GCSE ONLINE TUTORING × RS REMOTE TUTORING

GCSE MATHEMATICS AND NUMERACY DOUBLE AWARD

FOUNDATION

COMPREHENSIVE LESSON NOTEBOOK

UNIT 4: STATISTICS AND PROBABILITY

Mapped independently to WJEC qualification 3320QD • 8 detailed chapters

concept teaching • worked methods • reasoning • guided practice • independent practice • worked answers

Student: _____

Class: _____ Target grade: _____ Start date: _____

EXAM-BOARD INDEPENDENCE

Independent publication notice: mapped independently to the current WJEC GCSE Mathematics and Numeracy (Double Award). This resource is not produced, approved, endorsed by or affiliated with WJEC/CBAC. The WJEC and CBAC names identify curriculum alignment only. No exam-board logo, official question, mark-scheme wording, textbook page or proprietary artwork is reproduced.

© 2026 GCSE Online Tutoring and RS Remote Tutoring. All rights reserved.

COMPREHENSIVE LESSON NOTEBOOK

How to learn from this notebook

Meaning first. Method second. Reasoning throughout.

1 • UNDERSTAND

Read the definition and big idea. Redraw or annotate the representation, then answer the checkpoint without looking back.

2 • BUILD THE METHOD

Cover each next line of the example. Predict it, reveal it and explain why the transformation or calculation is permitted.

3 • CONNECT AND REASON

Use the misconception analysis and guided task to decide which method fits, not merely how to execute it.

4 • PRACTISE INDEPENDENTLY

Show the decisive setup, accurate progress and a supported conclusion. Do not replace mathematical communication with a calculator display.

5 • DIAGNOSE AND REVISIT

Mark from the worked answer. Record whether an error came from interpretation, structure, arithmetic, accuracy, unit or communication.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Statistics and Probability unit map

8 chapters mapped to current WJEC content headings.

CH 01	4.1	The data-handling cycle: collection: core concepts and methods
CH 02	4.1	The data-handling cycle: collection: applications and reasoning
CH 03	4.2	Representing, interpreting and comparing data: core concepts and methods
CH 04	4.2	Representing, interpreting and comparing data: applications and reasonin
CH 05	4.3	Probability: single events and experiments: core concepts and methods
CH 06	4.3	Probability: single events and experiments: applications and reasoning
CH 07	4.4	Probability: combined events and experiments: core concepts and methods
CH 08	4.4	Probability: combined events and experiments: applications and reasoning

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Copyright, permitted use and exam-board independence

Publication terms for teachers, tutors, learners and centres.

COPYRIGHT OWNERSHIP

All original explanations, examples, questions, answer methods, diagrams, layout and editorial structure in this notebook are copyright © 2026 GCSE Online Tutoring and RS Remote Tutoring. All rights are reserved.

PERMITTED USE

The lawful purchaser may use this notebook for their own learning or teaching and may print copies only to the extent allowed by the purchase licence. No part may be resold, uploaded publicly, redistributed, republished, adapted into another commercial resource or used to train a product without prior written permission.

WJEC / CBAC NON-AFFILIATION

This is an independent resource. It is not produced, approved, endorsed by or affiliated with WJEC/CBAC. WJEC and CBAC names are used solely to identify curriculum alignment. No official WJEC question, mark scheme, logo, trade dress or proprietary artwork is reproduced.

ACCURACY AND UPDATES

Content has been independently authored and checked against the current qualification structure. Teachers and centres remain responsible for consulting WJEC for current specifications, administrative rules, formula arrangements and assessment dates.

BRAND AND PERMISSIONS CONTACT

GCSE ONLINE TUTORING × RS REMOTE TUTORING. Websites: gcseonlinetutoring.uk • rsremotetutoring.co.uk. Retain this page and all copyright notices when using authorised copies.

