

GCSE MATHEMATICS

HIGHER TIER

UNIT 6: STATISTICS

CORRECTED PUBLICATION EDITION

20 chapters • 240 questions • 4–6 marks • complete worked solutions

Student: _____

Independent publication notice

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Questions are independently allocated marks, not official Eduqas marks. The companion lesson notebook reuses Questions 1–8 from each chapter; those are not additional unique questions.

HIGHER TIER**UNIT 6 • CHAPTER 1****HS1A - Populations, samples and bias****Chapter purpose**

Infer cautiously from samples while recognising sampling limitations, undercoverage, non-response and bias.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions. Questions 9–12 provide the chapter stretch sequence.

Chapter 1 • Method and assessment map

HS1A - Populations, samples and bias

Specification focus

Infer cautiously from samples while recognising sampling limitations, undercoverage, non-response and bias.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 1 • Practice

HS1A - Populations, samples and bias • Questions 1-2

Q01 | 4 MARKS

A school wants to estimate weekly exercise among all 1550 students. It surveys the first 70 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A school wants to estimate weekly exercise among all 1700 students. It surveys the first 45 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Chapter 1 • Practice

HS1A - Populations, samples and bias • Questions 3-4

Q03 | 4 MARKS

A school wants to estimate weekly exercise among all 1850 students. It surveys the first 60 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A school wants to estimate weekly exercise among all 2000 students. It surveys the first 35 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Chapter 1 • Practice

HS1A - Populations, samples and bias • Questions 5-6

Q05 | 4 MARKS

A school wants to estimate weekly exercise among all 2150 students. It surveys the first 50 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A school wants to estimate weekly exercise among all 2300 students. It surveys the first 65 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Chapter 1 • Practice

HS1A - Populations, samples and bias • Questions 7-8

Q07 | 4 MARKS

A school wants to estimate weekly exercise among all 2450 students. It surveys the first 40 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A school wants to estimate weekly exercise among all 2600 students. It surveys the first 55 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Chapter 1 • Practice

HS1A - Populations, samples and bias • Questions 9-10

Q09 | 4 MARKS

A school wants to estimate weekly exercise among all 2750 students. It surveys the first 70 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A school wants to estimate weekly exercise among all 2900 students. It surveys the first 45 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Chapter 1 • Practice

HS1A - Populations, samples and bias • Questions 11-12

Q11 | 5 MARKS

You must show your working. A school wants to estimate weekly exercise among all 2950 students. It surveys the first 50 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A school wants to estimate weekly exercise among all 3000 students. It surveys the first 55 students entering the sports centre on Monday. Identify the population and sample, explain two sources of bias, and propose a more representative design. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 1

HS1A - Populations, samples and bias • Questions 1-2

Q01 | 4 MARKS

The population is all 1550 students; the sample is the 70 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

The population is all 1700 students; the sample is the 45 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 1

HS1A - Populations, samples and bias • Questions 3-4

Q03 | 4 MARKS

The population is all 1850 students; the sample is the 60 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

The population is all 2000 students; the sample is the 35 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 1

HS1A - Populations, samples and bias • Questions 5-6

Q05 | 4 MARKS

The population is all 2150 students; the sample is the 50 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

The population is all 2300 students; the sample is the 65 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 1

HS1A - Populations, samples and bias • Questions 7-8

Q07 | 4 MARKS

The population is all 2450 students; the sample is the 40 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

The population is all 2600 students; the sample is the 55 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 1

HS1A - Populations, samples and bias • Questions 9-10

Q09 | 4 MARKS

The population is all 2750 students; the sample is the 70 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

The population is all 2900 students; the sample is the 45 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 1

HS1A - Populations, samples and bias • Questions 11-12

Q11 | 5 MARKS

The population is all 2950 students; the sample is the 50 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

The population is all 3000 students; the sample is the 55 early sports-centre entrants. It over-represents students who use sport facilities and those present at that time. Use an up-to-date whole-school sampling frame and select randomly, or stratify by relevant year groups, following up non-response. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 1 • Completion and retest record

HS1A - Populations, samples and bias

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 2****HS1B - Random, systematic and stratified sampling****Chapter purpose**

Select reproducible samples and calculate proportional stratified allocations.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 2 • Method and assessment map

HS1B - Random, systematic and stratified sampling

Specification focus

Select reproducible samples and calculate proportional stratified allocations.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 2 • Practice

HS1B - Random, systematic and stratified sampling • Questions 1-2

Q01 | 4 MARKS

A population has three strata of sizes 135, 180 and 225. Design a stratified sample of 60, showing proportional allocations that total exactly 60. Also state how a systematic sample of about 60 could be selected from a list of 540 people. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A population has three strata of sizes 138, 186 and 234. Design a stratified sample of 47, showing proportional allocations that total exactly 47. Also state how a systematic sample of about 47 could be selected from a list of 558 people. Your solution must justify the main method or assumption and include a final check.

Chapter 2 • Practice

HS1B - Random, systematic and stratified sampling • Questions 3-4

Q03 | 4 MARKS

A population has three strata of sizes 141, 192 and 243. Design a stratified sample of 50, showing proportional allocations that total exactly 50. Also state how a systematic sample of about 50 could be selected from a list of 576 people. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A population has three strata of sizes 144, 198 and 252. Design a stratified sample of 53, showing proportional allocations that total exactly 53. Also state how a systematic sample of about 53 could be selected from a list of 594 people. Your solution must justify the main method or assumption and include a final check.

Chapter 2 • Practice

HS1B - Random, systematic and stratified sampling • Questions 5-6

Q05 | 4 MARKS

A population has three strata of sizes 147, 204 and 261. Design a stratified sample of 56, showing proportional allocations that total exactly 56. Also state how a systematic sample of about 56 could be selected from a list of 612 people. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A population has three strata of sizes 150, 210 and 270. Design a stratified sample of 59, showing proportional allocations that total exactly 59. Also state how a systematic sample of about 59 could be selected from a list of 630 people. Your solution must justify the main method or assumption and include a final check.

Chapter 2 • Practice

HS1B - Random, systematic and stratified sampling • Questions 7-8

Q07 | 4 MARKS

A population has three strata of sizes 153, 216 and 279. Design a stratified sample of 46, showing proportional allocations that total exactly 46. Also state how a systematic sample of about 46 could be selected from a list of 648 people. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A population has three strata of sizes 156, 222 and 288. Design a stratified sample of 49, showing proportional allocations that total exactly 49. Also state how a systematic sample of about 49 could be selected from a list of 666 people. Your solution must justify the main method or assumption and include a final check.

Chapter 2 • Practice

HS1B - Random, systematic and stratified sampling • Questions 9-10

Q09 | 4 MARKS

A population has three strata of sizes 159, 228 and 297. Design a stratified sample of 52, showing proportional allocations that total exactly 52. Also state how a systematic sample of about 52 could be selected from a list of 684 people. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A population has three strata of sizes 162, 234 and 306. Design a stratified sample of 55, showing proportional allocations that total exactly 55. Also state how a systematic sample of about 55 could be selected from a list of 702 people. Your solution must justify the main method or assumption and include a final check.

Chapter 2 • Practice

HS1B - Random, systematic and stratified sampling • Questions 11-12

Q11 | 5 MARKS

You must show your working. A population has three strata of sizes 163, 236 and 309. Design a stratified sample of 56, showing proportional allocations that total exactly 56. Also state how a systematic sample of about 56 could be selected from a list of 708 people. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A population has three strata of sizes 164, 238 and 312. Design a stratified sample of 57, showing proportional allocations that total exactly 57. Also state how a systematic sample of about 57 could be selected from a list of 714 people. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 2

HS1B - Random, systematic and stratified sampling • Questions 1-2

Q01 | 4 MARKS

Use stratum size/total $\times$ 60. Raw allocations are 15.00, 20.00, 25.00; a largest-remainder allocation is 15, 20, 25, total 60. For systematic sampling use interval about $540/60=9.00$, choose a random start in the first interval, then take approximately every 9th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Use stratum size/total $\times$ 47. Raw allocations are 11.62, 15.67, 19.71; a largest-remainder allocation is 11, 16, 20, total 47. For systematic sampling use interval about $558/47=11.87$, choose a random start in the first interval, then take approximately every 11th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 2

HS1B - Random, systematic and stratified sampling • Questions 3-4

Q03 | 4 MARKS

Use stratum size/total $\times 50$. Raw allocations are 12.24, 16.67, 21.09; a largest-remainder allocation is 12, 17, 21, total 50. For systematic sampling use interval about $576/50=11.52$, choose a random start in the first interval, then take approximately every 11th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Use stratum size/total $\times 53$. Raw allocations are 12.85, 17.67, 22.48; a largest-remainder allocation is 13, 18, 22, total 53. For systematic sampling use interval about $594/53=11.21$, choose a random start in the first interval, then take approximately every 11th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 2

HS1B - Random, systematic and stratified sampling • Questions 5-6

Q05 | 4 MARKS

Use stratum size/total $\times$ 56. Raw allocations are 13.45, 18.67, 23.88; a largest-remainder allocation is 13, 19, 24, total 56. For systematic sampling use interval about $612/56=10.93$, choose a random start in the first interval, then take approximately every 10th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Use stratum size/total $\times$ 59. Raw allocations are 14.05, 19.67, 25.29; a largest-remainder allocation is 14, 20, 25, total 59. For systematic sampling use interval about $630/59=10.68$, choose a random start in the first interval, then take approximately every 10th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 2

HS1B - Random, systematic and stratified sampling • Questions 7-8

Q07 | 4 MARKS

Use stratum size/total $\times 46$. Raw allocations are 10.86, 15.33, 19.81; a largest-remainder allocation is 11, 15, 20, total 46. For systematic sampling use interval about $648/46=14.09$, choose a random start in the first interval, then take approximately every 14th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Use stratum size/total $\times 49$. Raw allocations are 11.48, 16.33, 21.19; a largest-remainder allocation is 12, 16, 21, total 49. For systematic sampling use interval about $666/49=13.59$, choose a random start in the first interval, then take approximately every 13th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 2

HS1B - Random, systematic and stratified sampling • Questions 9-10

Q09 | 4 MARKS

Use stratum size/total $\times$ 52. Raw allocations are 12.09, 17.33, 22.58; a largest-remainder allocation is 12, 17, 23, total 52. For systematic sampling use interval about $684/52=13.15$, choose a random start in the first interval, then take approximately every 13th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Use stratum size/total $\times$ 55. Raw allocations are 12.69, 18.33, 23.97; a largest-remainder allocation is 13, 18, 24, total 55. For systematic sampling use interval about $702/55=12.76$, choose a random start in the first interval, then take approximately every 12th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 2

HS1B - Random, systematic and stratified sampling • Questions 11-12

Q11 | 5 MARKS

Use stratum size/total $\times$ 56. Raw allocations are 12.89, 18.67, 24.44; a largest-remainder allocation is 13, 19, 24, total 56. For systematic sampling use interval about $708/56=12.64$, choose a random start in the first interval, then take approximately every 12th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Use stratum size/total $\times$ 57. Raw allocations are 13.09, 19.00, 24.91; a largest-remainder allocation is 13, 19, 25, total 57. For systematic sampling use interval about $714/57=12.53$, choose a random start in the first interval, then take approximately every 12th name. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 2 • Completion and retest record

HS1B - Random, systematic and stratified sampling

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 3****HS2 - Questionnaires and fairness****Chapter purpose**

Design, pilot and criticise neutral questions, response categories and data-collection procedures.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 3 • Method and assessment map

HS2 - Questionnaires and fairness

Specification focus

Design, pilot and criticise neutral questions, response categories and data-collection procedures.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 3 • Practice

HS2 - Questionnaires and fairness • Questions 1-2

Q01 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 5 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 2 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check.

