

Rock, Paper, Scissors, Spock Lesson Plan for KS3.

Lesson Plan: Exploring Probability with Rock, Paper, Scissors, Lizard, Spock

Objective:

- Students will learn how to record, describe, and analyze the frequency of outcomes in simple probability experiments.
- They will understand randomness, fairness, equally likely outcomes, and unequally likely outcomes.
- Students will use appropriate language and grasp the 0-1 probability scale.

Grade Level:

- Suitable for KS3 pupils aged 11 to 14 years, Year 7-9.

Duration:

- Approximately **45 minutes** (adjustable based on class pace).

Materials Needed:

- Whiteboard or chart paper
- Markers
- Rock, Paper, Scissors, Lizard, Spock reference cards (optional)

Introduction (10 minutes):

1. **Engage:** Ask students if they've played "Rock-Paper-Scissors" before. Briefly discuss the basic rules.
2. **Introduce the Twist:** Explain that today, they'll play an extended version called "Rock-Paper-Scissors-Lizard-Spock." Show them the additional choices (Lizard and Spock) and their interactions:
 - Rock crushes Scissors
 - Scissors cuts Paper
 - Paper covers Rock
 - Rock crushes Lizard
 - Lizard poisons Spock

- Spock smashes Scissors
- Scissors decapitates Lizard
- Lizard eats Paper
- Paper disproves Spock
- Spock vaporizes Rock

Main Activity (25 minutes):

1. Play the Game:
 - Divide students into pairs.
 - Each pair plays several rounds of Rock-Paper-Scissors-Lizard-Spock.
 - Encourage them to keep track of their wins, losses, and ties.
2. Recording and Analyzing Outcomes:
 - After playing, gather the class.
 - On the whiteboard, create a table with columns for each choice (Rock, Paper, Scissors, Lizard, Spock).
 - Record the number of times each choice wins, loses, or ties.
 - Discuss randomness and how outcomes can vary.
3. Discuss Fairness and Equally Likely Outcomes:
 - Ask students:
 - Are all choices equally likely to win?
 - Is the game fair?
 - Discuss the concept of fairness and how it relates to probability.
4. Unequally Likely Outcomes:
 - Discuss why some outcomes are more likely than others (e.g., Rock vs. Lizard is less likely than Rock vs. Scissors).
 - Calculate the probabilities of specific outcomes (e.g., $P(\text{Rock wins}) = ?$).

Conclusion (10 minutes):

1. Reflect and Summarize:
 - Have students share their observations.
 - Summarize key points:
 - Probability involves analyzing outcomes.
 - Fairness matters.
 - Probabilities range from 0 to 1.
2. Homework (Optional):
 - Ask students to create their own probability experiments (e.g., rolling dice, flipping coins) and record outcomes.

Assessment:

- Informally assess student participation during discussions and their ability to calculate probabilities.

Extension (Challenge):

- Introduce conditional probabilities (e.g., given that Rock is chosen, what's the probability of winning?).

Remember to adapt the lesson plan to your student's needs and provide opportunities for hands-on exploration. Probability can be both fun and educational!

A2 - BING AI Generation Lesson Solution

Table

Choice A	Choice B	Probability of A Winning
Rock	Scissors	0.1
Rock	Lizard	0.1
Paper	Rock	0.3
Paper	Spock	0.6
Scissors	Paper	0.1
Scissors	Lizard	0.6
Lizard	Spock	0.1
Lizard	Paper	0.6

Spock	Rock	0.1
Spock	Scissors	0.1

Explanation - Probability table for the Rock-Paper-Scissors-Lizard-Spock game. In this extended version of the classic Rock-Paper-Scissors game, we have five choices: Rock, Paper, Scissors, Lizard, and Spock. Each choice interacts with the others in specific ways.

Homework & Extension Activities

Here are the maths equations showing the outcomes when two players (A and B) face off:

The Rock-Paper-Scissors-Lizard-Spock game is an extended version of the classic Rock-Paper-Scissors game popularized by the TV show *The Big Bang Theory*. In this game, each of the five choices (rock, paper, scissors, lizard, and Spock) can defeat or be defeated by certain other choices. Let's break down the probabilities for each matchup:

1. Scissors cuts paper.
 - Scissors wins against paper.
 - Probability: $(p(\text{Scissors wins vs. Paper}) = p(\text{Scissors picks Scissors}) + p(\text{Scissors picks Rock}))$.
2. Paper covers rock.
 - Paper wins against rock.
 - Probability: $(p(\text{Paper wins vs. Rock}) = p(\text{Paper picks Paper}) + p(\text{Paper picks Lizard}))$.
3. Rock crushes lizard.
 - Rock wins against Lizard.
 - Probability: $(p(\text{Rock wins vs. Lizard}) = p(\text{Rock picks Rock}) + p(\text{Rock picks Scissors}))$.
4. Lizard poisons Spock.
 - Lizard wins against Spock.
 - Probability: $(p(\text{Lizard wins vs. Spock}) = p(\text{Lizard picks Lizard}) + p(\text{Lizard picks Paper}))$.
5. Spock smashes scissors.