COMPREHENSIVE LESSON NOTEBOOK

Chapter 1: The data-handling cycle: collection: core concepts and methods

Plan investigations and collect representative, relevant and reliable data.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.1. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Plan investigations and collect representative, relevant and reliable data. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this core concepts lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

population, census, sample, random, stratified, bias, response, variable

Three controlling ideas

- Define the population and the variable before choosing a sample.
- A representative method matters more than sample size alone.
- Use neutral questions with exhaustive, non-overlapping response categories.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “A school wants opinions from all 900 learners. State the population.”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 1: Build the method

The data-handling cycle: collection: core concepts and methods

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

A school wants opinions from all 900 learners. State the population.

WORKED REASONING

1. The population is the full group of interest.

Conclusion: All 900 learners

WORKED EXAMPLE 2

Explain one advantage of a simple random sample.

WORKED REASONING

1. This reduces deliberate selection bias.

Conclusion: Every population member has an equal selection chance.

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 1: Connect and reason

The data-handling cycle: collection: core concepts and methods

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.1, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

A survey asks, “How excellent was our service?” Identify the problem. Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding the data-handling cycle: collection: core concepts and methods.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.1 • The data-handling cycle: collection: core concepts and methods

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **A school wants opinions from all 900 learners. State the population.** **[4]**

2. **Explain one advantage of a simple random sample.** **[4]**

3. **A survey asks, “How excellent was our service?” Identify the problem.** **[4]**

4. **Rewrite age groups 10-15, 15-20, 20-25 so they do not overlap and are exhaustive for ages 10 and above.** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.1 • The data-handling cycle: collection: core concepts and methods

1. WORKED ANSWER

Method: The population is the full group of interest. Answer: All 900 learners Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: This reduces deliberate selection bias. Answer: Every population member has an equal selection chance. Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: The wording suggests a positive response. Answer: It is leading. Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: Use one included and one excluded boundary and include a final category. Answer: 10<=a<15, 15<=a<20, 20<=a<25, a>=25 Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 2: The data-handling cycle: collection: applications and reasoning

Plan investigations and collect representative, relevant and reliable data.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.1. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Plan investigations and collect representative, relevant and reliable data. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this applications and reasoning lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

population, census, sample, random, stratified, bias, response, variable

Three controlling ideas

- Define the population and the variable before choosing a sample.
- A representative method matters more than sample size alone.
- Use neutral questions with exhaustive, non-overlapping response categories.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “Give one reason an online voluntary-response poll may be biased.”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 2: Build the method

The data-handling cycle: collection: applications and reasoning

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

Give one reason an online voluntary-response poll may be biased.

WORKED REASONING

1. Self-selection can over-represent strong opinions.

Conclusion: People choosing to respond may differ from the population.

WORKED EXAMPLE 2

A population has 600 Year 10 and 400 Year 11 learners. Find a proportional sample of 50.

WORKED REASONING

1. Use 60% and 40% of 50.

Conclusion: 30 Year 10 and 20 Year 11

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 2: Connect and reason

The data-handling cycle: collection: applications and reasoning

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.1, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

State one quantitative and one qualitative variable about travel to school. Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding the data-handling cycle: collection: applications and reasoning.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.1 • The data-handling cycle: collection: applications and reasoning

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **Give one reason an online voluntary-response poll may be biased.** **[4]**

2. **A population has 600 Year 10 and 400 Year 11 learners. Find a proportional sample of 50.** **[4]**

3. **State one quantitative and one qualitative variable about travel to school.** **[4]**

4. **Why should a questionnaire be piloted?** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.1 • The data-handling cycle: collection: applications and reasoning

1. WORKED ANSWER

Method: Self-selection can over-represent strong opinions. Answer: People choosing to respond may differ from the population. Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: Use 60% and 40% of 50. Answer: 30 Year 10 and 20 Year 11 Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: Quantitative is numerical; qualitative is categorical. Answer: For example journey time; transport type Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: A pilot allows the design to be repaired. Answer: To identify ambiguity or practical problems before the main survey. Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 3: Representing, interpreting and comparing data: core concepts and methods

Construct, interpret and compare tables, charts, graphs and numerical summaries.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.2. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Construct, interpret and compare tables, charts, graphs and numerical summaries. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this core concepts lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

frequency, distribution, mean, median, quartile, range, density, trend

Three controlling ideas

- Choose a representation that matches the data type and purpose.
- Use centre and spread together when comparing distributions.
- Label titles, axes, scales, units and keys so the display is auditable.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “Find the mean of 6, 8, 8, 11 and 17.”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 3: Build the method

Representing, interpreting and comparing data: core concepts and methods

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

Find the mean of 6, 8, 8, 11 and 17.