Chapter 3 • Practice

HS2 - Questionnaires and fairness • Questions 3-4

Q03 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 5 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 2 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Chapter 3 • Practice

HS2 - Questionnaires and fairness • Questions 5-6

Q05 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 5 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. Identify the key condition you used and explain why it applies here. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 2 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. Identify the key condition you used and explain why it applies here. Your solution must justify the main method or assumption and include a final check.

Chapter 3 • Practice

HS2 - Questionnaires and fairness • Questions 7-8

Q07 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 5 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. Write one sentence interpreting your answer in the context of the question. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 2 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. Write one sentence interpreting your answer in the context of the question. Your solution must justify the main method or assumption and include a final check.

Chapter 3 • Practice

HS2 - Questionnaires and fairness • Questions 9-10

Q09 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 5 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. Describe one common error in this calculation and how your working avoids it. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A questionnaire asks: “Surely responsible students exercise at least 2 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check. Describe one common error in this calculation and how your working avoids it. Your solution must justify the main method or assumption and include a final check.

Chapter 3 • Practice

HS2 - Questionnaires and fairness • Questions 11-12

Q11 | 5 MARKS

You must show your working. A questionnaire asks: “Surely responsible students exercise at least 3 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A questionnaire asks: “Surely responsible students exercise at least 4 hours each week?” with response boxes 0-1, 1-3 and over 4 hours. Diagnose three design faults, rewrite the question neutrally, and propose non-overlapping exhaustive response intervals. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 3

HS2 - Questionnaires and fairness • Questions 1-2

Q01 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 3

HS2 - Questionnaires and fairness • Questions 3-4

Q03 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 3

HS2 - Questionnaires and fairness • Questions 5-6

Q05 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The explanation must name the relevant condition and link it explicitly to the method used. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The explanation must name the relevant condition and link it explicitly to the method used. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 3

HS2 - Questionnaires and fairness • Questions 7-8

Q07 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The interpretation should include the correct units or geometric/statistical meaning where applicable. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The interpretation should include the correct units or geometric/statistical meaning where applicable. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 3

HS2 - Questionnaires and fairness • Questions 9-10

Q09 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid response identifies a plausible error and points to the step that prevents it. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid response identifies a plausible error and points to the step that prevents it. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 3

HS2 - Questionnaires and fairness • Questions 11-12

Q11 | 5 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Faults include leading wording, ambiguous overlap/gap around 1, 3 and 4 hours, and no stated time reference beyond an imprecise “week”. A neutral version is: During the last seven days, how many hours of exercise did you complete? Valid boxes include $0 \leq h < 1$, $1 \leq h < 3$, $3 \leq h < 5$, $h \geq 5$. Pilot the question before the main survey. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 3 • Completion and retest record

HS2 - Questionnaires and fairness

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 4****HS3A - Data types and appropriate representation****Chapter purpose**

Distinguish categorical, discrete and continuous data and choose representations that preserve meaning.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 4 • Method and assessment map

HS3A - Data types and appropriate representation

Specification focus

Distinguish categorical, discrete and continuous data and choose representations that preserve meaning.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 4 • Practice

HS3A - Data types and appropriate representation • Questions 1-2

Q01 | 4 MARKS

A table groups measured masses using $20 < m \leq 25$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 21 to 25, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A table groups measured masses using $23 < m \leq 28$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 24 to 28, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check.

Chapter 4 • Practice

HS3A - Data types and appropriate representation • Questions 3-4

Q03 | 4 MARKS

A table groups measured masses using $26 < m \leq 31$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 27 to 31, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A table groups measured masses using $29 < m \leq 34$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 30 to 34, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check.

Chapter 4 • Practice

HS3A - Data types and appropriate representation • Questions 5-6

Q05 | 4 MARKS

A table groups measured masses using $32 < m \leq 37$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 33 to 37, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A table groups measured masses using $20 < m \leq 25$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 21 to 25, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Chapter 4 • Practice

HS3A - Data types and appropriate representation • Questions 7-8

Q07 | 4 MARKS

A table groups measured masses using $23 < m \leq 28$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 24 to 28, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A table groups measured masses using $26 < m \leq 31$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 27 to 31, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Chapter 4 • Practice

HS3A - Data types and appropriate representation • Questions 9-10

Q09 | 4 MARKS

A table groups measured masses using $29 < m \leq 34$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 30 to 34, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A table groups measured masses using $32 < m \leq 37$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 33 to 37, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Chapter 4 • Practice

HS3A - Data types and appropriate representation • Questions 11-12

Q11 | 5 MARKS

You must show your working. A table groups measured masses using $33 < m \leq 38$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 34 to 38, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A table groups measured masses using $34 < m \leq 39$ kg, recorded to the nearest kilogram. State whether mass is discrete or continuous, give the true boundary interval for values recorded from 35 to 39, and explain why class boundaries matter in a histogram. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 4

HS3A - Data types and appropriate representation • Questions 1-2

Q01 | 4 MARKS

Mass is continuous. Values recorded as 21 through 25 kg have true boundaries $20.5 \leq m < 25.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Mass is continuous. Values recorded as 24 through 28 kg have true boundaries $23.5 \leq m < 28.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 4

HS3A - Data types and appropriate representation • Questions 3-4

Q03 | 4 MARKS

Mass is continuous. Values recorded as 27 through 31 kg have true boundaries $26.5 \leq m < 31.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Mass is continuous. Values recorded as 30 through 34 kg have true boundaries $29.5 \leq m < 34.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 4

HS3A - Data types and appropriate representation • Questions 5-6

Q05 | 4 MARKS

Mass is continuous. Values recorded as 33 through 37 kg have true boundaries $32.5 \leq m < 37.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Mass is continuous. Values recorded as 21 through 25 kg have true boundaries $20.5 \leq m < 25.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 4

HS3A - Data types and appropriate representation • Questions 7-8

Q07 | 4 MARKS

Mass is continuous. Values recorded as 24 through 28 kg have true boundaries $23.5 \leq m < 28.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Mass is continuous. Values recorded as 27 through 31 kg have true boundaries $26.5 \leq m < 31.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 4

HS3A - Data types and appropriate representation • Questions 9-10

Q09 | 4 MARKS

Mass is continuous. Values recorded as 30 through 34 kg have true boundaries $29.5 \leq m < 34.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Mass is continuous. Values recorded as 33 through 37 kg have true boundaries $32.5 \leq m < 37.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 4

HS3A - Data types and appropriate representation • Questions 11-12

Q11 | 5 MARKS

Mass is continuous. Values recorded as 34 through 38 kg have true boundaries $33.5 \leq m < 38.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Mass is continuous. Values recorded as 35 through 39 kg have true boundaries $34.5 \leq m < 39.5$. Histograms use continuous widths and areas, so gaps or overlaps caused by using category labels instead of boundaries distort frequency density. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 4 • Completion and retest record

HS3A - Data types and appropriate representation

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 5****HS3B - Frequency tables and grouped data****Chapter purpose**

Construct tables, interpret class intervals and boundaries and calculate cumulative totals.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.

Questions 9–12 provide the chapter stretch sequence.

Chapter 5 • Method and assessment map

HS3B - Frequency tables and grouped data

Specification focus

Construct tables, interpret class intervals and boundaries and calculate cumulative totals.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 5 • Practice

HS3B - Frequency tables and grouped data • Questions 1-2

Q01 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [8, 8, 15, 10]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [7, 9, 17, 7]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Chapter 5 • Practice

HS3B - Frequency tables and grouped data • Questions 3-4

Q03 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [6, 10, 12, 10]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [5, 11, 14, 7]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Chapter 5 • Practice

HS3B - Frequency tables and grouped data • Questions 5-6

Q05 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [8, 12, 16, 10]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [7, 8, 18, 7]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Chapter 5 • Practice

HS3B - Frequency tables and grouped data • Questions 7-8

Q07 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [6, 9, 13, 10]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [5, 10, 15, 7]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Chapter 5 • Practice

HS3B - Frequency tables and grouped data • Questions 9-10

Q09 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [8, 11, 17, 10]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [7, 12, 12, 7]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Chapter 5 • Practice

HS3B - Frequency tables and grouped data • Questions 11-12

Q11 | 5 MARKS

You must show your working. A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [8, 9, 15, 8]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A grouped table has consecutive class widths [5, 5, 10, 20] and frequencies [5, 11, 18, 9]. Calculate every cumulative frequency, identify the modal class, and explain why the class with greatest frequency need not have the tallest histogram bar. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 5

HS3B - Frequency tables and grouped data • Questions 1-2

Q01 | 4 MARKS

Cumulative frequencies are [8, 16, 31, 41]. The greatest raw frequency is 15, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are ['8/5', '8/5', '3/2', '1/2'], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Cumulative frequencies are [7, 16, 33, 40]. The greatest raw frequency is 17, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are ['7/5', '9/5', '17/10', '7/20'], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 5

HS3B - Frequency tables and grouped data • Questions 3-4

Q03 | 4 MARKS

Cumulative frequencies are [6, 16, 28, 38]. The greatest raw frequency is 12, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are [$'6/5'$, $'2'$, $'6/5'$, $'1/2'$], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Cumulative frequencies are [5, 16, 30, 37]. The greatest raw frequency is 14, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are [$'1'$, $'11/5'$, $'7/5'$, $'7/20'$], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 5

HS3B - Frequency tables and grouped data • Questions 5-6

Q05 | 4 MARKS

Cumulative frequencies are [8, 20, 36, 46]. The greatest raw frequency is 16, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are ['8/5', '12/5', '8/5', '1/2'], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Cumulative frequencies are [7, 15, 33, 40]. The greatest raw frequency is 18, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are ['7/5', '8/5', '9/5', '7/20'], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 5

HS3B - Frequency tables and grouped data • Questions 7-8

Q07 | 4 MARKS

Cumulative frequencies are [6, 15, 28, 38]. The greatest raw frequency is 13, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are ['6/5', '9/5', '13/10', '1/2'], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Cumulative frequencies are [5, 15, 30, 37]. The greatest raw frequency is 15, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are ['1', '2', '3/2', '7/20'], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 5

HS3B - Frequency tables and grouped data • Questions 9-10

Q09 | 4 MARKS

Cumulative frequencies are [8, 19, 36, 46]. The greatest raw frequency is 17, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are [$'8/5'$, $'11/5'$, $'17/10'$, $'1/2'$], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Cumulative frequencies are [7, 19, 31, 38]. The greatest raw frequency is 12, so the modal class by table frequency is class 2. Histogram height is frequency density f/width ; densities are [$'7/5'$, $'12/5'$, $'6/5'$, $'7/20'$], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 5

HS3B - Frequency tables and grouped data • Questions 11-12

Q11 | 5 MARKS

Cumulative frequencies are [8, 17, 32, 40]. The greatest raw frequency is 15, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are [$'8/5'$, $'9/5'$, $'3/2'$, $'2/5'$], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Cumulative frequencies are [5, 16, 34, 43]. The greatest raw frequency is 18, so the modal class by table frequency is class 3. Histogram height is frequency density f/width ; densities are [$'1'$, $'11/5'$, $'9/5'$, $'9/20'$], so unequal widths can change which bar is tallest. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 5 • Completion and retest record

HS3B - Frequency tables and grouped data

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 6****HS3C - Two-way tables****Chapter purpose**

Complete marginal totals and analyse proportions or association.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.

