

AQA (GCSE Notes)

Chapter 5: Probability

- Q1.** A die is rolled 60 times. Record the outcomes in a table and calculate how often each number appears.
- Q2.** A coin is flipped 50 times. Describe how you would record the outcomes and represent them in a frequency table.
- Q3.** A spinner has 4 equal sections labelled A, B, C and D. It is spun 100 times. Explain how to use a table to analyse the frequency of each outcome.
- Q4.** You roll a fair die 120 times and get the following outcomes: 1 (18 times), 2 (20), 3 (19), 4 (21), 5 (22), 6 (20). Use this data to find the relative frequency for each number.
- Q5.** You flip a coin 200 times and record 112 heads. Compare the relative frequency of heads with the theoretical probability.
- Q6.** Create a frequency tree for a bag containing 3 red balls and 2 blue balls, where you draw two balls without replacement.
- Q7.** A coin is flipped and a die is rolled. Show the outcomes in a frequency tree.
- Q8.** A box has 5 green and 3 yellow sweets. You pick one sweet, note its colour, and replace it. Repeat this 40 times. Record and analyse your findings.
- Q9.** Explain how the concept of fairness applies to rolling a standard die.
- Q10.** Describe what is meant by an event being “equally likely” using the example of flipping a coin.
- Q11.** Two dice are rolled. List all possible outcomes and explain why this set is exhaustive.
- Q12.** You have a bag of counters: 2 red, 3 green, and 5 blue. What is the probability of picking a green counter? Justify your answer using the 0 to 1 scale.
- Q13.** A spinner with 3 equal sections is spun. After 60 spins, section A appears 10 times. Calculate the relative frequency and compare it with the expected probability.
- Q14.** A coin is flipped 100 times. Describe how to estimate the expected number of heads and tails.
- Q15.** You conduct a probability experiment using a six-sided die. Record the results in a table and describe how to analyse the data.
- Q16.** A student rolls a die 300 times. How should they use a frequency table to estimate the probability of rolling a 6?

- Q17.** Explain why the sum of the probabilities of all outcomes when rolling a die is 1.
- Q18.** In an experiment, 3 students each flip a coin 20 times. How can the combined data be used to estimate the probability of getting heads?
- Q19.** A spinner has unequal sections: $\frac{1}{2}$ red, $\frac{1}{4}$ blue, and $\frac{1}{4}$ yellow. Draw a frequency tree for two spins with replacement.
- Q20.** A bag has 6 blue, 3 red, and 1 green marble. Explain how to record the frequency of outcomes if 100 marbles are drawn with replacement.
- Q21.** Describe how to test whether a die is fair using a probability experiment.
- Q22.** If you flip a fair coin 500 times, how many heads would you expect? Explain your reasoning.
- Q23.** A student rolls two dice and adds the scores. Explain how to record the frequencies of the totals and compare them with theoretical probabilities.
- Q24.** In a game, you win if you roll a 5 or a 6. Estimate the expected number of wins in 60 rolls of a fair die.
- Q25.** A spinner with sections labelled A, B, C is spun 90 times. A appears 27 times, B 36 times, and C 27 times. Discuss the fairness of the spinner.
- Q26.** A card is drawn from a standard pack and replaced. This is repeated 100 times. How would you record and analyse the suit outcomes?
- Q27.** How does increasing the number of trials affect the relative frequency in a probability experiment?
- Q28.** A student flips 2 coins and records whether the results match or not. Describe how they could use a table to track the outcomes.
- Q29.** Explain how to create a frequency tree for choosing a coin at random from a set and then flipping it.
- Q30.** You spin a spinner with 5 equal parts 150 times. Describe how to use a frequency table to check if the spinner is biased.
- Q31.** A student flips a coin and records the result. They repeat this 10 times. Why might the results not match the expected probabilities?
- Q32.** A die is rolled 90 times and the number 3 comes up 10 times. How does this compare with the expected number?
- Q33.** Describe how to use relative frequency to estimate the probability of rain based on weather data from the past 100 days.