WORKED REASONING

1. Total 50 divided by 5.

Conclusion: 10

WORKED EXAMPLE 2

Find the median and range of 4, 9, 12, 12, 15, 21.

WORKED REASONING

1. Average the 3rd and 4th values; 21-4=17.

Conclusion: Median 12; range 17

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 3: Connect and reason

Representing, interpreting and comparing data: core concepts and methods

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.2, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

A frequency table has values 1,2,3 with frequencies 4,5,1. Find the mean. Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding representing, interpreting and comparing data: core concepts and methods.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.2 • Representing, interpreting and comparing data: core concepts and methods

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **Find the mean of 6, 8, 8, 11 and 17.** **[4]**

2. **Find the median and range of 4, 9, 12, 12, 15, 21.** **[4]**

3. **A frequency table has values 1,2,3 with frequencies 4,5,1. Find the mean.** **[4]**

4. **A pie-chart category has frequency 18 out of 60. Find its angle.** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.2 • Representing, interpreting and comparing data: core concepts and methods

1. WORKED ANSWER

Method: Total 50 divided by 5. Answer: 10 Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: Average the 3rd and 4th values; 21-4=17. Answer: Median 12; range 17 Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: Weighted total 4+10+3=17; total frequency 10. Answer: 1.7 Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: 18/60x360=108. Answer: 108 degrees Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 4: Representing, interpreting and comparing data: applications and reasoning

Construct, interpret and compare tables, charts, graphs and numerical summaries.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.2. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Construct, interpret and compare tables, charts, graphs and numerical summaries. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this applications and reasoning lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

frequency, distribution, mean, median, quartile, range, density, trend

Three controlling ideas

- Choose a representation that matches the data type and purpose.
- Use centre and spread together when comparing distributions.
- Label titles, axes, scales, units and keys so the display is auditable.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “Which average is most resistant to one extreme outlier?”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 4: Build the method

Representing, interpreting and comparing data: applications and reasoning

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

Which average is most resistant to one extreme outlier?

WORKED REASONING

1. Position changes less than the sum used by the mean.

Conclusion: Median

WORKED EXAMPLE 2

Class A has median 54 and range 18; Class B median 61 and range 32. Compare.

WORKED REASONING

1. Compare one centre and one spread.

Conclusion: B is typically higher; A is more consistent.

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 4: Connect and reason

Representing, interpreting and comparing data: applications and reasoning

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.2, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

A bar chart vertical scale starts at 90. State one possible risk. Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding representing, interpreting and comparing data: applications and reasoning.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.2 • Representing, interpreting and comparing data: applications and reasoning

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **Which average is most resistant to one extreme outlier?** **[4]**

2. **Class A has median 54 and range 18; Class B median 61 and range 32. Compare.** **[4]**

3. **A bar chart vertical scale starts at 90. State one possible risk.** **[4]**

4. **A time series rises each December. Name the pattern.** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.2 • Representing, interpreting and comparing data: applications and reasoning

1. WORKED ANSWER

Method: Position changes less than the sum used by the mean. Answer: Median Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: Compare one centre and one spread. Answer: B is typically higher; A is more consistent. Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: A truncated axis changes visual impression. Answer: Differences may look exaggerated. Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: The feature repeats at a regular yearly interval. Answer: Seasonal pattern Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 5: Probability: single events and experiments: core concepts and methods

Model single-event probability and connect theoretical and experimental results.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.3. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Model single-event probability and connect theoretical and experimental results. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this core concepts lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

outcome, event, probability, complement, relative frequency, expected frequency

Three controlling ideas

- Probability lies from 0 to 1 and complementary outcomes total 1.
- Relative frequency estimates probability from observed results.
- Expected frequency is probability multiplied by the number of trials.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “A fair spinner has 8 equal sectors, 3 red. Find P(red).”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 5: Build the method

Probability: single events and experiments: core concepts and methods

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

A fair spinner has 8 equal sectors, 3 red. Find P(red).

