the probability for each event. Use the results from your experiments above to calculate the experimental probabilities.

Game of Chance	Event	Experimental Probability	Theoretical Probability
Flip a coin	Heads		
Roll one die	6		
Pick a card colour	Red		
Pick a card suit	Diamonds		
Pick and exact card	5 of Diamonds		

8. Compare the theoretical and experimental probabilities for each game of chance. Were you close in any of the experiments?

Sum it up Questions:

1. You and your three friends take turns taking random samples of 10 jellybeans from the jar of 800 jellybeans. All the jellybeans are returned to the jar and mixed in, before the next sample is taken out. The table shows the number of different coloured jellybeans in each sample.

Sample #	Red	Yellow	White	Green
1	6	1	3	0
2	4	3	1	2
3	5	2	2	1
4	4	4	1	1

a. For each sample what is the experimental probability of picking a red jellybean?

b. For each sample what is the probability of not picking a red jellybean?

c. Use the sample data to predict the number of red jellybeans in the jar. Explain how you made your prediction.