GCSE ONLINE TUTORING

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GCSE MATHEMATICS HIGHER TIER

UNIT 5: PROBABILITY

18 chapters | 216 curated questions | 4-6 marks

Student name: _____

Contents and publication statement

This curated edition prioritises distinct tasks, accurate tier boundaries and visible reasoning. Marks indicate an independent teaching allocation, not an official OCR mark scheme.

HIGHER TIER

UNIT 5 | CHAPTER 1

Probability language, scale and complements

12 curated questions | complete solutions

Chapter focus

Outcomes, impossible and certain events, complements and coherent probability models

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

This chapter is independently authored and specification-mapped. It does not reproduce OCR questions, mark schemes, logos or proprietary layouts.

Chapter 1: Probability language, scale and complements

Q01 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/2 and P(B)=1/10. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/5 and P(B)=1/5. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Chapter 1: Probability language, scale and complements

Q03 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/2 and P(B)=3/10. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/5 and P(B)=2/5. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Chapter 1: Probability language, scale and complements

Q05 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/2 and P(B)=1/2. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/5 and P(B)=1/10. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Chapter 1: Probability language, scale and complements

Q07 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/2 and P(B)=1/5. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/5 and P(B)=3/10. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Chapter 1: Probability language, scale and complements

Q09 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/2 and P(B)=2/5. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Events A and B are mutually exclusive. P(A)=1/5 and P(B)=1/2. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Chapter 1: Probability language, scale and complements

Q11 | 5 MARKS

You must show your working.
Events A and B are mutually exclusive. P(A)=3/10 and P(B)=1/5. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
Events A and B are mutually exclusive. P(A)=2/5 and P(B)=2/5. Find P(A or B), P(neither A nor B), and explain why all four values lie on the probability scale. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

For mutually exclusive events, P(A or B)=1/2+1/10=3/5. The complement is 1-3/5=2/5. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

For mutually exclusive events, P(A or B)=1/5+1/5=2/5. The complement is 1-2/5=3/5. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

For mutually exclusive events, P(A or B)=1/2+3/10=4/5. The complement is 1-4/5=1/5. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

For mutually exclusive events, P(A or B)=1/5+2/5=3/5. The complement is 1-3/5=2/5. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

For mutually exclusive events, P(A or B)=1/2+1/2=1. The complement is 1-1=0. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

For mutually exclusive events, P(A or B)=1/5+1/10=3/10. The complement is 1-3/10=7/10. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

For mutually exclusive events, P(A or B)=1/2+1/5=7/10. The complement is 1-7/10=3/10. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

For mutually exclusive events, P(A or B)=1/5+3/10=1/2. The complement is 1-1/2=1/2. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

For mutually exclusive events, P(A or B)=1/2+2/5=9/10. The complement is 1-9/10=1/10. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

For mutually exclusive events, P(A or B)=1/5+1/2=7/10. The complement is 1-7/10=3/10. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

For mutually exclusive events, P(A or B)=3/10+1/5=1/2. The complement is 1-1/2=1/2. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

For mutually exclusive events, P(A or B)=2/5+2/5=4/5. The complement is 1-4/5=1/5. Each probability is between 0 and 1, and the event plus its complement totals 1. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 2

Fairness and equally likely outcomes

12 curated questions | complete solutions

Chapter focus

Theoretical probability, unequal mechanisms and tests of fairness

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

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Chapter 2: Fairness and equally likely outcomes

Q01 | 4 MARKS

A spinner has 14 equal sectors: 5 red, 5 blue and 4 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 5 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A spinner has 9 equal sectors: 2 red, 4 blue and 3 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 2 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Chapter 2: Fairness and equally likely outcomes

Q03 | 4 MARKS

A spinner has 10 equal sectors: 5 red, 3 blue and 2 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 5 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A spinner has 12 equal sectors: 2 red, 9 blue and 1 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 2 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Chapter 2: Fairness and equally likely outcomes

Q05 | 4 MARKS

A spinner has 17 equal sectors: 5 red, 8 blue and 4 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 5 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A spinner has 12 equal sectors: 2 red, 7 blue and 3 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 2 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Chapter 2: Fairness and equally likely outcomes

Q07 | 4 MARKS

A spinner has 13 equal sectors: 5 red, 6 blue and 2 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 5 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A spinner has 8 equal sectors: 2 red, 5 blue and 1 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 2 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Chapter 2: Fairness and equally likely outcomes

Q09 | 4 MARKS

A spinner has 13 equal sectors: 5 red, 4 blue and 4 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 5 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A spinner has 8 equal sectors: 2 red, 3 blue and 3 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 2 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Chapter 2: Fairness and equally likely outcomes

Q11 | 5 MARKS

You must show your working.
A spinner has 12 equal sectors: 3 red, 5 blue and 4 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 3 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A spinner has 12 equal sectors: 4 red, 7 blue and 1 green. A game pays a prize for red. Find the theoretical probability of winning, compare it with 1/3, and state one precise redesign that keeps all 4 red sectors but makes winning and losing equally likely. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

P(win)=5/14=5/14. It is greater than 1/3. Keeping 5 winning sectors requires exactly 5 losing sectors, so remove 4 losing sector(s). The redesigned spinner then has 10 equal sectors and P(win)=5/10=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