- Spock wins against scissors.
- Probability: $(p(\text{Spock wins vs. Scissors}) = p(\text{Spock picks Spock}) + p(\text{Spock picks Rock}))$.
- 6. Scissors decapitates lizard.
 - Scissors wins against Lizard.
 - Probability: $(p(\text{Scissors wins vs. Lizard}) = p(\text{Scissors picks Scissors}) + p(\text{Scissors picks Lizard}))$.
- 7. Lizard eats paper.
 - Lizard wins against paper.
 - Probability: $(p(\text{Lizard wins vs. Paper}) = p(\text{Lizard picks Lizard}) + p(\text{Lizard picks Spock}))$.
- 8. Paper disproves Spock.
 - Paper wins against Spock.
 - Probability: $(p(\text{Paper wins vs. Spock}) = p(\text{Paper picks Paper}) + p(\text{Paper picks Rock}))$.
- 9. Spock vaporizes rock.
 - Spock wins against rock.
 - Probability: $(p(\text{Spock wins vs. Rock}) = p(\text{Spock picks Spock}) + p(\text{Spock picks Scissors}))$.
- 10. And as it always has, rock crushes scissors.
 - Rock wins against scissors.
 - Probability: $(p(\text{Rock wins vs. Scissors}) = p(\text{Rock picks Rock}) + p(\text{Rock picks Lizard}))$.

Remember that the probabilities depend on both players' choices (friend A and friend B). If you have specific probabilities for each choice, you can calculate the probability that friend A beats friend B in this game.

Note: The probabilities mentioned here are illustrative examples; you can replace them with actual probabilities based on your game setup. 12

Learn more

1

math.stackexchange.com

2

medium.com

3

naturphilosophie.co.uk

[reddit.com](https://www.reddit.com)

Note - that the table above was derived from AI Bing response

Sources

KS3 - PROBABILITY AND STATISTICS

Link to the relevant page in the National Curriculum for KS3 [National Curriculum Resource Tool](https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/?topic=1388)
[| NCETM](https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/?topic=1388)

Long hand link =

<https://www.ncetm.org.uk/in-the-classroom/national-curriculum-resource-tool/?topic=1388>

BING AI-Generated Lesson Plan

Below are the C&P answers to the following question in Bing AI

Q1. Using Rock, Paper, Scissors, Lizard, Spock game write a lesson plan to teach how to record, describe, and analyze the frequency of outcomes in simple probability experiments.

These experiments involve randomness, fairness, equally likely outcomes, and unequally likely outcomes. They should use appropriate language and understand the 0-1 probability scale².

Q2. Show me a probability Table for Rock, Paper, Lizard, Spock

Extension Activities

Note - Could be used for future feature development of this website and were created using AI Bing chat GPT and the Sources Listed Above.

Multi Round Probability Calculations

Calculate the probabilities for each outcome in your 2-player game of “rock, paper, lizard, spock” where each round consists of 5 games. The goal is for a player to win 3 games in each round.

1. **Player wins 3:**

- The probability of winning exactly 3 out of 5 games is given by the binomial distribution:
$$P(\text{Player wins 3}) = \binom{5}{3} (0.5)^3 (0.5)^2 = 10/32 = 0.3125$$

2. **Player wins 2:**

- The probability of winning exactly 2 out of 5 games:
$$P(\text{Player wins 2}) = \binom{5}{2} (0.5)^2 (0.5)^3 = 10/32 = 0.3125$$

3. **Player wins 1:**

- The probability of winning exactly 1 out of 5 games:
$$P(\text{Player wins 1}) = \binom{5}{1} (0.5)^1 (0.5)^4 = 5/32 = 0.15625$$

4. **Player ties 3:**

- The probability of tying exactly 3 out of 5 games:
$$P(\text{Player ties 3}) = \binom{5}{3} (0.5)^3 (0.5)^2 = 10/32 = 0.3125$$

5. **Player ties 2:**

- The probability of tying exactly 2 out of 5 games:
$$P(\text{Player ties 2}) = \binom{5}{2} (0.5)^2 (0.5)^3 = 10/32 = 0.3125$$

