

Chapter 3 Exercises

Exercise 1: Draw a tree diagram showing all the elementary events arising from two successive throws of a die.

Exercise 2: Draw a tree diagram showing all the elementary events arising from a throw of a die, followed by a toss of a coin. How many joint events result in a six on the die or a Head on the coin?

Exercise 3: In how many ways can four letters of the word BRIDGE be arranged in a row, if no letter is repeated?

Exercise 4: In a class of 30 boys, one prize is awarded for Latin, another for French and a third for mathematics. In how many ways can the recipients be chosen?

Exercise 5: How many numbers greater than 5000 can be formed using some or all of the digits 7, 6, 5, 4, 3, without repetition?

Exercise 6: Five letters of the word SHILLING are arranged in a row. Find the number of ways in which this can be done, when the first letter is I and the last is L,

1. if no letter may be repeated,
2. if each letter may occur as many times as it does in SHILLING.

Exercise 7: Consider four groups of students. There are six students in each group, and all the students belonging to the same group wear the same coloured jumpers. Group colours are amber, blue, charcoal and dark grey. The groups are called A, B, C and D. Each student within a group has a number on his or her jumper, from 1 to 6 (no students with the same coloured jumper have the same number). In how many ways can the following groups be formed in the coffee bar:

- (a) a group of five students, all wearing the same coloured jumpers,
- (b) a group of five students in which two students have the same number on their jumpers and three students have different numbers on their jumpers?

Exercise 8: In how many ways can a party of eight persons arrange themselves:

1. in a row of eight chairs,
2. around a circular table?

Exercise 9: How many different 4-letter words (strings containing two characters), 5-letter words, 6-letter words and 9-letter words respectively can be formed from the words:

- GAGS

- SPURS
- FOREST,
- TOTTENHAM

Exercise 10: How many numbers between 1000 and 3000 can be formed from the digits 1, 2, 3, 4, 5, if repetition of digits is:

- allowed,
- not allowed?

Exercise 11: In how many ways can five trade union officials, four members of the board of Network Rail and three members of ACAS sit at a round negotiating table if all those people representing the same organization must sit together?

Exercise 12: Five cards are selected at random from a standard deck of 52 cards. In how many ways can the following hands be chosen:

- a hand consisting of exactly one pair of cards,
- a hand containing two pairs (and one odd card),
- a hand containing two cards of one suit and three cards of another suit,
- a hand containing three cards of one suit, but the other two do not form a pair,
- a hand consisting of five cards all of the same suit?

Exercise 13: Two dice are thrown. Calculate the probability of the total score exceeding 8, given that the first die shows the values 6, 4 and 2 in successive throws.

Exercise 14: Two dice are thrown and the sum is 6. Calculate the probability that one of the dice shows 2.

Exercise 15: Suppose you have to determine the probability of each of the following three events:

- England win the next FIFA World Cup
- The first baby born in California on the 1 January next year will be a boy
- OJ Simpson murdered his wife

A frequentist statistician tries to convince you that only the second statement can be assigned a meaningful probability. Explain the problems with this assertion.