Questions 9–12 provide the chapter stretch sequence.

Chapter 6 • Method and assessment map

HS3C - Two-way tables

Specification focus

Complete marginal totals and analyse proportions or association.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 6 • Practice

HS3C - Two-way tables • Questions 1-2

Q01 | 4 MARKS

In a two-way table of 330 people, 85 have attribute A, 110 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

In a two-way table of 360 people, 88 have attribute A, 116 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Chapter 6 • Practice

HS3C - Two-way tables • Questions 3-4

Q03 | 4 MARKS

In a two-way table of 390 people, 91 have attribute A, 122 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

In a two-way table of 420 people, 94 have attribute A, 83 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Chapter 6 • Practice

HS3C - Two-way tables • Questions 5-6

Q05 | 4 MARKS

In a two-way table of 450 people, 97 have attribute A, 89 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

In a two-way table of 480 people, 100 have attribute A, 95 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Chapter 6 • Practice

HS3C - Two-way tables • Questions 7-8

Q07 | 4 MARKS

In a two-way table of 510 people, 103 have attribute A, 101 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

In a two-way table of 540 people, 106 have attribute A, 107 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Chapter 6 • Practice

HS3C - Two-way tables • Questions 9-10

Q09 | 4 MARKS

In a two-way table of 570 people, 109 have attribute A, 113 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

In a two-way table of 600 people, 112 have attribute A, 119 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Chapter 6 • Practice

HS3C - Two-way tables • Questions 11-12

Q11 | 5 MARKS

You must show your working. In a two-way table of 610 people, 113 have attribute A, 121 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. In a two-way table of 620 people, 114 have attribute A, 123 have attribute B and 15 have both. Complete all four interior cells and marginal totals. Compare the proportion with B among A with the proportion with B among not A, and comment on association. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 6

HS3C - Two-way tables • Questions 1-2

Q01 | 4 MARKS

Cells are both=15, A-only=70, B-only=95, neither=150. $P(B \text{ within } A) = 15/85 = 0.176$; $P(B \text{ within not } A) = 95/245 = 0.388$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Cells are both=15, A-only=73, B-only=101, neither=171. $P(B \text{ within } A) = 15/88 = 0.170$; $P(B \text{ within not } A) = 101/272 = 0.371$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 6

HS3C - Two-way tables • Questions 3-4

Q03 | 4 MARKS

Cells are both=15, A-only=76, B-only=107, neither=192. $P(B \text{ within } A) = 15/91 = 0.165$; $P(B \text{ within not } A) = 107/299 = 0.358$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Cells are both=15, A-only=79, B-only=68, neither=258. $P(B \text{ within } A) = 15/94 = 0.160$; $P(B \text{ within not } A) = 68/326 = 0.209$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 6

HS3C - Two-way tables • Questions 5-6

Q05 | 4 MARKS

Cells are both=15, A-only=82, B-only=74, neither=279. $P(B \text{ within } A) = 15/97 = 0.155$; $P(B \text{ within not } A) = 74/353 = 0.210$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Cells are both=15, A-only=85, B-only=80, neither=300. $P(B \text{ within } A) = 15/100 = 0.150$; $P(B \text{ within not } A) = 80/380 = 0.211$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 6

HS3C - Two-way tables • Questions 7-8

Q07 | 4 MARKS

Cells are both=15, A-only=88, B-only=86, neither=321. $P(B \text{ within } A) = 15/103 = 0.146$; $P(B \text{ within not } A) = 86/407 = 0.211$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Cells are both=15, A-only=91, B-only=92, neither=342. $P(B \text{ within } A) = 15/106 = 0.142$; $P(B \text{ within not } A) = 92/434 = 0.212$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 6

HS3C - Two-way tables • Questions 9-10

Q09 | 4 MARKS

Cells are both=15, A-only=94, B-only=98, neither=363. $P(B \text{ within } A) = 15/109 = 0.138$; $P(B \text{ within not } A) = 98/461 = 0.213$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Cells are both=15, A-only=97, B-only=104, neither=384. $P(B \text{ within } A) = 15/112 = 0.134$; $P(B \text{ within not } A) = 104/488 = 0.213$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 6

HS3C - Two-way tables • Questions 11-12

Q11 | 5 MARKS

Cells are both=15, A-only=98, B-only=106, neither=391. $P(B \text{ within } A) = 15/113 = 0.133$; $P(B \text{ within not } A) = 106/497 = 0.213$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Cells are both=15, A-only=99, B-only=108, neither=398. $P(B \text{ within } A) = 15/114 = 0.132$; $P(B \text{ within not } A) = 108/506 = 0.213$. The differing conditional proportions suggest a negative association, not causation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 6 • Completion and retest record

HS3C - Two-way tables

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 7****HS3D - Bar, line and pie representations****Chapter purpose**

Construct, calculate and critically interpret common categorical and numerical displays.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 7 • Method and assessment map

HS3D - Bar, line and pie representations

Specification focus

Construct, calculate and critically interpret common categorical and numerical displays.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 7 • Practice

HS3D - Bar, line and pie representations • Questions 1-2

Q01 | 4 MARKS

Four categories have frequencies [13, 24, 25, 20]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Four categories have frequencies [16, 22, 25, 23]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Chapter 7 • Practice

HS3D - Bar, line and pie representations • Questions 3-4

Q03 | 4 MARKS

Four categories have frequencies [12, 20, 25, 16]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Four categories have frequencies [15, 18, 25, 19]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Chapter 7 • Practice

HS3D - Bar, line and pie representations • Questions 5-6

Q05 | 4 MARKS

Four categories have frequencies [18, 24, 25, 22]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Four categories have frequencies [14, 22, 25, 15]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Chapter 7 • Practice

HS3D - Bar, line and pie representations • Questions 7-8

Q07 | 4 MARKS

Four categories have frequencies [17, 20, 25, 18]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Four categories have frequencies [13, 18, 25, 21]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Chapter 7 • Practice

HS3D - Bar, line and pie representations • Questions 9-10

Q09 | 4 MARKS

Four categories have frequencies [16, 24, 25, 24]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Four categories have frequencies [12, 22, 25, 17]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Chapter 7 • Practice

HS3D - Bar, line and pie representations • Questions 11-12

Q11 | 5 MARKS

You must show your working. Four categories have frequencies [13, 24, 28, 18]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. Four categories have frequencies [14, 18, 31, 19]. Calculate the sector angle for each category for a pie chart, check that the angles total 360 degrees, and explain when a bar chart would communicate these data more effectively. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 7

HS3D - Bar, line and pie representations • Questions 1-2

Q01 | 4 MARKS

Angles are frequency/total $\times 360$. With total 82, the exact angles are ['2340/41', '4320/41', '4500/41', '3600/41'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Angles are frequency/total $\times 360$. With total 86, the exact angles are ['2880/43', '3960/43', '4500/43', '4140/43'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 7

HS3D - Bar, line and pie representations • Questions 3-4

Q03 | 4 MARKS

Angles are frequency/total $\times 360$. With total 73, the exact angles are ['4320/73', '7200/73', '9000/73', '5760/73'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Angles are frequency/total $\times 360$. With total 77, the exact angles are ['5400/77', '6480/77', '9000/77', '6840/77'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 7

HS3D - Bar, line and pie representations • Questions 5-6

Q05 | 4 MARKS

Angles are frequency/total $\times 360$. With total 89, the exact angles are ['6480/89', '8640/89', '9000/89', '7920/89'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Angles are frequency/total $\times 360$. With total 76, the exact angles are ['1260/19', '1980/19', '2250/19', '1350/19'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 7

HS3D - Bar, line and pie representations • Questions 7-8

Q07 | 4 MARKS

Angles are frequency/total $\times 360$. With total 80, the exact angles are ['153/2', '90', '225/2', '81'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Angles are frequency/total $\times 360$. With total 77, the exact angles are ['4680/77', '6480/77', '9000/77', '1080/11'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 7

HS3D - Bar, line and pie representations • Questions 9-10

Q09 | 4 MARKS

Angles are frequency/total $\times 360$. With total 89, the exact angles are ['5760/89', '8640/89', '9000/89', '8640/89'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Angles are frequency/total $\times 360$. With total 76, the exact angles are ['1080/19', '1980/19', '2250/19', '1530/19'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 7

HS3D - Bar, line and pie representations • Questions 11-12

Q11 | 5 MARKS

Angles are frequency/total $\times 360$. With total 83, the exact angles are ['4680/83', '8640/83', '10080/83', '6480/83'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Angles are frequency/total $\times 360$. With total 82, the exact angles are ['2520/41', '3240/41', '5580/41', '3420/41'] degrees, and they sum to 360 degrees. A bar chart is often clearer when precise category comparisons matter, while a pie chart emphasises part-to-whole composition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 7 • Completion and retest record

HS3D - Bar, line and pie representations

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 8****HS3E - Time series****Chapter purpose**

Use time plots and moving averages to identify trend, seasonality and forecasting limitations.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 8 • Method and assessment map

HS3E - Time series

Specification focus

Use time plots and moving averages to identify trend, seasonality and forecasting limitations.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 8 • Practice

HS3E - Time series • Questions 1-2

Q01 | 4 MARKS

A time series has consecutive values [115, 125, 119, 133, 127, 141, 135]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A time series has consecutive values [118, 128, 122, 136, 130, 144, 138]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Chapter 8 • Practice

HS3E - Time series • Questions 3-4

Q03 | 4 MARKS

A time series has consecutive values [121, 131, 125, 139, 133, 147, 141]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A time series has consecutive values [124, 134, 128, 142, 136, 150, 144]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Chapter 8 • Practice