P(win)=2/9=2/9. It is less than 1/3. Keeping 2 winning sectors requires exactly 2 losing sectors, so remove 5 losing sector(s). The redesigned spinner then has 4 equal sectors and P(win)=2/4=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

P(win)=5/10=1/2. It is greater than 1/3. Keeping 5 winning sectors requires exactly 5 losing sectors, so make no change. The redesigned spinner then has 10 equal sectors and P(win)=5/10=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

P(win)=2/12=1/6. It is less than 1/3. Keeping 2 winning sectors requires exactly 2 losing sectors, so remove 8 losing sector(s). The redesigned spinner then has 4 equal sectors and P(win)=2/4=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

P(win)=5/17=5/17. It is less than 1/3. Keeping 5 winning sectors requires exactly 5 losing sectors, so remove 7 losing sector(s). The redesigned spinner then has 10 equal sectors and P(win)=5/10=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

P(win)=2/12=1/6. It is less than 1/3. Keeping 2 winning sectors requires exactly 2 losing sectors, so remove 8 losing sector(s). The redesigned spinner then has 4 equal sectors and P(win)=2/4=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

P(win)=5/13=5/13. It is greater than 1/3. Keeping 5 winning sectors requires exactly 5 losing sectors, so remove 3 losing sector(s). The redesigned spinner then has 10 equal sectors and P(win)=5/10=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

P(win)=2/8=1/4. It is less than 1/3. Keeping 2 winning sectors requires exactly 2 losing sectors, so remove 4 losing sector(s). The redesigned spinner then has 4 equal sectors and P(win)=2/4=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

P(win)=5/13=5/13. It is greater than 1/3. Keeping 5 winning sectors requires exactly 5 losing sectors, so remove 3 losing sector(s). The redesigned spinner then has 10 equal sectors and P(win)=5/10=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

P(win)=2/8=1/4. It is less than 1/3. Keeping 2 winning sectors requires exactly 2 losing sectors, so remove 4 losing sector(s). The redesigned spinner then has 4 equal sectors and P(win)=2/4=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

P(win)=3/12=1/4. It is less than 1/3. Keeping 3 winning sectors requires exactly 3 losing sectors, so remove 6 losing sector(s). The redesigned spinner then has 6 equal sectors and P(win)=3/6=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

P(win)=4/12=1/3. It is equal than 1/3. Keeping 4 winning sectors requires exactly 4 losing sectors, so remove 4 losing sector(s). The redesigned spinner then has 8 equal sectors and P(win)=4/8=1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 3

Experimental probability and convergence

12 curated questions | complete solutions

Chapter focus

Relative frequency, repeated trials, comparison and reliability

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

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Chapter 3: Experimental probability and convergence

Q01 | 4 MARKS

An event occurred 74 times in 230 trials and 327 times in a later set of 920 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

An event occurred 91 times in 260 trials and 364 times in a later set of 1040 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Chapter 3: Experimental probability and convergence

Q03 | 4 MARKS

An event occurred 96 times in 290 trials and 400 times in a later set of 1160 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

An event occurred 115 times in 320 trials and 435 times in a later set of 1280 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Chapter 3: Experimental probability and convergence

Q05 | 4 MARKS

An event occurred 119 times in 350 trials and 497 times in a later set of 1400 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

An event occurred 122 times in 380 trials and 532 times in a later set of 1520 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Chapter 3: Experimental probability and convergence

Q07 | 4 MARKS

An event occurred 144 times in 410 trials and 566 times in a later set of 1640 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

An event occurred 145 times in 440 trials and 598 times in a later set of 1760 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Chapter 3: Experimental probability and convergence

Q09 | 4 MARKS

An event occurred 169 times in 470 trials and 667 times in a later set of 1880 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

An event occurred 170 times in 500 trials and 700 times in a later set of 2000 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Chapter 3: Experimental probability and convergence

Q11 | 5 MARKS

You must show your working.
An event occurred 178 times in 510 trials and 724 times in a later set of 2040 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
An event occurred 187 times in 520 trials and 707 times in a later set of 2080 trials. Calculate both relative frequencies, compare them, and decide which is the more reliable estimate of the long-run probability. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

First relative frequency=74/230=0.3217. Second=327/920=0.3554. The difference is 0.0337. The second estimate is normally more reliable because it is based on 920 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

First relative frequency=91/260=0.3500. Second=364/1040=0.3500. The difference is 0.0000. The second estimate is normally more reliable because it is based on 1040 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

First relative frequency=96/290=0.3310. Second=400/1160=0.3448. The difference is 0.0138. The second estimate is normally more reliable because it is based on 1160 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

First relative frequency=115/320=0.3594. Second=435/1280=0.3398. The difference is 0.0195. The second estimate is normally more reliable because it is based on 1280 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

First relative frequency=119/350=0.3400. Second=497/1400=0.3550. The difference is 0.0150. The second estimate is normally more reliable because it is based on 1400 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

First relative frequency=122/380=0.3211. Second=532/1520=0.3500. The difference is 0.0289. The second estimate is normally more reliable because it is based on 1520 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

First relative frequency=144/410=0.3512. Second=566/1640=0.3451. The difference is 0.0061. The second estimate is normally more reliable because it is based on 1640 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