- Q34.** In a class experiment, students each spin a spinner 20 times. How can the combined results be used to get a more accurate estimate?
- Q35.** A bag has 4 red and 6 blue counters. Describe how to use a tree diagram to show the outcomes of two draws without replacement.
- Q36.** A coin is flipped twice. List all possible outcomes and their probabilities. Show that the sum is 1.
- Q37.** A box contains balls numbered 1 to 5. Two balls are picked without replacement. Record all outcomes and check that the total probability is 1.
- Q38.** You throw two dice. What is the probability of getting a total of 7? Use the sample space to support your answer.
- Q39.** A fair spinner has 3 equal sections. How many times should you expect each outcome in 60 spins?
- Q40.** You roll a die and flip a coin. Explain how to use a table to list all possible outcomes.
- Q41.** In an experiment, the relative frequency of heads in 50 coin flips is 0.56. What does this suggest?
- Q42.** You pick a coloured marble from a bag of 10. Explain how the outcomes are mutually exclusive and exhaustive.
- Q43.** Two coins are flipped. Use a frequency tree to show all outcomes and their probabilities.
- Q44.** A biased die shows 6 twice as often as any other number. How would you record and analyse the outcomes?
- Q45.** Describe how to test the fairness of a spinner with unequal sections using experimental data.
- Q46.** A student claims a coin is not fair. What kind of experiment would you do to test this?
- Q47.** How does the idea of equally likely outcomes apply to drawing cards from a shuffled deck?
- Q48.** You conduct a survey and ask 100 people to pick a number from 1 to 10. How can you tell if people are choosing fairly?
- Q49.** A student rolls a die 180 times and records the frequency of each result. How do they use this to estimate probability?
- Q50.** A class plays a game where they roll a die and win if they roll a 6. How would they use a table to record and analyse their results?
- Q51.** A bag contains 4 red balls and 6 blue balls. One ball is taken out at random. List all possible outcomes and show that their probabilities add up to 1.

- Q52.** Two dice are rolled. List all possible outcomes and verify that the sum of their probabilities is 1.
- Q53.** A coin is flipped and a die is rolled. Write all possible combined outcomes and check that their total probability is 1.
- Q54.** Explain how the outcomes from rolling a fair die once form an exhaustive and mutually exclusive set.
- Q55.** A card is picked from a standard deck. List all suits and calculate their probabilities. Prove that they form an exhaustive set.
- Q56.** A bag contains 3 green and 2 yellow counters. A counter is picked and then replaced. Describe all possible outcomes and show their total probability is 1.
- Q57.** A student flips a fair coin 100 times. What should happen to the relative frequency of heads as the number of flips increases?
- Q58.** Explain why results from a small number of trials may differ from theoretical probabilities and how more trials help accuracy.
- Q59.** A class rolls a die 20 times each. How can their combined results give a better estimate of probability than one student's results?
- Q60.** Describe how a two-way table can be used to compare observed and expected frequencies for flipping a coin 200 times.
- Q61.** A bag has 2 red, 3 blue and 5 green counters. Describe a method to estimate the probability of drawing a red counter using experiment.
- Q62.** Draw a Venn diagram to represent the outcomes of drawing a red or even-numbered card from a standard pack.
- Q63.** Two events A and B are mutually exclusive. Explain what this means and how to calculate the probability of A or B.
- Q64.** A group of students were asked whether they like maths or science. Use a Venn diagram to represent the data and find the number who like only one subject.
- Q65.** Use a table to list the outcomes when a die is rolled and a coin is flipped. How many outcomes are there?
- Q66.** Draw a possibility space for two spins of a spinner with outcomes A, B, and C.
- Q67.** A spinner with four equal sections is spun twice. Construct the theoretical possibility space and calculate the probability of getting the same result both times.
- Q68.** Construct a tree diagram for picking a red or blue ball from a bag and then flipping a coin.

