

PROBABILITY

Every question, eight papers

DBE · National Senior Certificate · Mathematics Paper 1

November 2021 - 2024 and May/June 2021, 2022, 2024, 2025

10 questions · 120 marks · 8 papers

Each question is a clip of the original DBE page. The wording, the mark allocations and the diagrams are exactly as they were printed - nothing has been retyped or redrawn. Only the blank answer space has been removed, so work in a separate book.

How it is arranged

One chapter per topic, so you can work through a whole skill at a time.

Inside a chapter the questions run from fewest marks to most. That is an order by size, not by difficulty: unlike the IEB, the DBE does not split its papers into an easier and a harder section, and its marking guidelines carry no cognitive-level tags. Nothing in these papers ranks one question as harder than another, so this booklet does not pretend otherwise.

Contents

■ Probability rules, Venn diagrams and tree diagrams	7 questions, 92 marks
8 to 17 marks each	
■ Counting first: arrangements, codes and what follows	3 questions, 28 marks
7 to 13 marks each	

Probability rules, Venn diagrams and tree diagrams

Probabilities you are given, and what can be worked out from them. Whether two events are mutually exclusive or independent decides which rule applies, and DBE asks you to say which and why as often as it asks for a number. The diagrams do the bookkeeping: a Venn diagram for overlapping events, a tree for one thing happening after another.

7 questions · 92 marks

8 to 17 marks each

1. Mutually exclusive events, then a dice and a card together

DBE NSC Paper 1 · May/June 2025 · Q10 · 8 marks

QUESTION 10

- 10.1 A and B are mutually exclusive events.
If $P(A) = 0,42$ and $P(A \text{ or } B) = 0,79$, calculate $P(B)$. (2)

- 10.2 A game at a fun park requires a player to roll a six-sided dice and pick a card from a deck of 52 cards.

A player wins if an odd number appears on the uppermost face of the dice and the player also draws a picture card from the deck.

- A deck of cards has 4 suites (hearts, diamonds, spades and clubs).
- There are 4 picture cards (king, queen, jack and ace) in every suite.

A player pays R10 to play a game and in an hour, 260 people can each play one game. If the owner wants to make a 70% profit per hour, calculate the maximum amount that the owner must pay out to each winner. (6)
[8]

2. Three examinations in one Venn diagram

DBE NSC Paper 1 · November 2024 · Q11 · 9 marks

QUESTION 11

A certain number of learners are sitting for examinations in Mathematics, Tourism and Geography.

- All these learners sit for at least one of these examinations.
- The total number of learners who sit for Mathematics (M), is 22.
- The total number of learners sitting for Tourism (T), is 16.
- The total number of learners sitting for Geography (G), is 18.
- 5 learners sit for Mathematics and Tourism, but not Geography.
- 4 learners sit for Mathematics and Geography, but not Tourism.
- 3 learners sit for Tourism and Geography, but not Mathematics.
- 6 learners sit for only Tourism.

- 11.1 Draw a Venn diagram to represent ALL the learners sitting for these examinations. (3)
- 11.2 Calculate the probability that a learner, chosen at random, will sit for examinations in at least TWO of the subjects. (2)
- 11.3 Determine if the events: sitting for examinations in Mathematics and sitting for examinations in Tourism are independent. Support your answer with the necessary calculations. (4)
[9]

3. Independent or mutually exclusive? Then twelve books on a shelf

DBE NSC Paper 1 · November 2021 · Q12 · 14 marks

QUESTION 12

12.1 A and B are independent events. It is further given that:

$$P(A \text{ and } B) = 0,3 \text{ and } P(\text{only } B) = 0,2$$

12.1.1 Are A and B mutually exclusive? Motivate your answer. (1)

12.1.2 Determine:

(a) $P(\text{only } A)$ (4)

(b) $P(\text{not } A \text{ or not } B)$ (2)

12.2 A teacher has 5 different poetry books, 4 different dramas and 3 different novels. She must arrange these 12 books from left to right on a shelf.

12.2.1 Write down the probability that a novel will be the first book placed on the shelf. (1)

12.2.2 Calculate the number of different ways these 12 books can be placed on the shelf if any book can be placed in any position. (2)

12.2.3 Calculate the probability that a poetry book is placed in the first position, the three novels are placed next to each other and a drama is placed in the last position. (4)

[14]