First relative frequency=145/440=0.3295. Second=598/1760=0.3398. The difference is 0.0102. The second estimate is normally more reliable because it is based on 1760 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

First relative frequency=169/470=0.3596. Second=667/1880=0.3548. The difference is 0.0048. The second estimate is normally more reliable because it is based on 1880 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

First relative frequency=170/500=0.3400. Second=700/2000=0.3500. The difference is 0.0100. The second estimate is normally more reliable because it is based on 2000 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

First relative frequency=178/510=0.3490. Second=724/2040=0.3549. The difference is 0.0059. The second estimate is normally more reliable because it is based on 2040 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

First relative frequency=187/520=0.3596. Second=707/2080=0.3399. The difference is 0.0197. The second estimate is normally more reliable because it is based on 2080 trials, although neither guarantees the true probability. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 4

Expected frequency and decision-making

12 curated questions | complete solutions

Chapter focus

Scaling probabilities to expected counts and evaluating predictions

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 4: Expected frequency and decision-making

Q01 | 4 MARKS

A quality model gives probability 1/2 that an item needs reworking. For 1000 items, calculate the expected number needing rework. The observed number is 498; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A quality model gives probability 1/5 that an item needs reworking. For 1150 items, calculate the expected number needing rework. The observed number is 231; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Chapter 4: Expected frequency and decision-making

Q03 | 4 MARKS

A quality model gives probability 1/2 that an item needs reworking. For 1300 items, calculate the expected number needing rework. The observed number is 647; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A quality model gives probability 1/5 that an item needs reworking. For 1450 items, calculate the expected number needing rework. The observed number is 290; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Chapter 4: Expected frequency and decision-making

Q05 | 4 MARKS

A quality model gives probability 1/2 that an item needs reworking. For 1600 items, calculate the expected number needing rework. The observed number is 803; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A quality model gives probability 1/5 that an item needs reworking. For 1750 items, calculate the expected number needing rework. The observed number is 349; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Chapter 4: Expected frequency and decision-making

Q07 | 4 MARKS

A quality model gives probability 1/2 that an item needs reworking. For 1900 items, calculate the expected number needing rework. The observed number is 952; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A quality model gives probability 1/5 that an item needs reworking. For 2050 items, calculate the expected number needing rework. The observed number is 408; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Chapter 4: Expected frequency and decision-making

Q09 | 4 MARKS

A quality model gives probability 1/2 that an item needs reworking. For 2200 items, calculate the expected number needing rework. The observed number is 1101; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A quality model gives probability 1/5 that an item needs reworking. For 2350 items, calculate the expected number needing rework. The observed number is 467; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Chapter 4: Expected frequency and decision-making

Q11 | 5 MARKS

You must show your working.
A quality model gives probability 3/10 that an item needs reworking. For 2400 items, calculate the expected number needing rework. The observed number is 718; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A quality model gives probability 2/5 that an item needs reworking. For 2450 items, calculate the expected number needing rework. The observed number is 979; compare observation with expectation and give a cautious conclusion. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

Expected frequency=1000x1/2=500. The difference is 498-500=-2. This sample is below the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Expected frequency=1150x1/5=230. The difference is 231-230=1. This sample is above the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Expected frequency=1300x1/2=650. The difference is 647-650=-3. This sample is below the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Expected frequency=1450x1/5=290. The difference is 290-290=0. This sample is equal to the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Expected frequency=1600x1/2=800. The difference is 803-800=3. This sample is above the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Expected frequency=1750x1/5=350. The difference is 349-350=-1. This sample is below the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Expected frequency=1900x1/2=950. The difference is 952-950=2. This sample is above the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Expected frequency=2050x1/5=410. The difference is 408-410=-2. This sample is below the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Expected frequency=2200x1/2=1100. The difference is 1101-1100=1. This sample is above the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Expected frequency=2350x1/5=470. The difference is 467-470=-3. This sample is below the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Expected frequency=2400x3/10=720. The difference is 718-720=-2. This sample is below the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Expected frequency=2450x2/5=980. The difference is 979-980=-1. This sample is below the model expectation, but ordinary random variation means one result alone is insufficient to reject the model. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 5

Systematic listing and product rule

12 curated questions | complete solutions

Chapter focus

Ordered outcomes, structured lists and counting without omission

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

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Chapter 5: Systematic listing and product rule

Q01 | 4 MARKS

A code uses one of 6 letters followed by one of 4 digits. Exactly 4 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A code uses one of 5 letters followed by one of 5 digits. Exactly 4 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Chapter 5: Systematic listing and product rule

Q03 | 4 MARKS

A code uses one of 4 letters followed by one of 6 digits. Exactly 2 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A code uses one of 3 letters followed by one of 7 digits. Exactly 1 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Chapter 5: Systematic listing and product rule

Q05 | 4 MARKS

A code uses one of 6 letters followed by one of 8 digits. Exactly 4 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A code uses one of 5 letters followed by one of 4 digits. Exactly 3 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Chapter 5: Systematic listing and product rule

Q07 | 4 MARKS

A code uses one of 4 letters followed by one of 5 digits. Exactly 2 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A code uses one of 3 letters followed by one of 6 digits. Exactly 1 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Chapter 5: Systematic listing and product rule