HS3E - Time series • Questions 5-6

Q05 | 4 MARKS

A time series has consecutive values [127, 137, 131, 145, 139, 153, 147]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A time series has consecutive values [130, 140, 134, 148, 142, 156, 150]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Chapter 8 • Practice

HS3E - Time series • Questions 7-8

Q07 | 4 MARKS

A time series has consecutive values [133, 143, 137, 151, 145, 159, 153]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A time series has consecutive values [136, 146, 140, 154, 148, 162, 156]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Chapter 8 • Practice

HS3E - Time series • Questions 9-10

Q09 | 4 MARKS

A time series has consecutive values [139, 149, 143, 157, 151, 165, 159]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A time series has consecutive values [142, 152, 146, 160, 154, 168, 162]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Chapter 8 • Practice

HS3E - Time series • Questions 11-12

Q11 | 5 MARKS

You must show your working. A time series has consecutive values [143, 153, 147, 161, 155, 169, 163]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A time series has consecutive values [144, 154, 148, 162, 156, 170, 164]. Calculate the five three-point moving averages, place each against the correct central period, and describe the underlying trend after smoothing. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 8

HS3E - Time series • Questions 1-2

Q01 | 4 MARKS

Three-point totals divided by 3 give ['359/3', '377/3', '379/3', '401/3', '403/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Three-point totals divided by 3 give ['368/3', '386/3', '388/3', '410/3', '412/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 8

HS3E - Time series • Questions 3-4

Q03 | 4 MARKS

Three-point totals divided by 3 give ['377/3', '395/3', '397/3', '419/3', '421/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Three-point totals divided by 3 give ['386/3', '404/3', '406/3', '428/3', '430/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 8

HS3E - Time series • Questions 5-6

Q05 | 4 MARKS

Three-point totals divided by 3 give ['395/3', '413/3', '415/3', '437/3', '439/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Three-point totals divided by 3 give ['404/3', '422/3', '424/3', '446/3', '448/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 8

HS3E - Time series • Questions 7-8

Q07 | 4 MARKS

Three-point totals divided by 3 give ['413/3', '431/3', '433/3', '455/3', '457/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Three-point totals divided by 3 give ['422/3', '440/3', '442/3', '464/3', '466/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 8

HS3E - Time series • Questions 9-10

Q09 | 4 MARKS

Three-point totals divided by 3 give ['431/3', '449/3', '451/3', '473/3', '475/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Three-point totals divided by 3 give ['440/3', '458/3', '460/3', '482/3', '484/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 8

HS3E - Time series • Questions 11-12

Q11 | 5 MARKS

Three-point totals divided by 3 give ['443/3', '461/3', '463/3', '485/3', '487/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Three-point totals divided by 3 give ['446/3', '464/3', '466/3', '488/3', '490/3']. They are plotted at periods 2 through 6, the centres of their windows. Despite short-term alternation, the moving averages show an overall upward trend. A forecast should also consider whether the alternating pattern is seasonal. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 8 • Completion and retest record

HS3E - Time series

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 9****HS4A - Histograms and frequency density****Chapter purpose**

Construct and interpret histograms with equal and unequal class widths using area correctly.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 9 • Method and assessment map

HS4A - Histograms and frequency density

Specification focus

Construct and interpret histograms with equal and unequal class widths using area correctly.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 9 • Practice

HS4A - Histograms and frequency density • Questions 1-2

Q01 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [13, 24, 24, 21]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [10, 22, 24, 24]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Chapter 9 • Practice

HS4A - Histograms and frequency density • Questions 3-4

Q03 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [13, 20, 24, 17]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [10, 18, 24, 20]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Chapter 9 • Practice

HS4A - Histograms and frequency density • Questions 5-6

Q05 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [13, 24, 24, 23]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [10, 22, 24, 16]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Chapter 9 • Practice

HS4A - Histograms and frequency density • Questions 7-8

Q07 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [13, 20, 24, 19]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [10, 18, 24, 22]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Chapter 9 • Practice

HS4A - Histograms and frequency density • Questions 9-10

Q09 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [13, 24, 24, 25]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A histogram uses class widths [5, 10, 15, 20] and frequencies [10, 22, 24, 18]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Chapter 9 • Practice

HS4A - Histograms and frequency density • Questions 11-12

Q11 | 5 MARKS

You must show your working. A histogram uses class widths [5, 10, 15, 20] and frequencies [11, 24, 27, 19]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A histogram uses class widths [5, 10, 15, 20] and frequencies [12, 18, 30, 20]. Calculate all frequency densities. A missing bar has width 15 and the same area as the third class; find its frequency and state what bar area represents. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 9

HS4A - Histograms and frequency density • Questions 1-2

Q01 | 4 MARKS

Frequency density = f/width , giving ['13/5', '12/5', '8/5', '21/20']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Frequency density = f/width , giving ['2', '11/5', '8/5', '6/5']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 9

HS4A - Histograms and frequency density • Questions 3–4

Q03 | 4 MARKS

Frequency density = f/width , giving ['13/5', '2', '8/5', '17/20']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Frequency density = f/width , giving ['2', '9/5', '8/5', '1']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 9

HS4A - Histograms and frequency density • Questions 5–6

Q05 | 4 MARKS

Frequency density = f/width , giving ['13/5', '12/5', '8/5', '23/20']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Frequency density = f/width , giving ['2', '11/5', '8/5', '4/5']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 9

HS4A - Histograms and frequency density • Questions 7-8

Q07 | 4 MARKS

Frequency density = f/width , giving ['13/5', '2', '8/5', '19/20']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Frequency density = f/width , giving ['2', '9/5', '8/5', '11/10']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 9

HS4A - Histograms and frequency density • Questions 9-10

Q09 | 4 MARKS

Frequency density = f/width , giving ['13/5', '12/5', '8/5', '5/4']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Frequency density = f/width , giving ['2', '11/5', '8/5', '9/10']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 24, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 9

HS4A - Histograms and frequency density • Questions 11-12

Q11 | 5 MARKS

Frequency density = f/width , giving ['11/5', '12/5', '9/5', '19/20']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 27, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Frequency density = f/width , giving ['12/5', '9/5', '2', '1']. Histogram area = class width $\times$ density = frequency. Equal area therefore means equal frequency, so the missing class frequency is 30, regardless of its height. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 9 • Completion and retest record

HS4A - Histograms and frequency density

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 10****HS4B - Cumulative-frequency graphs****Chapter purpose**

Use cumulative totals, quartiles, percentiles and interpolation.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.

Questions 9–12 provide the chapter stretch sequence.

Chapter 10 • Method and assessment map

HS4B - Cumulative-frequency graphs

Specification focus

Use cumulative totals, quartiles, percentiles and interpolation.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 10 • Practice

HS4B - Cumulative-frequency graphs • Questions 1-2

Q01 | 4 MARKS

Grouped frequencies are [8, 16, 25, 18, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Grouped frequencies are [11, 15, 26, 12, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Chapter 10 • Practice

HS4B - Cumulative-frequency graphs • Questions 3-4

Q03 | 4 MARKS

Grouped frequencies are [9, 14, 27, 15, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Grouped frequencies are [12, 20, 20, 18, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Chapter 10 • Practice

HS4B - Cumulative-frequency graphs • Questions 5-6

Q05 | 4 MARKS

Grouped frequencies are [10, 19, 21, 12, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Grouped frequencies are [8, 18, 22, 15, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Chapter 10 • Practice

HS4B - Cumulative-frequency graphs • Questions 7-8

Q07 | 4 MARKS

Grouped frequencies are [11, 17, 23, 18, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Grouped frequencies are [9, 16, 24, 12, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Chapter 10 • Practice

HS4B - Cumulative-frequency graphs • Questions 9-10

Q09 | 4 MARKS

Grouped frequencies are [12, 15, 25, 15, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Grouped frequencies are [10, 14, 26, 18, 6] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Chapter 10 • Practice

HS4B - Cumulative-frequency graphs • Questions 11-12

Q11 | 5 MARKS

You must show your working. Grouped frequencies are [11, 16, 21, 19, 8] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. Grouped frequencies are [12, 18, 24, 20, 10] across five increasing intervals. Form cumulative frequencies, identify the cumulative-frequency positions of Q1, median and Q3, and explain how they would be read from a curve. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 10

HS4B - Cumulative-frequency graphs • Questions 1-2

Q01 | 4 MARKS

Cumulative totals are [8, 24, 49, 67, 73]; $N=73$. Quartile positions are $73/4$, $73/2$, $219/4$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Cumulative totals are [11, 26, 52, 64, 70]; $N=70$. Quartile positions are $35/2$, 35, $105/2$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 10

HS4B - Cumulative-frequency graphs • Questions 3-4

Q03 | 4 MARKS

Cumulative totals are [9, 23, 50, 65, 71]; $N=71$. Quartile positions are $71/4$, $71/2$, $213/4$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Cumulative totals are [12, 32, 52, 70, 76]; $N=76$. Quartile positions are 19, 38, 57. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 10

HS4B - Cumulative-frequency graphs • Questions 5-6

Q05 | 4 MARKS

Cumulative totals are [10, 29, 50, 62, 68]; $N=68$. Quartile positions are 17, 34, 51. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Cumulative totals are [8, 26, 48, 63, 69]; $N=69$. Quartile positions are $69/4$, $69/2$, $207/4$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 10

HS4B - Cumulative-frequency graphs • Questions 7-8

Q07 | 4 MARKS

Cumulative totals are [11, 28, 51, 69, 75]; $N=75$. Quartile positions are $75/4$, $75/2$, $225/4$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Cumulative totals are [9, 25, 49, 61, 67]; $N=67$. Quartile positions are $67/4$, $67/2$, $201/4$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 10

HS4B - Cumulative-frequency graphs • Questions 9-10

Q09 | 4 MARKS

Cumulative totals are [12, 27, 52, 67, 73]; $N=73$. Quartile positions are $73/4$, $73/2$, $219/4$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Cumulative totals are [10, 24, 50, 68, 74]; $N=74$. Quartile positions are $37/2$, 37, $111/2$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 10

HS4B - Cumulative-frequency graphs • Questions 11-12

Q11 | 5 MARKS

Cumulative totals are [11, 27, 48, 67, 75]; $N=75$. Quartile positions are $75/4$, $75/2$, $225/4$. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Cumulative totals are [12, 30, 54, 74, 84]; $N=84$. Quartile positions are 21, 42, 63. From the curve, move horizontally from each cumulative-frequency value to the curve, then vertically to the measurement axis. Values are graphical estimates and depend on within-class interpolation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 10 • Completion and retest record

HS4B - Cumulative-frequency graphs

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 11****HS5A - Averages, range and outliers****Chapter purpose**

Calculate and select appropriate measures of centre and spread.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 11 • Method and assessment map

HS5A - Averages, range and outliers

Specification focus

Calculate and select appropriate measures of centre and spread.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 11 • Practice

HS5A - Averages, range and outliers • Questions 1-2

Q01 | 4 MARKS

For the data [4, 8, 12, 12, 15, 16, 23], calculate the mean, median and range. If the largest value is replaced by a value 20 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