4. P(B) from mutually exclusive events, then what a learner buys

DBE NSC Paper 1 · May/June 2024 · Q11 · 14 marks

QUESTION 11

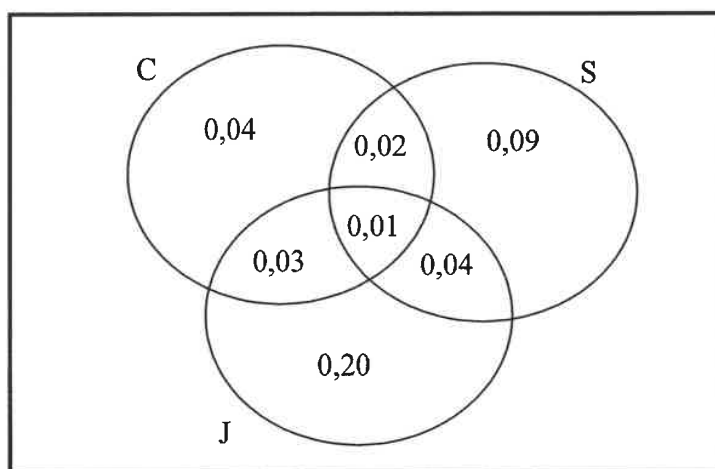
11.1 Two events, A and B, are such that:

- $P(A) = 0,4$
- $P(A \text{ or } B) = 0,52$
- A and B are mutually exclusive

Calculate $P(B)$.

(2)

11.2 The items that a learner bought at a tuck shop were recorded over a period of time. The probabilities of the learner buying a sandwich (S), a chocolate (C) and a juice (J) are shown in the Venn diagram below.



11.2.1 What is the probability that the learner will buy a sandwich?

(1)

11.2.2 Calculate the probability that the learner will buy at least two of the three items.

(2)

11.2.3 Calculate the probability that the learner would NOT buy any of the three items.

(2)

11.3 Seven guitar players, each with a different name, participate in a concert.

11.3.1 In how many different ways can the names of the guitar players be listed, one below the other, in the programme?

(1)

11.3.2 After the performance, the guitar players wait backstage. There is a bench with only room for four to sit on.

What will be the probability that the four guitar players will be sitting in alphabetical order, from left to right?

(3)

11.3.3 During the performance, the seven guitar players sit in a line on stage. Four guitar players are female and three are male.

In how many different ways can they be seated if the males may not sit next to each other?

(3)
[14]

5. Independent events, then a survey of 150 learners

DBE NSC Paper 1 · May/June 2021 · Q11 · 15 marks

QUESTION 11

11.1 Two events, A and B, are such that:

- Events A and B are independent
- $P(\text{not } A) = 0,4$
- $P(B) = 0,3$

Calculate $P(A \text{ and } B)$.

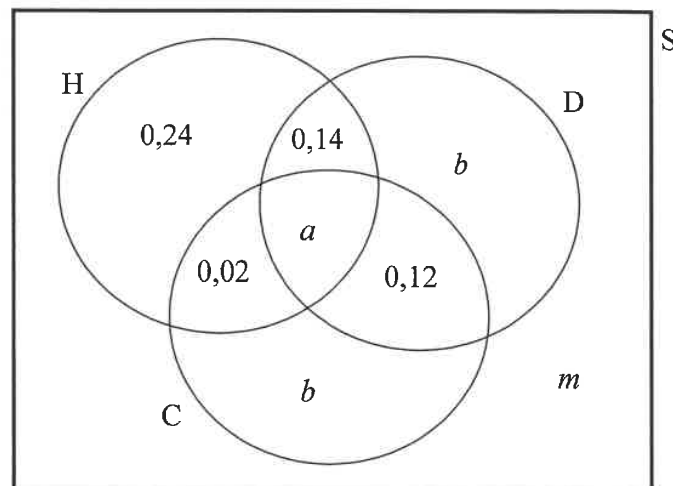
(3)

11.2 A survey was conducted among 150 learners at a school.

The following observations were made:

- The probability that a learner, selected at random, will take part in:
 - Only hockey (H) is 0,24
 - Hockey and debating (D), but not chess (C) is 0,14
 - Debating and chess, but not hockey is 0,12
 - Hockey and chess, but not debating is 0,02
- The probability that a learner, selected at random, participates in at least one activity is 0,7.
- 15 learners participated in all three activities.
- The number of learners that participate only in debating is the same as the number of learners who participate only in chess.

The Venn diagram below shows some of the above information.



11.2.1 Determine a , the probability that a learner, selected at random, participates in all three activities.

(1)

11.2.2 Determine m , the probability that a learner, selected at random, does NOT participate in any of the three activities.