Q09 | 4 MARKS

A code uses one of 6 letters followed by one of 7 digits. Exactly 4 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A code uses one of 5 letters followed by one of 8 digits. Exactly 3 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Chapter 5: Systematic listing and product rule

Q11 | 5 MARKS

You must show your working.
A code uses one of 6 letters followed by one of 5 digits. Exactly 4 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A code uses one of 3 letters followed by one of 7 digits. Exactly 3 specified letter-digit pairs are forbidden. Use the product rule to find the number of valid codes, then explain how a systematic list would verify that no outcome was counted twice. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

Before restrictions there are 6x4=24 ordered codes. Removing 4 distinct forbidden pairs leaves 20. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Before restrictions there are 5x5=25 ordered codes. Removing 4 distinct forbidden pairs leaves 21. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Before restrictions there are 4x6=24 ordered codes. Removing 2 distinct forbidden pairs leaves 22. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Before restrictions there are 3x7=21 ordered codes. Removing 1 distinct forbidden pairs leaves 20. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Before restrictions there are 6x8=48 ordered codes. Removing 4 distinct forbidden pairs leaves 44. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Before restrictions there are 5x4=20 ordered codes. Removing 3 distinct forbidden pairs leaves 17. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Before restrictions there are 4x5=20 ordered codes. Removing 2 distinct forbidden pairs leaves 18. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Before restrictions there are 3x6=18 ordered codes. Removing 1 distinct forbidden pairs leaves 17. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Before restrictions there are 6x7=42 ordered codes. Removing 4 distinct forbidden pairs leaves 38. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Before restrictions there are 5x8=40 ordered codes. Removing 3 distinct forbidden pairs leaves 37. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Before restrictions there are 6x5=30 ordered codes. Removing 4 distinct forbidden pairs leaves 26. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Before restrictions there are 3x7=21 ordered codes. Removing 3 distinct forbidden pairs leaves 18. A verification list groups codes by first letter and lists every allowed digit once within each group, preventing omission or duplication. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 6

Possibility spaces

12 curated questions | complete solutions

Chapter focus

Two-stage grids, totals, products and event regions

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 6: Possibility spaces

Q01 | 4 MARKS

Two fair 4-sided spinners numbered 1 to 4 are spun. Construct a possibility-space argument to find P(total at least 6). Then find P(the two scores are equal or the total is at least 6). Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Two fair 7-sided spinners numbered 1 to 7 are spun. Construct a possibility-space argument to find P(total at least 10). Then find P(the two scores are equal or the total is at least 10). Your solution must justify the main method or assumption and include a final check.

Chapter 6: Possibility spaces

Q03 | 4 MARKS

Two fair 5-sided spinners numbered 1 to 5 are spun. Construct a possibility-space argument to find P(total at least 8). Then find P(the two scores are equal or the total is at least 8). Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Two fair 8-sided spinners numbered 1 to 8 are spun. Construct a possibility-space argument to find P(total at least 14). Then find P(the two scores are equal or the total is at least 14). Your solution must justify the main method or assumption and include a final check.

Chapter 6: Possibility spaces

Q05 | 4 MARKS

Two fair 6-sided spinners numbered 1 to 6 are spun. Construct a possibility-space argument to find P(total at least 10). Then find P(the two scores are equal or the total is at least 10). Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Two fair 4-sided spinners numbered 1 to 4 are spun. Construct a possibility-space argument to find P(total at least 7). Then find P(the two scores are equal or the total is at least 7). Your solution must justify the main method or assumption and include a final check.

Chapter 6: Possibility spaces

Q07 | 4 MARKS

Two fair 7-sided spinners numbered 1 to 7 are spun. Construct a possibility-space argument to find P(total at least 12). Then find P(the two scores are equal or the total is at least 12). Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Two fair 5-sided spinners numbered 1 to 5 are spun. Construct a possibility-space argument to find P(total at least 5). Then find P(the two scores are equal or the total is at least 5). Your solution must justify the main method or assumption and include a final check.

Chapter 6: Possibility spaces

Q09 | 4 MARKS

Two fair 8-sided spinners numbered 1 to 8 are spun. Construct a possibility-space argument to find P(total at least 14). Then find P(the two scores are equal or the total is at least 14). 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.

Q10 | 4 MARKS

Two fair 6-sided spinners numbered 1 to 6 are spun. Construct a possibility-space argument to find P(total at least 14). Then find P(the two scores are equal or the total is at least 14). Your solution must justify the main method or assumption and include a final check.

Chapter 6: Possibility spaces

Q11 | 5 MARKS

You must show your working.
Two fair 7-sided spinners numbered 1 to 7 are spun. Construct a possibility-space argument to find P(total at least 9). Then find P(the two scores are equal or the total is at least 9). Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
Two fair 8-sided spinners numbered 1 to 8 are spun. Construct a possibility-space argument to find P(total at least 19). Then find P(the two scores are equal or the total is at least 19). Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

There are 16 equally likely ordered outcomes. The region with total at least 6 contains 6, so probability=3/8. Equality contains 4 outcomes, with 2 also in the high-total region. Union count=6+4-2=8, giving 1/2. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

There are 49 equally likely ordered outcomes. The region with total at least 10 contains 15, so probability=15/49. Equality contains 7 outcomes, with 3 also in the high-total region. Union count=15+7-3=19, giving 19/49. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