WORKED REASONING

1. Favourable outcomes divided by total equally likely outcomes.

Conclusion: 3/8

WORKED EXAMPLE 2

If P(rain)=0.27, find P(no rain).

WORKED REASONING

1. Complement=1-0.27.

Conclusion: 0.73

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 5: Connect and reason

Probability: single events and experiments: core concepts and methods

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.3, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

A coin lands heads 84 times in 200 tosses. Estimate P(heads). Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding probability: single events and experiments: core concepts and methods.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.3 • Probability: single events and experiments: core concepts and methods

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **A fair spinner has 8 equal sectors, 3 red. Find P(red).** **[4]**

2. **If P(rain)=0.27, find P(no rain).** **[4]**

3. **A coin lands heads 84 times in 200 tosses. Estimate P(heads).** **[4]**

4. **A bag has 5 blue, 7 green and 8 yellow counters. Find P(not green).** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.3 • Probability: single events and experiments: core concepts and methods

1. WORKED ANSWER

Method: Favourable outcomes divided by total equally likely outcomes. Answer: 3/8 Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: Complement=1-0.27. Answer: 0.73 Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: 84/200=0.42. Answer: 0.42 Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: Not green count is 5+8=13; total 20. Answer: 13/20 Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 6: Probability: single events and experiments: applications and reasoning

Model single-event probability and connect theoretical and experimental results.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.3. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Model single-event probability and connect theoretical and experimental results. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this applications and reasoning lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

outcome, event, probability, complement, relative frequency, expected frequency

Three controlling ideas

- Probability lies from 0 to 1 and complementary outcomes total 1.
- Relative frequency estimates probability from observed results.
- Expected frequency is probability multiplied by the number of trials.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “A probability model gives 0.18, 0.35, x and 0.22. Find x.”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 6: Build the method

Probability: single events and experiments: applications and reasoning

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

A probability model gives 0.18, 0.35, x and 0.22. Find x.

WORKED REASONING

1. Probabilities total 1.

Conclusion: 0.25

WORKED EXAMPLE 2

A machine has fault probability 0.03. Find expected faults in 1,200 items.

WORKED REASONING

1. 0.03x1200=36.

Conclusion: 36

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 6: Connect and reason

Probability: single events and experiments: applications and reasoning

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.3, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

Why may experimental probability differ from theoretical probability? Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding probability: single events and experiments: applications and reasoning.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.3 • Probability: single events and experiments: applications and reasoning

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **A probability model gives 0.18, 0.35, x and 0.22. Find x.** **[4]**

2. **A machine has fault probability 0.03. Find expected faults in 1,200 items.** **[4]**

3. **Why may experimental probability differ from theoretical probability?** **[4]**

4. **An event occurred 45 times in 150 trials. Predict occurrences in 800 further trials.** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.3 • Probability: single events and experiments: applications and reasoning

1. WORKED ANSWER

Method: Probabilities total 1. Answer: 0.25 Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: 0.03x1200=36. Answer: 36 Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: Relative frequency tends to stabilise over many trials. Answer: Random variation, especially with few trials. Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: Estimated probability 45/150=0.3; 0.3x800. Answer: 240 Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 7: Probability: combined events and experiments: core concepts and methods

Analyse more than one event using systematic representations and probability rules.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.4. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Analyse more than one event using systematic representations and probability rules. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this core concepts lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

independent, mutually exclusive, replacement, tree diagram, conditional, intersection, union

Three controlling ideas

- List outcomes systematically using a table, diagram or organised list.
- For independent events, multiply probabilities along a route.
- Add probabilities of mutually exclusive final routes.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “Two fair coins are tossed. Find P(two heads).”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 7: Build the method

Probability: combined events and experiments: core concepts and methods

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

Two fair coins are tossed. Find P(two heads).