(1)

11.2.3 How many learners play only chess?

(4)

11.3 A three-digit number is made up by using three randomly selected digits from 0 to 9. NO digit may be repeated.

- 11.3.1 Determine the total number of possible three-digit numbers, greater than 100, that can be formed. (2)
- 11.3.2 Determine the total number of possible three-digit numbers, both even and greater than 600, that can be formed. (4)
- [15]

6. At least one event occurring, then snow on the Drakensberg

DBE NSC Paper 1 · November 2023 · Q10 · 15 marks

QUESTION 10

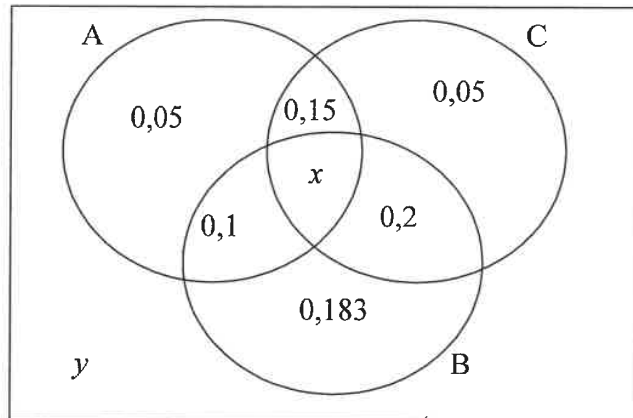
- 10.1 A and B are independent events. $P(A) = \frac{1}{3}$ and $P(B) = \frac{3}{4}$
Determine:
- 10.1.1 $P(A \text{ and } B)$ (2)
- 10.1.2 $P(\text{at least ONE event occurs})$ (2)
- 10.2 The probability that it will snow on the Drakensberg Mountains in June is 5%.
- When it snows on the mountains, the probability that the minimum temperature in Central South Africa will drop below 0°C is 72%.
 - If it does not snow on the mountains, the probability that the minimum temperature in Central South Africa will drop below 0°C is 35%.
- 10.2.1 Represent the given information on a tree diagram. Clearly indicate the probabilities associated with EACH branch. (3)
- 10.2.2 Calculate the probability that the temperature in Central South Africa will NOT drop below 0°C in June 2024. (3)
- 10.3 Ten learners stand randomly in a line, one behind the other.
- 10.3.1 In how many different ways can the ten learners stand in the line? (1)
- 10.3.2 Calculate the probability that there will be 5 learners between the 2 youngest learners in the line. (4)
- [15]

7. Three events in a Venn diagram, with two unknowns to find

DBE NSC Paper 1 · November 2022 · Q10 · 17 marks

QUESTION 10

- 10.1 A, B and C are three events. The probabilities of these events (or any combination of them) occurring is given in the Venn-diagram below



- 10.1.1 If it is given that the probability that at least one of the events will occur is 0,893, calculate the value of:
- (a) y , the probability that none of the events will occur. (1)
 - (b) x , the probability that all three events will occur. (1)
- 10.1.2 Determine the probability that at least two of the events will take place. (2)
- 10.1.3 Are events B and C independent? Justify your answer. (5)
- 10.2 A four-digit code is required to open a combination lock. The code must be even-numbered and may not contain the digits 0 or 1. Digits may not be repeated.
- 10.2.1 How many possible 4-digit combinations are there to open the lock? (3)
- 10.2.2 Calculate the probability that you will open the lock at the first attempt if it is given that the code is greater than 5 000 and the third digit is 2. (5)

[17]

Counting first: arrangements, codes and what follows

Here the probability comes last. First count how many arrangements, codes or numbers are possible - with repetition or without, with positions fixed or free - and the probability is the favourable count over the total. The counting is the work; the division at the end is not.

3 questions · 28 marks

7 to 13 marks each

8. Three-digit numbers from 501 to 999

DBE NSC Paper 1 · May/June 2025 · Q11 · 7 marks

QUESTION 11

Consider the three-digit numbers from 501 up to 999.

- 11.1 How many of these three-digit numbers have exactly one 5 in them? (4)
- 11.2 Calculate the probability of a three-digit number not satisfying the condition given in QUESTION 11.1. (3)
- [7]

9. A four-character code, with repetition and without

DBE NSC Paper 1 · November 2024 · Q12 · 8 marks

QUESTION 12

A company generates a 4-character code using the 26 letters of the alphabet and the 10 digits, from 0 to 9.

The code is in the form:

letter	digit	letter	digit
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- 12.1 Determine how many different codes can be formed if letters and digits may be repeated. (2)
- 12.2 Determine how many different codes can be formed if:
- The letters D, F, I, Q, U and V may NOT be used
 - The code may NOT start with a W or a Z
 - Letters or digits may NOT be repeated
 - The code ends with an odd digit
- (4)
- 12.3 The company wishes to increase the number of 4-character codes formed in QUESTION 12.2 by allowing the letters D, F, I, Q, U and V to be used. Calculate the percentage increase in the number of different codes that can now be formed. (2)
- [8]

10. Seven flags in a row, and the chance they fall by continent

DBE NSC Paper 1 · May/June 2022 · Q10 · 13 marks

QUESTION 10

- 10.1 Flags from four African countries and three European countries were displayed in a row during the 2021 Olympics.