There are 25 equally likely ordered outcomes. The region with total at least 8 contains 6, so probability=6/25. Equality contains 5 outcomes, with 2 also in the high-total region. Union count=6+5-2=9, giving 9/25. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

There are 64 equally likely ordered outcomes. The region with total at least 14 contains 6, so probability=3/32. Equality contains 8 outcomes, with 2 also in the high-total region. Union count=6+8-2=12, giving 3/16. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

There are 36 equally likely ordered outcomes. The region with total at least 10 contains 6, so probability=1/6. Equality contains 6 outcomes, with 2 also in the high-total region. Union count=6+6-2=10, giving 5/18. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

There are 16 equally likely ordered outcomes. The region with total at least 7 contains 3, so probability=3/16. Equality contains 4 outcomes, with 1 also in the high-total region. Union count=3+4-1=6, giving 3/8. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

There are 49 equally likely ordered outcomes. The region with total at least 12 contains 6, so probability=6/49. Equality contains 7 outcomes, with 2 also in the high-total region. Union count=6+7-2=11, giving 11/49. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

There are 25 equally likely ordered outcomes. The region with total at least 5 contains 19, so probability=19/25. Equality contains 5 outcomes, with 3 also in the high-total region. Union count=19+5-3=21, giving 21/25. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

There are 64 equally likely ordered outcomes. The region with total at least 14 contains 6, so probability=3/32. Equality contains 8 outcomes, with 2 also in the high-total region. Union count=6+8-2=12, giving 3/16. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

There are 36 equally likely ordered outcomes. The region with total at least 14 contains 0, so probability=0. Equality contains 6 outcomes, with 0 also in the high-total region. Union count=0+6-0=6, giving 1/6. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

There are 49 equally likely ordered outcomes. The region with total at least 9 contains 21, so probability=3/7. Equality contains 7 outcomes, with 3 also in the high-total region. Union count=21+7-3=25, giving 25/49. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

There are 64 equally likely ordered outcomes. The region with total at least 19 contains 0, so probability=0. Equality contains 8 outcomes, with 0 also in the high-total region. Union count=0+8-0=8, giving 1/8. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 7

Frequency trees

12 curated questions | complete solutions

Chapter focus

Missing frequencies, successive classifications and conditional proportions

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 7: Frequency trees

Q01 | 4 MARKS

A frequency tree classifies 330 people first as A or not A, then as B or not B. There are 85 in A, 40 in both A and B, and 60 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A frequency tree classifies 360 people first as A or not A, then as B or not B. There are 88 in A, 43 in both A and B, and 66 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Chapter 7: Frequency trees

Q03 | 4 MARKS

A frequency tree classifies 390 people first as A or not A, then as B or not B. There are 91 in A, 26 in both A and B, and 32 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A frequency tree classifies 420 people first as A or not A, then as B or not B. There are 94 in A, 29 in both A and B, and 38 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Chapter 7: Frequency trees

Q05 | 4 MARKS

A frequency tree classifies 450 people first as A or not A, then as B or not B. There are 97 in A, 32 in both A and B, and 44 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A frequency tree classifies 480 people first as A or not A, then as B or not B. There are 100 in A, 35 in both A and B, and 50 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Chapter 7: Frequency trees

Q07 | 4 MARKS

A frequency tree classifies 510 people first as A or not A, then as B or not B. There are 103 in A, 38 in both A and B, and 56 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A frequency tree classifies 540 people first as A or not A, then as B or not B. There are 106 in A, 41 in both A and B, and 62 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Chapter 7: Frequency trees

Q09 | 4 MARKS

A frequency tree classifies 570 people first as A or not A, then as B or not B. There are 109 in A, 44 in both A and B, and 68 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A frequency tree classifies 600 people first as A or not A, then as B or not B. There are 72 in A, 27 in both A and B, and 34 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Chapter 7: Frequency trees

Q11 | 5 MARKS

You must show your working.
A frequency tree classifies 610 people first as A or not A, then as B or not B. There are 73 in A, 28 in both A and B, and 36 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A frequency tree classifies 620 people first as A or not A, then as B or not B. There are 74 in A, 29 in both A and B, and 38 in not A and B. Complete every branch frequency and find P(A given B). Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

A and not B=85-40=45. Not A=330-85=245; not A and not B=245-60=185. Total B=40+60=100. Therefore P(A given B)=40/100=2/5. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

A and not B=88-43=45. Not A=360-88=272; not A and not B=272-66=206. Total B=43+66=109. Therefore P(A given B)=43/109=43/109. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

A and not B=91-26=65. Not A=390-91=299; not A and not B=299-32=267. Total B=26+32=58. Therefore P(A given B)=26/58=13/29. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

A and not B=94-29=65. Not A=420-94=326; not A and not B=326-38=288. Total B=29+38=67. Therefore P(A given B)=29/67=29/67. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

A and not B=97-32=65. Not A=450-97=353; not A and not B=353-44=309. Total B=32+44=76. Therefore P(A given B)=32/76=8/19. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

A and not B=100-35=65. Not A=480-100=380; not A and not B=380-50=330. Total B=35+50=85. Therefore P(A given B)=35/85=7/17. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