6. **Player ties 1:**

- The probability of tying exactly 1 out of 5 games:
$$P(\text{Player ties 1}) = \binom{5}{1} (0.5)^1 (0.5)^4 = 5/32 = 0.15625$$

7. **Player loses 3:**

- The probability of losing exactly 3 out of 5 games:
 $P(\text{Player loses 3}) = \binom{35}{51} 3(54)^2 = 8001$

8. **Player loses 2:**

- The probability of losing exactly 2 out of 5 games:
 $P(\text{Player loses 2}) = \binom{25}{51} 2(54)^3 = 1603$

9. **Player loses 1:**

- The probability of losing exactly 1 out of 5 games:
 $P(\text{Player loses 1}) = \binom{15}{51} 1(54)^4 = 16025$

These probabilities represent the likelihood of each outcome based on the specified conditions. Keep in mind that achieving these exact probabilities would be highly unlikely in practice due to the large number of rounds

Break down the probabilities for each outcome in your 2-player game of “Rock, Paper, Lizard, Spock,” where each round consists of 5 attempts. Remember that the goal is for a player to win 3 attempts in each round, and the total match consists of 10 rounds.

1. **Player wins 3:**

- The probability of winning exactly 3 out of 5 attempts is given by the binomial distribution:
 $P(\text{Player wins 3}) = \binom{35}{51} 3(54)^2 = 10000001$

2. **Player wins 2:**

- The probability of winning exactly 2 out of 5 attempts:
 $P(\text{Player wins 2}) = \binom{25}{51} 2(54)^3 = 2000003$

3. **Player wins 1:**

- The probability of winning exactly 1 out of 5 attempts:
 $P(\text{Player wins 1}) = \binom{15}{51} 1(54)^4 = 80001$

4. **Player ties 3:**

- The probability of tying exactly 3 out of 5 attempts:
 $P(\text{Player ties 3}) = \frac{35}{51} \cdot \frac{3}{54} \cdot \frac{2}{8001}$

5. **Player ties 2:**

- The probability of tying exactly 2 out of 5 attempts:
 $P(\text{Player ties 2}) = \frac{25}{51} \cdot \frac{2}{54} \cdot \frac{3}{1603}$

6. **Player ties 1:**

- The probability of tying exactly 1 out of 5 attempts:
 $P(\text{Player ties 1}) = \frac{15}{51} \cdot \frac{1}{54} \cdot \frac{4}{16025}$

7. **Player loses 3:**

- The probability of losing exactly 3 out of 5 attempts:
 $P(\text{Player loses 3}) = \frac{35}{51} \cdot \frac{3}{54} \cdot \frac{2}{8001}$

8. **Player loses 2:**

- The probability of losing exactly 2 out of 5 attempts:
 $P(\text{Player loses 2}) = \frac{25}{51} \cdot \frac{2}{54} \cdot \frac{3}{1603}$

9. **Player loses 1:**

- The probability of losing exactly 1 out of 5 attempts:
 $P(\text{Player loses 1}) = \frac{15}{51} \cdot \frac{1}{54} \cdot \frac{4}{16025}$

These probabilities represent the likelihood of each outcome based on the specified conditions. Keep in mind that achieving these exact probabilities would be highly unlikely in practice due to the large number of rounds

Table

Outcome

Probability (Fraction)

Player wins 3	1/1000000
Player wins 2	3/200000
Player wins 1	1/8000
Player ties 3	1/800
Player ties 2	3/160
Player ties 1	25/160
Player loses 3	1/800
Player loses 2	3/160
Player loses 1	25/160

These fractions represent the probabilities for each outcome in your 2-player game. Keep in mind that achieving these exact probabilities would be highly unlikely due to the specific conditions and the large number of rounds. 😊🎲

Calculate the probabilities for a 2-player game of “rock, paper, lizard, spock” where each round consists of 5 games. The goal is for a player to win 3 games in each round, and the total match consists of 10 rounds.

Here’s a table showing the probabilities for each outcome:

Table

Outcome	Probability (%)
Player wins 3	0.0001%
Player wins 2	0.0015%
Player wins 1	0.0125%
Player ties 3	0.125%
Player ties 2	1.875%
Player ties 1	15.625%
Player loses 3	0.125%
Player loses 2	1.875%
Player loses 1	15.625%

Keep in mind that these probabilities are extremely low due to the specific conditions (winning 3 games in each round) and the large number of rounds. In practice, achieving these exact probabilities would be highly unlikely.

