

Max's Probability Puzzles

Learning objective: To calculate, compare, and describe the probability of outcomes using fractions, decimals, and percentages.

Read each scenario carefully. Use your knowledge of probability scales—ranging from impossible to certain—to solve the maths challenges below. Show your working out clearly.

Max the monkey is organising a charity raffle and a game stall for the school summer fete. He has a bag of coloured marbles, a set of numbered cards, and a spinner to help him calculate the chances of winning.

Word bank: probability · certain · impossible · likely · unlikely · equally likely · outcome · fraction

1. Max has a bag containing 5 red marbles, 3 blue marbles, and 2 yellow marbles. If he picks one marble at random, what is the probability (as a fraction in its simplest form) that he picks a blue marble? Explain your reasoning. (2 marks)

2. Max has a spinner with 8 equal segments. 4 segments are green, 2 are purple, 1 is orange, and 1 is silver. If you spin the spinner, compare the probability of landing on green versus the probability of landing on purple. Justify your answer using percentages. (2 marks)

3. In a game, players must roll a standard 6-sided die. What is the probability of rolling a prime number? Express your answer as a decimal. (2 marks)

4. Max adds 10 white marbles to the bag (which already has 5 red, 3 blue, and 2 yellow). What might happen to the probability of picking a blue marble? Calculate the new probability and explain the change. (2 marks)

5. If Max creates a game where a player pays £2.00 to guess a card from a deck of 20 cards (numbered 1-20), and they win £5.00 if they pick a multiple of 5, is this game 'likely' or 'unlikely' to result in a win? Prove your answer. (2 marks)

Draw: Draw a spinner that has an 'equally likely' chance of landing on three different colours. Label the probability of each colour as a fraction.



Extension challenge: Design your own probability game for the school fete. You must include at least two different objects (e.g., dice, cards, or spinners). Write a short paragraph justifying why your game is fair or unfair, and explain how you would change the rules to make it 'certain' that a player would win.