A and not B=103-38=65. Not A=510-103=407; not A and not B=407-56=351. Total B=38+56=94. Therefore P(A given B)=38/94=19/47. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

A and not B=106-41=65. Not A=540-106=434; not A and not B=434-62=372. Total B=41+62=103. Therefore P(A given B)=41/103=41/103. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

A and not B=109-44=65. Not A=570-109=461; not A and not B=461-68=393. Total B=44+68=112. Therefore P(A given B)=44/112=11/28. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

A and not B=72-27=45. Not A=600-72=528; not A and not B=528-34=494. Total B=27+34=61. Therefore P(A given B)=27/61=27/61. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

A and not B=73-28=45. Not A=610-73=537; not A and not B=537-36=501. Total B=28+36=64. Therefore P(A given B)=28/64=7/16. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

A and not B=74-29=45. Not A=620-74=546; not A and not B=546-38=508. Total B=29+38=67. Therefore P(A given B)=29/67=29/67. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 8

Two-way tables

12 curated questions | complete solutions

Chapter focus

Completing tables, marginal totals and probability extraction

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 8: Two-way tables

Q01 | 4 MARKS

In a survey of 350 students, 95 study subject A, 120 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

In a survey of 380 students, 98 study subject A, 126 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Chapter 8: Two-way tables

Q03 | 4 MARKS

In a survey of 410 students, 101 study subject A, 132 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

In a survey of 440 students, 104 study subject A, 138 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Chapter 8: Two-way tables

Q05 | 4 MARKS

In a survey of 470 students, 107 study subject A, 94 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

In a survey of 500 students, 110 study subject A, 100 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Chapter 8: Two-way tables

Q07 | 4 MARKS

In a survey of 530 students, 113 study subject A, 106 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

In a survey of 560 students, 116 study subject A, 112 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Chapter 8: Two-way tables

Q09 | 4 MARKS

In a survey of 590 students, 119 study subject A, 118 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

In a survey of 620 students, 122 study subject A, 124 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Chapter 8: Two-way tables

Q11 | 5 MARKS

You must show your working.
In a survey of 630 students, 123 study subject A, 126 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
In a survey of 640 students, 124 study subject A, 128 study subject B and 20 study both. Complete a two-way table for A/not A against B/not B. Find P(exactly one subject) and P(not B given A). Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

A and B=20; A only=75; B only=100; neither=155. Exactly one count=175, so P(exactly one)=1/2. Within A, not B count=75; hence P(not B given A)=15/19. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

A and B=20; A only=78; B only=106; neither=176. Exactly one count=184, so P(exactly one)=46/95. Within A, not B count=78; hence P(not B given A)=39/49. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

A and B=20; A only=81; B only=112; neither=197. Exactly one count=193, so P(exactly one)=193/410. Within A, not B count=81; hence P(not B given A)=81/101. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

A and B=20; A only=84; B only=118; neither=218. Exactly one count=202, so P(exactly one)=101/220. Within A, not B count=84; hence P(not B given A)=21/26. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

A and B=20; A only=87; B only=74; neither=289. Exactly one count=161, so P(exactly one)=161/470. Within A, not B count=87; hence P(not B given A)=87/107. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

A and B=20; A only=90; B only=80; neither=310. Exactly one count=170, so P(exactly one)=17/50. Within A, not B count=90; hence P(not B given A)=9/11. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

A and B=20; A only=93; B only=86; neither=331. Exactly one count=179, so P(exactly one)=179/530. Within A, not B count=93; hence P(not B given A)=93/113. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

A and B=20; A only=96; B only=92; neither=352. Exactly one count=188, so P(exactly one)=47/140. Within A, not B count=96; hence P(not B given A)=24/29. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

A and B=20; A only=99; B only=98; neither=373. Exactly one count=197, so P(exactly one)=197/590. Within A, not B count=99; hence P(not B given A)=99/119. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

A and B=20; A only=102; B only=104; neither=394. Exactly one count=206, so P(exactly one)=103/310. Within A, not B count=102; hence P(not B given A)=51/61. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

A and B=20; A only=103; B only=106; neither=401. Exactly one count=209, so P(exactly one)=209/630. Within A, not B count=103; hence P(not B given A)=103/123. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

A and B=20; A only=104; B only=108; neither=408. Exactly one count=212, so P(exactly one)=53/160. Within A, not B count=104; hence P(not B given A)=26/31. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 9

Set notation and Venn diagrams

12 curated questions | complete solutions

Chapter focus

Union, intersection, complement and region allocation

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

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Chapter 9: Set notation and Venn diagrams

Q01 | 4 MARKS

Of 195 members, 70 are in set A, 53 are in set B and 33 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Of 210 members, 73 are in set A, 59 are in set B and 18 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Chapter 9: Set notation and Venn diagrams

Q03 | 4 MARKS

Of 225 members, 76 are in set A, 65 are in set B and 21 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Of 240 members, 79 are in set A, 71 are in set B and 24 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Chapter 9: Set notation and Venn diagrams

Q05 | 4 MARKS

Of 255 members, 57 are in set A, 52 are in set B and 27 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Of 270 members, 60 are in set A, 58 are in set B and 30 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Chapter 9: Set notation and Venn diagrams