For the data [7, 7, 13, 9, 12, 19, 24], calculate the mean, median and range. If the largest value is replaced by a value 23 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Chapter 11 • Practice

HS5A - Averages, range and outliers • Questions 3-4

Q03 | 4 MARKS

For the data [5, 6, 14, 12, 18, 15, 25], calculate the mean, median and range. If the largest value is replaced by a value 26 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

For the data [8, 12, 7, 9, 15, 18, 18], calculate the mean, median and range. If the largest value is replaced by a value 29 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Chapter 11 • Practice

HS5A - Averages, range and outliers • Questions 5-6

Q05 | 4 MARKS

For the data [6, 11, 8, 12, 12, 21, 19], calculate the mean, median and range. If the largest value is replaced by a value 32 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

For the data [4, 10, 9, 9, 18, 17, 20], calculate the mean, median and range. If the largest value is replaced by a value 20 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Chapter 11 • Practice

HS5A - Averages, range and outliers • Questions 7-8

Q07 | 4 MARKS

For the data [7, 9, 10, 12, 15, 20, 21], calculate the mean, median and range. If the largest value is replaced by a value 23 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

For the data [5, 8, 11, 9, 12, 16, 22], calculate the mean, median and range. If the largest value is replaced by a value 26 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Chapter 11 • Practice

HS5A - Averages, range and outliers • Questions 9-10

Q09 | 4 MARKS

For the data [8, 7, 12, 12, 18, 19, 23], calculate the mean, median and range. If the largest value is replaced by a value 29 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

For the data [6, 6, 13, 9, 15, 15, 24], calculate the mean, median and range. If the largest value is replaced by a value 32 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Chapter 11 • Practice

HS5A - Averages, range and outliers • Questions 11-12

Q11 | 5 MARKS

You must show your working. For the data [7, 8, 8, 10, 17, 16, 19], calculate the mean, median and range. If the largest value is replaced by a value 33 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. For the data [8, 10, 11, 11, 19, 17, 22], calculate the mean, median and range. If the largest value is replaced by a value 34 greater, determine which statistics change and recommend a measure of centre for data containing an extreme value. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 11

HS5A - Averages, range and outliers • Questions 1-2

Q01 | 4 MARKS

Original mean=90/7, median=12, range=19. After replacement, mean=110/7, median=12, range=39. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Original mean=13, median=12, range=17. After replacement, mean=114/7, median=12, range=40. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 11

HS5A - Averages, range and outliers • Questions 3-4

Q03 | 4 MARKS

Original mean=95/7, median=14, range=20. After replacement, mean=121/7, median=14, range=46. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Original mean=87/7, median=12, range=11. After replacement, mean=116/7, median=12, range=40. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 11

HS5A - Averages, range and outliers • Questions 5-6

Q05 | 4 MARKS

Original mean=89/7, median=12, range=15. After replacement, mean=121/7, median=12, range=45. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Original mean=87/7, median=10, range=16. After replacement, mean=107/7, median=10, range=36. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 11

HS5A - Averages, range and outliers • Questions 7-8

Q07 | 4 MARKS

Original mean=94/7, median=12, range=14. After replacement, mean=117/7, median=12, range=37. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Original mean=83/7, median=11, range=17. After replacement, mean=109/7, median=11, range=43. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 11

HS5A - Averages, range and outliers • Questions 9-10

Q09 | 4 MARKS

Original mean=99/7, median=12, range=16. After replacement, mean=128/7, median=12, range=45. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Original mean=88/7, median=13, range=18. After replacement, mean=120/7, median=13, range=50. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 11

HS5A - Averages, range and outliers • Questions 11-12

Q11 | 5 MARKS

Original mean=85/7, median=10, range=12. After replacement, mean=118/7, median=10, range=45. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Original mean=14, median=11, range=14. After replacement, mean=132/7, median=11, range=48. The median is usually more resistant to an extreme value, although choice should reflect the investigative purpose. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 11 • Completion and retest record

HS5A - Averages, range and outliers

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 12****HS5B - Weighted means and combined groups****Chapter purpose**

Use frequency weighting and reverse-mean reasoning.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 12 • Method and assessment map

HS5B - Weighted means and combined groups

Specification focus

Use frequency weighting and reverse-mean reasoning.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 12 • Practice

HS5B - Weighted means and combined groups • Questions 1-2

Q01 | 4 MARKS

Group A has 25 values with mean 62; group B has 31 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 63, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Group A has 28 values with mean 57; group B has 25 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 60, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Chapter 12 • Practice

HS5B - Weighted means and combined groups • Questions 3-4

Q03 | 4 MARKS

Group A has 21 values with mean 60; group B has 31 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 63, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Group A has 24 values with mean 55; group B has 25 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 60, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Chapter 12 • Practice

HS5B - Weighted means and combined groups • Questions 5-6

Q05 | 4 MARKS

Group A has 27 values with mean 58; group B has 31 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 63, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Group A has 20 values with mean 61; group B has 25 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 60, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Chapter 12 • Practice

HS5B - Weighted means and combined groups • Questions 7–8

Q07 | 4 MARKS

Group A has 23 values with mean 56; group B has 31 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 63, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Group A has 26 values with mean 59; group B has 25 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 60, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Chapter 12 • Practice

HS5B - Weighted means and combined groups • Questions 9-10

Q09 | 4 MARKS

Group A has 29 values with mean 62; group B has 31 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 63, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Group A has 22 values with mean 57; group B has 25 values with mean 61. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 60, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Chapter 12 • Practice

HS5B - Weighted means and combined groups • Questions 11-12

Q11 | 5 MARKS

You must show your working. Group A has 23 values with mean 58; group B has 27 values with mean 64. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 61, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. Group A has 24 values with mean 59; group B has 29 values with mean 67. Find the combined mean. Then find the mean group B would need for the combined mean to be exactly 62, keeping both group sizes fixed. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 12

HS5B - Weighted means and combined groups • Questions 1-2

Q01 | 4 MARKS

Total for A=25x62; total for B=31x61. Combined mean= $(1550+1891)/56=61.446$. For target 63, required B mean= $[63(56)-1550]/31=63.806$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Total for A=28x57; total for B=25x61. Combined mean= $(1596+1525)/53=58.887$. For target 60, required B mean= $[60(53)-1596]/25=63.360$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 12

HS5B - Weighted means and combined groups • Questions 3-4

Q03 | 4 MARKS

Total for A=21x60; total for B=31x61. Combined mean= $(1260+1891)/52=60.596$. For target 63, required B mean= $[63(52)-1260]/31=65.032$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Total for A=24x55; total for B=25x61. Combined mean= $(1320+1525)/49=58.061$. For target 60, required B mean= $[60(49)-1320]/25=64.800$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 12

HS5B - Weighted means and combined groups • Questions 5–6

Q05 | 4 MARKS

Total for A=27x58; total for B=31x61. Combined mean= $(1566+1891)/58=59.603$. For target 63, required B mean= $[63(58)-1566]/31=67.355$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Total for A=20x61; total for B=25x61. Combined mean= $(1220+1525)/45=61.000$. For target 60, required B mean= $[60(45)-1220]/25=59.200$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 12

HS5B - Weighted means and combined groups • Questions 7–8

Q07 | 4 MARKS

Total for A=23x56; total for B=31x61. Combined mean= $(1288+1891)/54=58.870$. For target 63, required B mean= $[63(54)-1288]/31=68.194$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Total for A=26x59; total for B=25x61. Combined mean= $(1534+1525)/51=59.980$. For target 60, required B mean= $[60(51)-1534]/25=61.040$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 12

HS5B - Weighted means and combined groups • Questions 9-10

Q09 | 4 MARKS

Total for A=29x62; total for B=31x61. Combined mean= $(1798+1891)/60=61.483$. For target 63, required B mean= $[63(60)-1798]/31=63.935$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Total for A=22x57; total for B=25x61. Combined mean= $(1254+1525)/47=59.128$. For target 60, required B mean= $[60(47)-1254]/25=62.640$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 12

HS5B - Weighted means and combined groups • Questions 11-12

Q11 | 5 MARKS

Total for A=23x58; total for B=27x64. Combined mean= $(1334+1728)/50=61.240$. For target 61, required B mean= $[61(50)-1334]/27=63.556$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Total for A=24x59; total for B=29x67. Combined mean= $(1416+1943)/53=63.377$. For target 62, required B mean= $[62(53)-1416]/29=64.483$. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 12 • Completion and retest record

HS5B - Weighted means and combined groups

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 13****HS5C - Estimated mean from grouped data****Chapter purpose**

Use midpoint products and explain the assumptions and limitations of estimation.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 13 • Method and assessment map

HS5C - Estimated mean from grouped data

Specification focus

Use midpoint products and explain the assumptions and limitations of estimation.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 13 • Practice

HS5C - Estimated mean from grouped data • Questions 1-2

Q01 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [4, 8, 15, 13]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [7, 8, 17, 8]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Chapter 13 • Practice

HS5C - Estimated mean from grouped data • Questions 3-4

Q03 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [5, 8, 12, 11]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [8, 8, 14, 6]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Chapter 13 • Practice

HS5C - Estimated mean from grouped data • Questions 5-6

Q05 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [6, 8, 16, 9]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [4, 8, 18, 12]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Chapter 13 • Practice

HS5C - Estimated mean from grouped data • Questions 7-8

Q07 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [7, 8, 13, 7]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [5, 8, 15, 10]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Chapter 13 • Practice

HS5C - Estimated mean from grouped data • Questions 9-10

Q09 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [8, 8, 17, 13]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Grouped data have class midpoints [5, 15, 30, 50] and frequencies [6, 8, 12, 8]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Chapter 13 • Practice

HS5C - Estimated mean from grouped data • Questions 11-12

Q11 | 5 MARKS

You must show your working. Grouped data have class midpoints [5, 15, 30, 50] and frequencies [7, 10, 15, 9]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. Grouped data have class midpoints [5, 15, 30, 50] and frequencies [8, 12, 18, 10]. Calculate the estimated mean using a midpoint-product table. Explain precisely why the answer is an estimate and give one possible set of class intervals. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 13

HS5C - Estimated mean from grouped data • Questions 1-2

Q01 | 4 MARKS

Midpoint products are [20, 120, 450, 650], with sum 1240 and total frequency 40. Estimated mean = $1240/40 = 31.000$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Midpoint products are [35, 120, 510, 400], with sum 1065 and total frequency 40. Estimated mean = $1065/40 = 26.625$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 13

HS5C - Estimated mean from grouped data • Questions 3-4

Q03 | 4 MARKS

Midpoint products are [25, 120, 360, 550], with sum 1055 and total frequency 36. Estimated mean = $1055/36 = 29.306$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Midpoint products are [40, 120, 420, 300], with sum 880 and total frequency 36. Estimated mean = $880/36 = 24.444$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 13