Determine:

- 10.1.1 The total number of possible ways in which all 7 flags from these countries could be displayed (2)

- 10.1.2 The probability that the flags from the African countries were displayed next to each other (3)

- 10.2 A and B are two independent events.

$$P(A) = 0,4 \text{ and } P(A \text{ or } B) = 0,88$$

Calculate $P(B)$. (3)

- 10.3 There are 120 passengers on board an aeroplane. Passengers have a choice between a meat sandwich or a cheese sandwich, but more passengers will choose a meat sandwich. There are only 120 sandwiches available to choose from. The probability that the first passenger chooses a meat sandwich and the second passenger chooses a cheese sandwich is $\frac{18}{85}$. Calculate the probability that the first passenger will choose a cheese sandwich. (5)

[13]

Index by paper

Every probability question in each paper, and where it sits in this booklet.

May/June 2021		1 question, 15 of 150 marks
Q11	Independent events, then a survey of 150 learners	15 marks p7
November 2021		1 question, 14 of 150 marks
Q12	Independent or mutually exclusive? Then twelve books on a shelf	14 marks p4
May/June 2022		1 question, 13 of 150 marks
Q10	Seven flags in a row, and the chance they fall by continent	13 marks p12
November 2022		1 question, 17 of 150 marks
Q10	Three events in a Venn diagram, with two unknowns to find	17 marks p9
November 2023		1 question, 15 of 150 marks
Q10	At least one event occurring, then snow on the Drakensberg	15 marks p8
May/June 2024		1 question, 14 of 150 marks
Q11	$P(B)$ from mutually exclusive events, then what a learner buys	14 marks p5
November 2024		2 questions, 17 of 150 marks
Q11	Three examinations in one Venn diagram	9 marks p3
Q12	A four-character code, with repetition and without	8 marks p11
May/June 2025		2 questions, 15 of 150 marks
Q10	Mutually exclusive events, then a dice and a card together	8 marks p3
Q11	Three-digit numbers from 501 to 999	7 marks p11

Index by topic

A question appears under every topic it uses, so it can be found even when it is filed in another chapter.

The addition and product rules

5 questions

- | | | |
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| 2. | Three examinations in one Venn diagram | p3 |
| 4. | $P(B)$ from mutually exclusive events, then what a learner buys | p5 |
| 5. | Independent events, then a survey of 150 learners | p7 |
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Mutually exclusive events

3 questions

- | | | |
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Independent events

4 questions

- | | | |
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Complementary events, and "at least one"

5 questions

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Venn diagrams

4 questions

- | | | |
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| 4. | $P(B)$ from mutually exclusive events, then what a learner buys | p5 |
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| 7. | Three events in a Venn diagram, with two unknowns to find | p9 |

Tree diagrams

1 question

- | | | |
|----|--|----|
| 6. | At least one event occurring, then snow on the Drakensberg | p8 |
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The fundamental counting principle

3 questions

- | | | |
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| 3. | Independent or mutually exclusive? Then twelve books on a shelf | p4 |
| 9. | A four-character code, with repetition and without | p11 |
| 10. | Seven flags in a row, and the chance they fall by continent | p12 |

Arrangements in a row

2 questions

- | | | |
|-----|---|-----|
| 3. | Independent or mutually exclusive? Then twelve books on a shelf | p4 |
| 10. | Seven flags in a row, and the chance they fall by continent | p12 |

Codes and numbers with restrictions

2 questions

- | | | |
|----|--|-----|
| 8. | Three-digit numbers from 501 to 999 | p11 |
| 9. | A four-character code, with repetition and without | p11 |

Probability worked out from a count**2 questions**

8. Three-digit numbers from 501 to 999
10. Seven flags in a row, and the chance they fall by continent

p11

p12

Where these came from

So that "every probability question" is a claim you can check.

Eight DBE NSC Mathematics Paper 1 papers were read end to end:
November 2021, 2022, 2023, 2024 and May/June 2021, 2022, 2024, 2025.

All 338 questions in them were classified. These papers are scans - they carry no text layer at all - so the structure was rebuilt by reading them with OCR, and then checked three ways: every paper adds back up to exactly 150, the Afrikaans paper matches the English question for question, and the official marking guideline, which IS ordinary text, agrees with the marks read off every question.

DBE publishes an official marking guideline for every one of these papers. The companion file "CAPS_P1_Probability_Solutions.pdf" carries the guideline for each question here, in the same order and under the same numbers.