MEGA LECTURE

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.

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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: 1/2 red, 1/4 blue, and 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.