HS5C - Estimated mean from grouped data • Questions 5-6

Q05 | 4 MARKS

Midpoint products are [30, 120, 480, 450], with sum 1080 and total frequency 39. Estimated mean = $1080/39 = 27.692$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Midpoint products are [20, 120, 540, 600], with sum 1280 and total frequency 42. Estimated mean = $1280/42 = 30.476$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 13

HS5C - Estimated mean from grouped data • Questions 7-8

Q07 | 4 MARKS

Midpoint products are [35, 120, 390, 350], with sum 895 and total frequency 35. Estimated mean = $895/35 = 25.571$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Midpoint products are [25, 120, 450, 500], with sum 1095 and total frequency 38. Estimated mean = $1095/38 = 28.816$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 13

HS5C - Estimated mean from grouped data • Questions 9-10

Q09 | 4 MARKS

Midpoint products are [40, 120, 510, 650], with sum 1320 and total frequency 46. Estimated mean = $1320/46 = 28.696$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Midpoint products are [30, 120, 360, 400], with sum 910 and total frequency 34. Estimated mean = $910/34 = 26.765$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 13

HS5C - Estimated mean from grouped data • Questions 11-12

Q11 | 5 MARKS

Midpoint products are [35, 150, 450, 450], with sum 1085 and total frequency 41. Estimated mean = $1085/41 = 26.463$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Midpoint products are [40, 180, 540, 500], with sum 1260 and total frequency 48. Estimated mean = $1260/48 = 26.250$. It assumes every value in a class equals its midpoint. One compatible consecutive system is $0 \leq x < 10$, $10 \leq x < 20$, $20 \leq x < 40$ and $40 \leq x < 60$. Their midpoints are 5, 15, 30 and 50. Midpoints alone do not make the class boundaries unique, so this is one valid construction rather than the only one. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 13 • Completion and retest record

HS5C - Estimated mean from grouped data

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 14****HS5D - Stem-and-leaf diagrams****Chapter purpose**

Construct ordered displays with keys and compare centre and spread.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 14 • Method and assessment map

HS5D - Stem-and-leaf diagrams

Specification focus

Construct ordered displays with keys and compare centre and spread.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 14 • Practice

HS5D - Stem-and-leaf diagrams • Questions 1-2

Q01 | 4 MARKS

Two ordered samples are [12, 17, 15, 19, 25, 28, 25] and [18, 23, 21, 25, 31, 34, 31]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Two ordered samples are [15, 14, 15, 22, 26, 22, 31] and [20, 19, 20, 27, 31, 27, 36]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Chapter 14 • Practice

HS5D - Stem-and-leaf diagrams • Questions 3-4

Q03 | 4 MARKS

Two ordered samples are [13, 17, 15, 18, 27, 25, 27] and [17, 21, 19, 22, 31, 29, 31]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Two ordered samples are [16, 14, 15, 21, 20, 28, 33] and [19, 17, 18, 24, 23, 31, 36]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Chapter 14 • Practice

HS5D - Stem-and-leaf diagrams • Questions 5-6

Q05 | 4 MARKS

Two ordered samples are [14, 17, 15, 24, 21, 22, 29] and [20, 23, 21, 30, 27, 28, 35]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Two ordered samples are [12, 14, 15, 20, 22, 25, 25] and [17, 19, 20, 25, 27, 30, 30]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Chapter 14 • Practice

HS5D - Stem-and-leaf diagrams • Questions 7-8

Q07 | 4 MARKS

Two ordered samples are [15, 17, 15, 23, 23, 28, 31] and [19, 21, 19, 27, 27, 32, 35]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Two ordered samples are [13, 14, 15, 19, 24, 22, 27] and [16, 17, 18, 22, 27, 25, 30]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Chapter 14 • Practice

HS5D - Stem-and-leaf diagrams • Questions 9-10

Q09 | 4 MARKS

Two ordered samples are [16, 17, 15, 22, 25, 25, 33] and [22, 23, 21, 28, 31, 31, 39]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Two ordered samples are [14, 14, 15, 18, 26, 28, 29] and [19, 19, 20, 23, 31, 33, 34]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Chapter 14 • Practice

HS5D - Stem-and-leaf diagrams • Questions 11-12

Q11 | 5 MARKS

You must show your working. Two ordered samples are [15, 15, 17, 19, 21, 29, 31] and [21, 21, 23, 25, 27, 35, 37]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. Two ordered samples are [16, 16, 19, 20, 24, 30, 33] and [19, 19, 22, 23, 27, 33, 36]. Write each as a stem-and-leaf diagram using a common key, calculate both medians and ranges, and compare the distributions using centre and spread. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 14

HS5D - Stem-and-leaf diagrams • Questions 1-2

Q01 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=19, range=16. Sample 2 median=25, range=16. Sample 2 has higher centre and range 16 compared with 16. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=22, range=17. Sample 2 median=27, range=17. Sample 2 has higher centre and range 17 compared with 17. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 14

HS5D - Stem-and-leaf diagrams • Questions 3-4

Q03 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=18, range=14. Sample 2 median=22, range=14. Sample 2 has higher centre and range 14 compared with 14. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=20, range=19. Sample 2 median=23, range=19. Sample 2 has higher centre and range 19 compared with 19. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 14

HS5D - Stem-and-leaf diagrams • Questions 5-6

Q05 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=21, range=15. Sample 2 median=27, range=15. Sample 2 has higher centre and range 15 compared with 15. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=20, range=13. Sample 2 median=25, range=13. Sample 2 has higher centre and range 13 compared with 13. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 14

HS5D - Stem-and-leaf diagrams • Questions 7-8

Q07 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=23, range=16. Sample 2 median=27, range=16. Sample 2 has higher centre and range 16 compared with 16. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=19, range=14. Sample 2 median=22, range=14. Sample 2 has higher centre and range 14 compared with 14. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 14

HS5D - Stem-and-leaf diagrams • Questions 9-10

Q09 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=22, range=18. Sample 2 median=28, range=18. Sample 2 has higher centre and range 18 compared with 18. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=18, range=15. Sample 2 median=23, range=15. Sample 2 has higher centre and range 15 compared with 15. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 14

HS5D - Stem-and-leaf diagrams • Questions 11-12

Q11 | 5 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=19, range=16. Sample 2 median=25, range=16. Sample 2 has higher centre and range 16 compared with 16. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Use tens as stems and units as leaves; preserve repeated leaves and provide a key such as $1|4=14$. Sample 1 median=20, range=17. Sample 2 median=23, range=17. Sample 2 has higher centre and range 17 compared with 17. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 14 • Completion and retest record

HS5D - Stem-and-leaf diagrams

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 15****HS5E - Box plots and five-number summaries****Chapter purpose**

Construct and interpret box plots using medians, quartiles and extremes.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 15 • Method and assessment map

HS5E - Box plots and five-number summaries

Specification focus

Construct and interpret box plots using medians, quartiles and extremes.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 15 • Practice

HS5E - Box plots and five-number summaries • Questions 1-2

Q01 | 4 MARKS

A distribution has five-number summary (8, 19, 24, 33, 47). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A distribution has five-number summary (5, 14, 22, 28, 36). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Chapter 15 • Practice

HS5E - Box plots and five-number summaries • Questions 3-4

Q03 | 4 MARKS

A distribution has five-number summary (8, 17, 23, 32, 43). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A distribution has five-number summary (5, 12, 21, 27, 41). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Chapter 15 • Practice

HS5E - Box plots and five-number summaries • Questions 5-6

Q05 | 4 MARKS

A distribution has five-number summary (8, 15, 22, 31, 39). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A distribution has five-number summary (5, 18, 23, 29, 40). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Chapter 15 • Practice

HS5E - Box plots and five-number summaries • Questions 7-8

Q07 | 4 MARKS

A distribution has five-number summary (8, 13, 21, 30, 44). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A distribution has five-number summary (5, 16, 22, 28, 36). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Chapter 15 • Practice

HS5E - Box plots and five-number summaries • Questions 9-10

Q09 | 4 MARKS

A distribution has five-number summary (8, 19, 28, 37, 48). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A distribution has five-number summary (5, 14, 21, 27, 41). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Chapter 15 • Practice

HS5E - Box plots and five-number summaries • Questions 11-12

Q11 | 5 MARKS

You must show your working. A distribution has five-number summary (6, 15, 23, 30, 45). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A distribution has five-number summary (7, 16, 25, 33, 49). Draw a correctly scaled box plot, calculate the range and IQR, and determine the lower and upper $1.5 \times \text{IQR}$ outlier fences. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 15

HS5E - Box plots and five-number summaries • Questions 1-2

Q01 | 4 MARKS

Whiskers are at 8 and 47; box edges at 19 and 33; median at 24. Range=39; IQR=14. Fences are $19-1.5(14)=-2$ and $33+1.5(14)=54$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Whiskers are at 5 and 36; box edges at 14 and 28; median at 22. Range=31; IQR=14. Fences are $14-1.5(14)=-7$ and $28+1.5(14)=49$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 15

HS5E - Box plots and five-number summaries • Questions 3-4

Q03 | 4 MARKS

Whiskers are at 8 and 43; box edges at 17 and 32; median at 23. Range=35; IQR=15. Fences are $17-1.5(15)=-11/2$ and $32+1.5(15)=109/2$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Whiskers are at 5 and 41; box edges at 12 and 27; median at 21. Range=36; IQR=15. Fences are $12-1.5(15)=-21/2$ and $27+1.5(15)=99/2$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 15

HS5E - Box plots and five-number summaries • Questions 5-6

Q05 | 4 MARKS

Whiskers are at 8 and 39; box edges at 15 and 31; median at 22. Range=31; IQR=16. Fences are $15-1.5(16)=-9$ and $31+1.5(16)=55$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Whiskers are at 5 and 40; box edges at 18 and 29; median at 23. Range=35; IQR=11. Fences are $18-1.5(11)=3/2$ and $29+1.5(11)=91/2$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 15

HS5E - Box plots and five-number summaries • Questions 7-8

Q07 | 4 MARKS

Whiskers are at 8 and 44; box edges at 13 and 30; median at 21. Range=36; IQR=17. Fences are $13-1.5(17)=-25/2$ and $30+1.5(17)=111/2$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Whiskers are at 5 and 36; box edges at 16 and 28; median at 22. Range=31; IQR=12. Fences are $16-1.5(12)=-2$ and $28+1.5(12)=46$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 15

HS5E - Box plots and five-number summaries • Questions 9-10

Q09 | 4 MARKS

Whiskers are at 8 and 48; box edges at 19 and 37; median at 28. Range=40; IQR=18. Fences are $19-1.5(18)=-8$ and $37+1.5(18)=64$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Whiskers are at 5 and 41; box edges at 14 and 27; median at 21. Range=36; IQR=13. Fences are $14-1.5(13)=-11/2$ and $27+1.5(13)=93/2$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 15