Q07 | 4 MARKS

Of 285 members, 63 are in set A, 64 are in set B and 33 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Of 300 members, 66 are in set A, 70 are in set B and 18 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Chapter 9: Set notation and Venn diagrams

Q09 | 4 MARKS

Of 315 members, 69 are in set A, 51 are in set B and 21 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Of 330 members, 72 are in set A, 57 are in set B and 24 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Chapter 9: Set notation and Venn diagrams

Q11 | 5 MARKS

You must show your working.
Of 335 members, 73 are in set A, 59 are in set B and 25 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
Of 340 members, 74 are in set A, 61 are in set B and 26 are in A intersection B. Fill every Venn region, then calculate P((A union B) complement) and P(A intersection B complement). Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

A-only=70-33=37; B-only=53-33=20; neither=195-(70+53-33)=105. Thus P((A union B) complement)=7/13 and P(A intersection B complement)=37/195. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

A-only=73-18=55; B-only=59-18=41; neither=210-(73+59-18)=96. Thus P((A union B) complement)=16/35 and P(A intersection B complement)=11/42. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

A-only=76-21=55; B-only=65-21=44; neither=225-(76+65-21)=105. Thus P((A union B) complement)=7/15 and P(A intersection B complement)=11/45. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

A-only=79-24=55; B-only=71-24=47; neither=240-(79+71-24)=114. Thus P((A union B) complement)=19/40 and P(A intersection B complement)=11/48. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

A-only=57-27=30; B-only=52-27=25; neither=255-(57+52-27)=173. Thus P((A union B) complement)=173/255 and P(A intersection B complement)=2/17. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

A-only=60-30=30; B-only=58-30=28; neither=270-(60+58-30)=182. Thus P((A union B) complement)=91/135 and P(A intersection B complement)=1/9. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

A-only=63-33=30; B-only=64-33=31; neither=285-(63+64-33)=191. Thus P((A union B) complement)=191/285 and P(A intersection B complement)=2/19. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

A-only=66-18=48; B-only=70-18=52; neither=300-(66+70-18)=182. Thus P((A union B) complement)=91/150 and P(A intersection B complement)=4/25. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

A-only=69-21=48; B-only=51-21=30; neither=315-(69+51-21)=216. Thus P((A union B) complement)=24/35 and P(A intersection B complement)=16/105. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

A-only=72-24=48; B-only=57-24=33; neither=330-(72+57-24)=225. Thus P((A union B) complement)=15/22 and P(A intersection B complement)=8/55. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

A-only=73-25=48; B-only=59-25=34; neither=335-(73+59-25)=228. Thus P((A union B) complement)=228/335 and P(A intersection B complement)=48/335. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

A-only=74-26=48; B-only=61-26=35; neither=340-(74+61-26)=231. Thus P((A union B) complement)=231/340 and P(A intersection B complement)=12/85. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 10

Addition rule and mutually exclusive events

12 curated questions | complete solutions

Chapter focus

General OR rule, overlap correction and exhaustive cases

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

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Chapter 10: Addition rule and mutually exclusive events

Q01 | 4 MARKS

P(A)=7/10, P(B)=1/2 and P(A intersection B)=1/5. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

P(A)=3/5, P(B)=3/10 and P(A intersection B)=1/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. Your solution must justify the main method or assumption and include a final check.

Chapter 10: Addition rule and mutually exclusive events

Q03 | 4 MARKS

P(A)=1/2, P(B)=1/2 and P(A intersection B)=1/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

P(A)=2/5, P(B)=3/10 and P(A intersection B)=1/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. Your solution must justify the main method or assumption and include a final check.

Chapter 10: Addition rule and mutually exclusive events

Q05 | 4 MARKS

P(A)=7/10, P(B)=1/2 and P(A intersection B)=1/5. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. 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.

Q06 | 4 MARKS

P(A)=3/5, P(B)=3/10 and P(A intersection B)=1/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. 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.

Chapter 10: Addition rule and mutually exclusive events

Q07 | 4 MARKS

P(A)=1/2, P(B)=1/2 and P(A intersection B)=1/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. 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.

Q08 | 4 MARKS

P(A)=2/5, P(B)=3/10 and P(A intersection B)=1/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. 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.

Chapter 10: Addition rule and mutually exclusive events

Q09 | 4 MARKS

P(A)=7/10, P(B)=1/2 and P(A intersection B)=1/5. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. 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.

Q10 | 4 MARKS

P(A)=3/5, P(B)=3/10 and P(A intersection B)=1/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. 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 10: Addition rule and mutually exclusive events

Q11 | 5 MARKS

You must show your working.
P(A)=7/10, P(B)=1/2 and P(A intersection B)=1/5. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. 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.