WORKED REASONING

1. Four equally likely outcomes; only HH works.

Conclusion: 1/4

WORKED EXAMPLE 2

A fair die and fair coin are used. How many combined outcomes?

WORKED REASONING

1. 6x2=12.

Conclusion: 12

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 7: Connect and reason

Probability: combined events and experiments: core concepts and methods

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.4, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

A bag has 3 red and 2 blue counters. One is replaced, then another is drawn. Find P(two red). Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding probability: combined events and experiments: core concepts and methods.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.4 • Probability: combined events and experiments: core concepts and methods

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **Two fair coins are tossed. Find P(two heads).** **[4]**

2. **A fair die and fair coin are used. How many combined outcomes?** **[4]**

3. **A bag has 3 red and 2 blue counters. One is replaced, then another is drawn. Find P(two red).** **[4]**

4. **A spinner has P(A)=0.4 and P(B)=0.35, with A and B mutually exclusive. Find P(A or B).** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.4 • Probability: combined events and experiments: core concepts and methods

1. WORKED ANSWER

Method: Four equally likely outcomes; only HH works. Answer: 1/4 Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: 6x2=12. Answer: 12 Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: 3/5x3/5. Answer: 9/25 Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: Add mutually exclusive probabilities. Answer: 0.75 Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 8: Probability: combined events and experiments: applications and reasoning

Analyse more than one event using systematic representations and probability rules.

SPECIFICATION ALIGNMENT

Independent teaching summary for current WJEC content heading 4.4. This lesson develops conceptual understanding, communication using symbols, fluency, logical reasoning and strategic competence.

Understand the mathematical object

Analyse more than one event using systematic representations and probability rules. The central idea is that a representation is useful only when its meaning and conditions are explicit. In this applications and reasoning lesson, first identify the quantities, structures or events involved; then connect the words to notation, a diagram, a table or a graph. A reliable solution preserves that meaning at every step and ends with an answer that fits the original context.

KEY VOCABULARY

independent, mutually exclusive, replacement, tree diagram, conditional, intersection, union

Three controlling ideas

- List outcomes systematically using a table, diagram or organised list.
- For independent events, multiply probabilities along a route.
- Add probabilities of mutually exclusive final routes.

PRIOR-KNOWLEDGE CHECK

Can you state the meaning of the key terms, identify the operation or relationship in “Two independent events have probabilities 0.6 and 0.3. Find probability both occur.”, and predict the form or approximate size of the answer? Repair any weakness before continuing.

CHECKPOINT

Explain one method condition in a complete sentence. Give a simple valid example and one non-example that breaks the condition.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 8: Build the method

Probability: combined events and experiments: applications and reasoning

Reliable routine

- Interpret: name the target, given information, conditions and units.
- Represent: write an equation, diagram, table, graph or exact numerical structure.
- Execute: show valid transformations or calculations in a readable order.
- Verify: test size, sign, units, domain, accuracy and contextual meaning.

WORKED EXAMPLE 1

Two independent events have probabilities 0.6 and 0.3. Find probability both occur.

WORKED REASONING

1. Multiply: 0.6x0.3.

Conclusion: 0.18

WORKED EXAMPLE 2

From 1,2,3,4 one digit is selected, then an independent coin is tossed. Find P(even and heads).

WORKED REASONING

1. P(even)=1/2 and P(heads)=1/2.

Conclusion: 1/4

SELF-EXPLANATION PROMPT

Which line contains the main mathematical decision? Which line checks interpretation, reasonableness or accuracy? Explain how the method would change if one condition changed.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Chapter 8: Connect and reason

Probability: combined events and experiments: applications and reasoning

Why the method works

The method works because each stage preserves the defining relationship in the problem. A calculation is not merely a sequence of button presses: it is a chain in which every symbol, operation and representation has a stated meaning. An independent check uses a different feature - such as an inverse operation, an alternative representation, a bound, a unit or a limiting case - so it can reveal an error rather than repeat it.

