

ROCK, PAPER, SCISSORS

PROBABILITY: The Study of Chance

OVERVIEW: The theory of probability is an important branch of mathematics with many practical applications in the physical, medical, biological and social sciences. An understanding of this theory is essential to understand weather reports, medical findings, political doings and the state lotteries. Students have many misconceptions about probability situations.

PURPOSE: The purpose of this activity, is to begin the process of helping students to learn the basic principles of probability.

OBJECTIVES: As a result of this activity the student will:

1. Conduct an experiment
2. Determine if a game is "fair"
3. Collect data (table)
4. Interpret data (range, mode, median)
5. Display data (line graph)
6. Conduct analysis of game (tree diagram)
7. State and apply the rule (definition) for probability

RESOURCES, MATERIALS: Overhead grid, overhead, pencils, paper.

ACTIVITIES & PROCEDURES:

1. Introduce activity with a demonstration of game: rock, scissors, paper.
2. Divide class into pairs (player A and player B) and have them play the game 18 times.
3. Use overhead graph grid to graph the wins of player A in red (how many A players won one game, two games, etc.) Do the same for all B players in a different color.
4. Help students determine range, mode, and mean for each set of data. Compare the results.
5. Do a tree diagram to determine the possible outcomes.
6. Answer the following questions to determine if the game is fair.
 - a. How many questions does game have ? (9)
 - b. Label each possible outcome on tree diagram as to win for A, B, or tie.
 - c. Count wins for A (3)
 - d. Find probability A will win in any round ($3/9 - 1/3$) Explain what probability means favorable outcomes / possible outcomes.
 - e. Count wins for B (3)
 - f. Find probability B will win in any round (3/9).
 - g. Is game fair? Do both players have an equal probability of winning in any round? (Yes)
7. Compare the mathematical model with what happened when students played the game.

TYING IT ALL TOGETHER:

1. Use this as an introduction to a unit on probability.
2. Follow-up with discussion about how probability is used in world.
3. Play game again using 3 students. Using the following rules:
 1. A wins if all 3 hands are same.
 2. B wins if all 3 hands are different.
 3. C wins if 2 hands are same.

There will be 27 outcomes this time. 3 to the third power. $3*3*3=27$

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

of groups

RED # of wins for player A

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

of groups

BLUE # of wins for player B

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

of groups

GREEN # of wins for player C