HS5E - Box plots and five-number summaries • Questions 11-12

Q11 | 5 MARKS

Whiskers are at 6 and 45; box edges at 15 and 30; median at 23. Range=39; IQR=15. Fences are $15-1.5(15)=-15/2$ and $30+1.5(15)=105/2$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Whiskers are at 7 and 49; box edges at 16 and 33; median at 25. Range=42; IQR=17. Fences are $16-1.5(17)=-19/2$ and $33+1.5(17)=117/2$. Values beyond them are potential outliers. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 15 • Completion and retest record

HS5E - Box plots and five-number summaries

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 16****HS5F - Comparing distributions****Chapter purpose**

Compare centre, spread, skew and outliers using contextual conclusions.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 16 • Method and assessment map

HS5F - Comparing distributions

Specification focus

Compare centre, spread, skew and outliers using contextual conclusions.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 16 • Practice

HS5F - Comparing distributions • Questions 1-2

Q01 | 4 MARKS

Distribution A has median 55 and IQR 13; distribution B has median 58 and IQR 11. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Distribution A has median 58 and IQR 16; distribution B has median 64 and IQR 8. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Chapter 16 • Practice

HS5F - Comparing distributions • Questions 3-4

Q03 | 4 MARKS

Distribution A has median 51 and IQR 12; distribution B has median 55 and IQR 11. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Distribution A has median 54 and IQR 15; distribution B has median 61 and IQR 8. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Chapter 16 • Practice

HS5F - Comparing distributions • Questions 5-6

Q05 | 4 MARKS

Distribution A has median 57 and IQR 18; distribution B has median 62 and IQR 11. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Distribution A has median 50 and IQR 14; distribution B has median 53 and IQR 8. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Chapter 16 • Practice

HS5F - Comparing distributions • Questions 7-8

Q07 | 4 MARKS

Distribution A has median 53 and IQR 17; distribution B has median 59 and IQR 11. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Distribution A has median 56 and IQR 13; distribution B has median 60 and IQR 8. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Chapter 16 • Practice

HS5F - Comparing distributions • Questions 9-10

Q09 | 4 MARKS

Distribution A has median 59 and IQR 16; distribution B has median 66 and IQR 11. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Distribution A has median 52 and IQR 12; distribution B has median 57 and IQR 8. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Chapter 16 • Practice

HS5F - Comparing distributions • Questions 11-12

Q11 | 5 MARKS

You must show your working. Distribution A has median 53 and IQR 13; distribution B has median 59 and IQR 9. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. Distribution A has median 54 and IQR 14; distribution B has median 61 and IQR 10. Compare typical value and consistency in context, then explain why these four statistics do not prove that every observation in B exceeds every observation in A. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 16

HS5F - Comparing distributions • Questions 1-2

Q01 | 4 MARKS

B has the higher median (58 versus 55), so its typical value is higher. The smaller IQR is 11, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

B has the higher median (64 versus 58), so its typical value is higher. The smaller IQR is 8, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 16

HS5F - Comparing distributions • Questions 3-4

Q03 | 4 MARKS

B has the higher median (55 versus 51), so its typical value is higher. The smaller IQR is 11, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

B has the higher median (61 versus 54), so its typical value is higher. The smaller IQR is 8, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 16

HS5F - Comparing distributions • Questions 5-6

Q05 | 4 MARKS

B has the higher median (62 versus 57), so its typical value is higher. The smaller IQR is 11, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

B has the higher median (53 versus 50), so its typical value is higher. The smaller IQR is 8, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 16

HS5F - Comparing distributions • Questions 7-8

Q07 | 4 MARKS

B has the higher median (59 versus 53), so its typical value is higher. The smaller IQR is 11, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

B has the higher median (60 versus 56), so its typical value is higher. The smaller IQR is 8, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 16

HS5F - Comparing distributions • Questions 9-10

Q09 | 4 MARKS

B has the higher median (66 versus 59), so its typical value is higher. The smaller IQR is 11, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

B has the higher median (57 versus 52), so its typical value is higher. The smaller IQR is 8, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 16

HS5F - Comparing distributions • Questions 11-12

Q11 | 5 MARKS

B has the higher median (59 versus 53), so its typical value is higher. The smaller IQR is 9, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

B has the higher median (61 versus 54), so its typical value is higher. The smaller IQR is 10, belonging to B, indicating greater consistency in the middle 50%. The distributions may overlap; medians and IQRs do not locate every individual observation. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 16 • Completion and retest record

HS5F - Comparing distributions

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 17****HS5G - Grouped-data interpolation****Chapter purpose**

Estimate medians, quartiles and percentiles within classes and critique uniformity assumptions.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 17 • Method and assessment map

HS5G - Grouped-data interpolation

Specification focus

Estimate medians, quartiles and percentiles within classes and critique uniformity assumptions.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 17 • Practice

HS5G - Grouped-data interpolation • Questions 1-2

Q01 | 4 MARKS

A cumulative-frequency estimate is required inside class $25 < x \leq 35$. The cumulative frequency before the class is 30, the class frequency is 24, and the target cumulative frequency is 38. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A cumulative-frequency estimate is required inside class $28 < x \leq 38$. The cumulative frequency before the class is 33, the class frequency is 18, and the target cumulative frequency is 39. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Chapter 17 • Practice

HS5G - Grouped-data interpolation • Questions 3-4

Q03 | 4 MARKS

A cumulative-frequency estimate is required inside class $21 < x \leq 31$. The cumulative frequency before the class is 36, the class frequency is 24, and the target cumulative frequency is 44. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A cumulative-frequency estimate is required inside class $24 < x \leq 34$. The cumulative frequency before the class is 39, the class frequency is 18, and the target cumulative frequency is 45. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Chapter 17 • Practice

HS5G - Grouped-data interpolation • Questions 5-6

Q05 | 4 MARKS

A cumulative-frequency estimate is required inside class $27 < x \leq 37$. The cumulative frequency before the class is 42, the class frequency is 24, and the target cumulative frequency is 50. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A cumulative-frequency estimate is required inside class $20 < x \leq 30$. The cumulative frequency before the class is 30, the class frequency is 18, and the target cumulative frequency is 36. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Chapter 17 • Practice

HS5G - Grouped-data interpolation • Questions 7-8

Q07 | 4 MARKS

A cumulative-frequency estimate is required inside class $23 < x \leq 33$. The cumulative frequency before the class is 33, the class frequency is 24, and the target cumulative frequency is 41. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A cumulative-frequency estimate is required inside class $26 < x \leq 36$. The cumulative frequency before the class is 36, the class frequency is 18, and the target cumulative frequency is 42. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Chapter 17 • Practice

HS5G - Grouped-data interpolation • Questions 9-10

Q09 | 4 MARKS

A cumulative-frequency estimate is required inside class $29 < x \leq 39$. The cumulative frequency before the class is 39, the class frequency is 24, and the target cumulative frequency is 47. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A cumulative-frequency estimate is required inside class $22 < x \leq 32$. The cumulative frequency before the class is 42, the class frequency is 18, and the target cumulative frequency is 48. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Chapter 17 • Practice

HS5G - Grouped-data interpolation • Questions 11-12

Q11 | 5 MARKS

You must show your working. A cumulative-frequency estimate is required inside class $23 < x \leq 33$. The cumulative frequency before the class is 43, the class frequency is 20, and the target cumulative frequency is $149/3$. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. A cumulative-frequency estimate is required inside class $24 < x \leq 34$. The cumulative frequency before the class is 44, the class frequency is 22, and the target cumulative frequency is $154/3$. Use linear interpolation to estimate x and state the assumption made. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 17

HS5G - Grouped-data interpolation • Questions 1-2

Q01 | 4 MARKS

Fraction through class= $(38-30)/24=1/3$. Estimated $x=25+1/3(10)=28.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Fraction through class= $(39-33)/18=1/3$. Estimated $x=28+1/3(10)=31.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 17

HS5G - Grouped-data interpolation • Questions 3-4

Q03 | 4 MARKS

Fraction through class= $(44-36)/24=1/3$. Estimated $x=21+1/3(10)=24.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Fraction through class= $(45-39)/18=1/3$. Estimated $x=24+1/3(10)=27.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 17

HS5G - Grouped-data interpolation • Questions 5-6

Q05 | 4 MARKS

Fraction through class= $(50-42)/24=1/3$. Estimated $x=27+1/3(10)=30.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Fraction through class= $(36-30)/18=1/3$. Estimated $x=20+1/3(10)=23.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 17

HS5G - Grouped-data interpolation • Questions 7-8

Q07 | 4 MARKS

Fraction through class= $(41-33)/24=1/3$. Estimated $x=23+1/3(10)=26.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Fraction through class= $(42-36)/18=1/3$. Estimated $x=26+1/3(10)=29.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 17

HS5G - Grouped-data interpolation • Questions 9-10

Q09 | 4 MARKS

Fraction through class= $(47-39)/24=1/3$. Estimated $x=29+1/3(10)=32.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Fraction through class= $(48-42)/18=1/3$. Estimated $x=22+1/3(10)=25.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 17

HS5G - Grouped-data interpolation • Questions 11-12

Q11 | 5 MARKS

Fraction through class= $(149/3-43)/20=1/3$. Estimated $x=23+1/3(10)=26.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Fraction through class= $(154/3-44)/22=1/3$. Estimated $x=24+1/3(10)=27.333$. The method assumes observations are distributed uniformly within that class interval. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 17 • Completion and retest record

HS5G - Grouped-data interpolation

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 18****HS6A - Population estimation****Chapter purpose**

Apply capture-recapture and evaluate closure, mixing, marking and equal-catchability assumptions.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 18 • Method and assessment map

HS6A - Population estimation

Specification focus

Apply capture-recapture and evaluate closure, mixing, marking and equal-catchability assumptions.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 18 • Practice

HS6A - Population estimation • Questions 1-2

Q01 | 4 MARKS

In a capture-recapture study, 65 animals are marked initially. Later, 50 are captured and 13 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

In a capture-recapture study, 68 animals are marked initially. Later, 56 are captured and 16 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Chapter 18 • Practice

HS6A - Population estimation • Questions 3-4

Q03 | 4 MARKS

In a capture-recapture study, 51 animals are marked initially. Later, 42 are captured and 9 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

In a capture-recapture study, 54 animals are marked initially. Later, 48 are captured and 12 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Chapter 18 • Practice

HS6A - Population estimation • Questions 5-6

Q05 | 4 MARKS

In a capture-recapture study, 57 animals are marked initially. Later, 54 are captured and 15 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

In a capture-recapture study, 60 animals are marked initially. Later, 40 are captured and 8 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Chapter 18 • Practice

HS6A - Population estimation • Questions 7-8

Q07 | 4 MARKS

In a capture-recapture study, 63 animals are marked initially. Later, 46 are captured and 11 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

In a capture-recapture study, 66 animals are marked initially. Later, 52 are captured and 14 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Chapter 18 • Practice

HS6A - Population estimation • Questions 9-10

Q09 | 4 MARKS

In a capture-recapture study, 69 animals are marked initially. Later, 58 are captured and 17 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