- Q69.** Explain how to use a tree diagram to find the probability of getting two heads when flipping a coin twice.
- Q70.** A student picks a card, replaces it, and picks again. Draw a tree diagram and use it to find the probability of getting two aces.
- Q71.** Explain how tree diagrams show the difference between independent and dependent events using the example of picking two counters without replacement.
- Q72.** In a bag of 10 balls (4 red, 6 blue), two are drawn without replacement. Use a tree diagram to find the probability of getting one red and one blue.
- Q73.** Describe how the structure of a tree diagram changes when replacement is allowed versus when it is not.
- Q74.** A fair coin is flipped and then a biased die is rolled (where 6 is twice as likely). Construct a tree diagram and label probabilities.
- Q75.** Explain how to use a possibility grid to show the outcomes of two dice and calculate the probability of getting a total greater than 9.
- Q76.** You draw a card and roll a die. Construct the full set of outcomes and determine how many are possible.
- Q77.** A jar has 3 red, 2 green, and 5 yellow sweets. One sweet is chosen, eaten, and then another is chosen. Find the probability of picking two different colours.
- Q78.** Two students flip a coin 50 times each. Explain how combining their results helps improve the estimate of the probability of heads.
- Q79.** A survey shows that 70 students like sports, 50 like music, and 30 like both. Represent this using a Venn diagram and find how many like only one activity.
- Q80.** A class of 40 students has 22 boys and 18 girls. 14 boys and 12 girls like maths. Use a two-way table to show this data.
- Q81.** Given that a student has passed a test, what is the probability they revised, using a table showing 100 students and their revision/pass status?
- Q82.** In a game, a player wins if they draw a red card and then roll an even number. Draw a tree diagram and find the probability of winning.
- Q83.** A bag contains 5 red and 5 blue counters. One is drawn, not replaced, and another is drawn. Use a tree diagram to find the probability both are blue.
- Q84.** A box has 3 pens: black, blue, and red. One pen is picked and used to tick an answer. How many outcomes are possible?

- Q85.** List all the outcomes of rolling two different dice and calculate the probability that the two numbers are equal.
- Q86.** A test has two questions. Each has a correct answer with probability 0.6. What is the probability of getting both right using a tree diagram?
- Q87.** Explain how Venn diagrams can be used to find the number of students who belong to neither of two clubs.
- Q88.** A student draws two balls from a bag with 4 green and 6 red balls without replacement. What is the probability both are green?
- Q89.** A spinner with three colours is spun twice. Describe how to list all possible outcomes and count how many are the same colour.
- Q90.** You toss three coins. How many different outcomes are there? Use a tree diagram to find the probability of getting exactly two heads.
- Q91.** A shop records how many customers buy snacks and drinks. Use a two-way table to analyse the data and find how many bought both.
- Q92.** A survey shows 40 people own dogs, 30 own cats, and 10 own both. How many own only cats? Use a Venn diagram.
- Q93.** A card is drawn from a deck. Find the probability of drawing a heart given that the card is red.
- Q94.** A test has a 70% pass rate. Given that a student passed, find the probability they studied, using a tree diagram and expected frequencies.
- Q95.** Describe how to calculate the conditional probability of passing a test given that a student studied, using a two-way table.
- Q96.** Use a tree diagram to calculate the probability of getting at least one head in two coin tosses.
- Q97.** A class rolls a die and records the number. How can they use relative frequencies to estimate the probability of each face?
- Q98.** A box has 2 black, 3 white, and 5 red balls. Draw a ball, replace it, and draw again. What is the probability of getting the same colour twice?
- Q99.** Two events are A (even number on a die) and B (number less than 4). Show how to use a Venn diagram to find $P(A \cap B)$.
- Q100.** A test question is answered correctly with probability 0.75. What is the probability of getting exactly one correct answer in two attempts? Use a tree diagram.