COMMON MISCONCEPTION

A common error is to use a familiar rule before checking its conditions. For 4.4, this can produce a plausible-looking answer with the wrong structure, scale, sign, unit or interpretation. State the condition first, then apply the rule.

GUIDED REASONING TASK

List the sums possible when two counters numbered 1,2,3 are selected with replacement. Before calculating, write: (a) what is known, (b) what is required, (c) the controlling relationship, and (d) one check. Then complete the solution.

COMMUNICATION STANDARD

Use one mathematical statement per line. Define symbols, label units and diagrams, retain exact values until approximation is requested, and close with a sentence that answers the actual question.

EXTENSION OR REPAIR

Change one value or condition in the guided task. Predict which steps remain valid and which must change. This is the difference between memorising a routine and understanding probability: combined events and experiments: applications and reasoning.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Independent practice

4.4 • Probability: combined events and experiments: applications and reasoning

Complete without notes. Show the setup, decisive working and final conclusion. Marks are independent teaching allocations, not official WJEC marks.

1. **Two independent events have probabilities 0.6 and 0.3. Find probability both occur.** **[4]**

2. **From 1,2,3,4 one digit is selected, then an independent coin is tossed. Find P(even and heads).** **[4]**

3. **List the sums possible when two counters numbered 1,2,3 are selected with replacement.** **[4]**

4. **Why must branches leaving one tree-diagram node total 1?** **[4]**

REFLECTION

Record the question number of your least secure answer. Name the error type and write the first corrected line that would repair it.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Worked answers and repair notes

4.4 • Probability: combined events and experiments: applications and reasoning

1. WORKED ANSWER

Method: Multiply: 0.6x0.3. Answer: 0.18 Check: confirm the result against the original conditions, units and expected scale.

2. WORKED ANSWER

Method: P(even)=1/2 and P(heads)=1/2. Answer: 1/4 Check: confirm the result against the original conditions, units and expected scale.

3. WORKED ANSWER

Method: Use an organised 3 by 3 table. Answer: 2,3,4,5,6 Check: confirm the result against the original conditions, units and expected scale.

4. WORKED ANSWER

Method: Exactly one of the branches must occur. Answer: They represent all mutually exclusive next outcomes. Check: confirm the result against the original conditions, units and expected scale.

© 2026 GCSE Online Tutoring & RS Remote Tutoring

COMPREHENSIVE LESSON NOTEBOOK

Statistics and Probability mastery review

Explain, demonstrate, connect and revisit.

I can...

- 4.1 The data-handling cycle: collection: core concepts and methods: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.
- 4.1 The data-handling cycle: collection: applications and reasoning: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.
- 4.2 Representing, interpreting and comparing data: core concepts and methods: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.
- 4.2 Representing, interpreting and comparing data: applications and reasoning: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.
- 4.3 Probability: single events and experiments: core concepts and methods: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.
- 4.3 Probability: single events and experiments: applications and reasoning: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.
- 4.4 Probability: combined events and experiments: core concepts and methods: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.
- 4.4 Probability: combined events and experiments: applications and reasoning: explain the idea, reproduce a valid method, solve an unfamiliar problem and check the result.

INDEPENDENT PUBLICATION NOTICE

This comprehensive lesson notebook is independently aligned to WJEC GCSE Mathematics and Numeracy (Double Award), qualification code 3320QD. It is not produced, approved, endorsed by or affiliated with WJEC/CBAC. Exam-board names identify alignment only.

COPYRIGHT REMINDER

© 2026 GCSE Online Tutoring and RS Remote Tutoring. All rights reserved. gcseonlinetutoring.uk • rsremotetutoring.co.uk. Reproduction, redistribution, resale, public upload and commercial adaptation require prior written permission except where expressly allowed by the purchase licence.