In a capture-recapture study, 52 animals are marked initially. Later, 44 are captured and 10 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Chapter 18 • Practice

HS6A - Population estimation • Questions 11-12

Q11 | 5 MARKS

You must show your working. In a capture-recapture study, 53 animals are marked initially. Later, 46 are captured and 11 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working. In a capture-recapture study, 54 animals are marked initially. Later, 48 are captured and 12 are marked. Estimate the population size, show the proportional model, and discuss two assumptions whose failure would bias the estimate. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 18

HS6A - Population estimation • Questions 1-2

Q01 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $13/50=65/N$. Thus $N=65 \times 50 / 13 = 250.0$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $16/56=68/N$. Thus $N=68 \times 56 / 16 = 238.0$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 18

HS6A - Population estimation • Questions 3-4

Q03 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $9/42=51/N$. Thus $N=51 \times 42/9=238.0$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $12/48=54/N$. Thus $N=54 \times 48/12=216.0$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 18

HS6A - Population estimation • Questions 5-6

Q05 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $15/54=57/N$. Thus $N=57 \times 54/15=205.2$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $8/40=60/N$. Thus $N=60 \times 40/8=300.0$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 18

HS6A - Population estimation • Questions 7-8

Q07 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $11/46=63/N$. Thus $N=63 \times 46/11=263.5$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $14/52=66/N$. Thus $N=66 \times 52/14=245.1$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 18

HS6A - Population estimation • Questions 9-10

Q09 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $17/58=69/N$. Thus $N=69 \times 58/17=235.4$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $10/44=52/N$. Thus $N=52 \times 44/10=228.8$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 18

HS6A - Population estimation • Questions 11-12

Q11 | 5 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $11/46=53/N$. Thus $N=53 \times 46/11=221.6$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Assume marked proportion in second sample approximates marked proportion in population: $12/48=54/N$. Thus $N=54 \times 48/12=216.0$, normally rounded appropriately. Assumptions include a closed population, marks retained and recognisable, full mixing, and equal recapture probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 18 • Completion and retest record

HS6A - Population estimation

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 19****HS6B - Statistical investigations****Chapter purpose**

Plan, process and evaluate investigations and make evidence-based population conclusions.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 19 • Method and assessment map

HS6B - Statistical investigations

Specification focus

Plan, process and evaluate investigations and make evidence-based population conclusions.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 19 • Practice

HS6B - Statistical investigations • Questions 1-2

Q01 | 4 MARKS

Two teaching methods are compared using samples of 40 and 45 learners. Their mean scores are 59 and 66. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Q02 | 4 MARKS

Two teaching methods are compared using samples of 43 and 51 learners. Their mean scores are 62 and 67. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Chapter 19 • Practice

HS6B - Statistical investigations • Questions 3-4

Q03 | 4 MARKS

Two teaching methods are compared using samples of 46 and 57 learners. Their mean scores are 58 and 68. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Q04 | 4 MARKS

Two teaching methods are compared using samples of 49 and 48 learners. Their mean scores are 61 and 61. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Chapter 19 • Practice

HS6B - Statistical investigations • Questions 5-6

Q05 | 4 MARKS

Two teaching methods are compared using samples of 52 and 54 learners. Their mean scores are 64 and 62. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Q06 | 4 MARKS

Two teaching methods are compared using samples of 40 and 45 learners. Their mean scores are 60 and 63. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Chapter 19 • Practice

HS6B - Statistical investigations • Questions 7-8

Q07 | 4 MARKS

Two teaching methods are compared using samples of 43 and 51 learners. Their mean scores are 63 and 64. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Q08 | 4 MARKS

Two teaching methods are compared using samples of 46 and 57 learners. Their mean scores are 59 and 65. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Chapter 19 • Practice

HS6B - Statistical investigations • Questions 9-10

Q09 | 4 MARKS

Two teaching methods are compared using samples of 49 and 48 learners. Their mean scores are 62 and 66. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Q10 | 4 MARKS

Two teaching methods are compared using samples of 52 and 54 learners. Their mean scores are 58 and 67. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Chapter 19 • Practice

HS6B - Statistical investigations • Questions 11-12

Q11 | 5 MARKS

You must show your working. Two teaching methods are compared using samples of 53 and 56 learners. Their mean scores are 59 and 62. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Q12 | 6 MARKS

You must show your working. Two teaching methods are compared using samples of 54 and 58 learners. Their mean scores are 60 and 65. Design the remaining investigation: identify suitable sampling, an additional spread statistic, an appropriate display, a supported preliminary conclusion, and at least three limitations.

Worked solutions • Chapter 19

HS6B - Statistical investigations • Questions 1-2

Q01 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 7 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 5 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 19

HS6B - Statistical investigations • Questions 3-4

Q03 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 10 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 0 points in favour of neither, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 19

HS6B - Statistical investigations • Questions 5-6

Q05 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is -2 points in favour of A, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 3 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 19

HS6B - Statistical investigations • Questions 7-8

Q07 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 1 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 6 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 19

HS6B - Statistical investigations • Questions 9-10

Q09 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 4 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 4 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 9 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 19

HS6B - Statistical investigations • Questions 11-12

Q11 | 5 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 3 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 6 MARKS

Use random or relevant stratified sampling and identical assessment conditions. Calculate IQR or standard range information and use paired box plots or another display suited to the data. The observed mean difference is 5 points in favour of B, but conclude cautiously. Limitations include sampling bias, unequal prior attainment, uncontrolled teaching time, non-response, measurement validity and absence of spread information. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 19 • Completion and retest record

HS6B - Statistical investigations

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____

HIGHER TIER**UNIT 6 • CHAPTER 20****HS7 - Scatter graphs and correlation****Chapter purpose**

Interpret bivariate data, fit lines, predict cautiously and distinguish correlation from causation.

Higher reasoning expectation

Select methods independently, connect representations, justify assumptions and verify conclusions.
Questions 9–12 provide the chapter stretch sequence.

Chapter 20 • Method and assessment map

HS7 - Scatter graphs and correlation

Specification focus

Interpret bivariate data, fit lines, predict cautiously and distinguish correlation from causation.

Method routine

Identify the mathematical structure; record assumptions and units; carry out an exact or controlled calculation; then verify by inverse work, substitution, estimation or a second representation.

Marking principle

Award method, accuracy, reasoning and final interpretation only where the question requires them. Equivalent valid methods should receive credit.

Calculator choice

Content may be assessed on either Eduqas component. Students should decide whether technology supports rather than replaces reasoning.

Chapter 20 • Practice

HS7 - Scatter graphs and correlation • Questions 1-2

Q01 | 4 MARKS

A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [3, 5, 7, 9, 11, 13]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [3, 5, 7, 9, 11, 13]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Chapter 20 • Practice

HS7 - Scatter graphs and correlation • Questions 3-4

Q03 | 4 MARKS

A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [3, 5, 7, 9, 11, 13]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. Identify the key condition you used and explain why it applies here.

Q04 | 4 MARKS

A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [3, 5, 7, 9, 11, 13]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. Write one sentence interpreting your answer in the context of the question. Your solution must justify the main method or assumption and include a final check.

Chapter 20 • Practice

HS7 - Scatter graphs and correlation • Questions 5-6

Q05 | 4 MARKS

A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [3, 5, 7, 9, 11, 13]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. Describe one common error in this calculation and how your working avoids it. Your solution must justify the main method or assumption and include a final check.

Q06 | 5 MARKS

You must show your working. A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [2, 5, 8, 8, 11, 14]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check.

Chapter 20 • Practice

HS7 - Scatter graphs and correlation • Questions 7-8

Q07 | 6 MARKS

You must show your working. A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [1, 5, 9, 7, 11, 15]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check.

Q08 | 5 MARKS

You must show your working. A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [2, 5, 8, 8, 11, 14]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Chapter 20 • Practice

HS7 - Scatter graphs and correlation • Questions 9-10

Q09 | 6 MARKS

You must show your working. A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [1, 5, 9, 7, 11, 15]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. After completing the calculation, give one independent check that supports your result. Your solution must justify the main method or assumption and include a final check.

Q10 | 5 MARKS

You must show your working. A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [2, 5, 8, 8, 11, 14]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. Identify the key condition you used and explain why it applies here.

Chapter 20 • Practice

HS7 - Scatter graphs and correlation • Questions 11-12

Q11 | 6 MARKS

You must show your working. A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [1, 5, 9, 7, 11, 15]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. Identify the key condition you used and explain why it applies here.

Q12 | 5 MARKS

You must show your working. A scatter plot uses points with x-values [1, 2, 3, 4, 5, 6] and y-values [2, 5, 8, 8, 11, 14]. Describe the correlation, propose a reasonable line of best fit, estimate y when $x=7$, and explain why the relationship alone cannot establish causation. Your solution must justify the main method or assumption and include a final check. Write one sentence interpreting your answer in the context of the question. Your solution must justify the main method or assumption and include a final check.

Worked solutions • Chapter 20

HS7 - Scatter graphs and correlation • Questions 1-2

Q01 | 4 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q01.

Q02 | 4 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q02.

Worked solutions • Chapter 20

HS7 - Scatter graphs and correlation • Questions 3-4

Q03 | 4 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The explanation must name the relevant condition and link it explicitly to the method used. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q03.

Q04 | 4 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The interpretation should include the correct units or geometric/statistical meaning where applicable. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q04.

Worked solutions • Chapter 20

HS7 - Scatter graphs and correlation • Questions 5-6

Q05 | 4 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid response identifies a plausible error and points to the step that prevents it. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q05.

Q06 | 5 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q06.

Worked solutions • Chapter 20

HS7 - Scatter graphs and correlation • Questions 7-8

Q07 | 6 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q07.

Q08 | 5 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q08.

Worked solutions • Chapter 20

HS7 - Scatter graphs and correlation • Questions 9-10

Q09 | 6 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. A valid independent check uses substitution, an inverse operation, estimation, or the defining property as appropriate. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q09.

Q10 | 5 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The explanation must name the relevant condition and link it explicitly to the method used. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q10.

Worked solutions • Chapter 20

HS7 - Scatter graphs and correlation • Questions 11-12

Q11 | 6 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The explanation must name the relevant condition and link it explicitly to the method used. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q11.

Q12 | 5 MARKS

The points show positive correlation. A defensible approximate model is $y=2x+1$, giving y approximately 15 at $x=7$. Different reasonable lines may give nearby answers. Correlation does not control lurking variables or establish a causal mechanism; extrapolation beyond observed x -values also increases uncertainty. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context. The interpretation should include the correct units or geometric/statistical meaning where applicable. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Item-specific marking check

Credit the principal method and accurate progress. Reserve any reasoning or checking mark for a statement that answers the explicit demand of Q12.

Chapter 20 • Completion and retest record

HS7 - Scatter graphs and correlation

Question	1	2	3	4	5	6	7	8	9	10	11	12
Score												
Retest												

Reflection

Which decision, representation or proof step should you practise again?

Teacher / reviewer: _____ Date: _____