Q12 | 6 MARKS

You must show your working.
P(A)=2/5, P(B)=3/10 and P(A intersection B)=3/10. Find P(A union B), P(neither), and decide with justification whether A and B are mutually exclusive. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=7/10+1/2-1/5=1. P(neither)=1-1=0. They are not mutually exclusive because P(A intersection B)=1/5. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=3/5+3/10-1/10=4/5. P(neither)=1-4/5=1/5. They are not mutually exclusive because P(A intersection B)=1/10. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=1/2+1/2-1/10=9/10. P(neither)=1-9/10=1/10. They are not mutually exclusive because P(A intersection B)=1/10. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=2/5+3/10-1/10=3/5. P(neither)=1-3/5=2/5. They are not mutually exclusive because P(A intersection B)=1/10. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=7/10+1/2-1/5=1. P(neither)=1-1=0. They are not mutually exclusive because P(A intersection B)=1/5. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=3/5+3/10-1/10=4/5. P(neither)=1-4/5=1/5. They are not mutually exclusive because P(A intersection B)=1/10. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=1/2+1/2-1/10=9/10. P(neither)=1-9/10=1/10. They are not mutually exclusive because P(A intersection B)=1/10. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=2/5+3/10-1/10=3/5. P(neither)=1-3/5=2/5. They are not mutually exclusive because P(A intersection B)=1/10. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=7/10+1/2-1/5=1. P(neither)=1-1=0. They are not mutually exclusive because P(A intersection B)=1/5. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=3/5+3/10-1/10=4/5. P(neither)=1-4/5=1/5. They are not mutually exclusive because P(A intersection B)=1/10. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=7/10+1/2-1/5=1. P(neither)=1-1=0. They are not mutually exclusive because P(A intersection B)=1/5. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

P(A union B)=P(A)+P(B)-P(A intersection B)=2/5+3/10-3/10=2/5. P(neither)=1-2/5=3/5. They are not mutually exclusive because P(A intersection B)=3/10. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

Question	Score / marks	Repair target	Retest date
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HIGHER TIER

UNIT 5 | CHAPTER 11

Multiplication rule and independent events

12 curated questions | complete solutions

Chapter focus

General AND rule, independence testing and repeated trials

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 11: Multiplication rule and independent events

Q01 | 4 MARKS

Events A and B are independent with P(A)=1/2 and P(B)=3/10. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

Events A and B are independent with P(A)=1/5 and P(B)=2/5. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Chapter 11: Multiplication rule and independent events

Q03 | 4 MARKS

Events A and B are independent with P(A)=1/2 and P(B)=1/2. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

Events A and B are independent with P(A)=1/5 and P(B)=3/5. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Chapter 11: Multiplication rule and independent events

Q05 | 4 MARKS

Events A and B are independent with P(A)=1/2 and P(B)=7/10. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

Events A and B are independent with P(A)=1/5 and P(B)=3/10. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Chapter 11: Multiplication rule and independent events

Q07 | 4 MARKS

Events A and B are independent with P(A)=1/2 and P(B)=2/5. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

Events A and B are independent with P(A)=1/5 and P(B)=1/2. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Chapter 11: Multiplication rule and independent events

Q09 | 4 MARKS

Events A and B are independent with P(A)=1/2 and P(B)=3/5. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

Events A and B are independent with P(A)=1/5 and P(B)=7/10. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Chapter 11: Multiplication rule and independent events

Q11 | 5 MARKS

You must show your working.
Events A and B are independent with P(A)=3/10 and P(B)=2/5. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
Events A and B are independent with P(A)=2/5 and P(B)=3/5. Find P(A and B), P(exactly one of A and B), and verify independence using a conditional probability statement. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

Independence gives P(A and B)=1/2x3/10=3/20. Exactly one has two disjoint routes: 1/2x7/10+1/2x3/10=1/2. Also P(A given B)=P(A)=1/2, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Independence gives P(A and B)=1/5x2/5=2/25. Exactly one has two disjoint routes: 1/5x3/5+4/5x2/5=11/25. Also P(A given B)=P(A)=1/5, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Independence gives P(A and B)=1/2x1/2=1/4. Exactly one has two disjoint routes: 1/2x1/2+1/2x1/2=1/2. Also P(A given B)=P(A)=1/2, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Independence gives P(A and B)=1/5x3/5=3/25. Exactly one has two disjoint routes: 1/5x2/5+4/5x3/5=14/25. Also P(A given B)=P(A)=1/5, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Independence gives P(A and B)=1/2x7/10=7/20. Exactly one has two disjoint routes: 1/2x3/10+1/2x7/10=1/2. Also P(A given B)=P(A)=1/2, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Independence gives P(A and B)=1/5x3/10=3/50. Exactly one has two disjoint routes: 1/5x7/10+4/5x3/10=19/50. Also P(A given B)=P(A)=1/5, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Independence gives P(A and B)=1/2x2/5=1/5. Exactly one has two disjoint routes: 1/2x3/5+1/2x2/5=1/2. Also P(A given B)=P(A)=1/2, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Independence gives P(A and B)=1/5x1/2=1/10. Exactly one has two disjoint routes: 1/5x1/2+4/5x1/2=1/2. Also P(A given B)=P(A)=1/5, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Independence gives P(A and B)=1/2x3/5=3/10. Exactly one has two disjoint routes: 1/2x2/5+1/2x3/5=1/2. Also P(A given B)=P(A)=1/2, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Independence gives P(A and B)=1/5x7/10=7/50. Exactly one has two disjoint routes: 1/5x3/10+4/5x7/10=31/50. Also P(A given B)=P(A)=1/5, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Independence gives P(A and B)=3/10x2/5=3/25. Exactly one has two disjoint routes: 3/10x3/5+7/10x2/5=23/50. Also P(A given B)=P(A)=3/10, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Independence gives P(A and B)=2/5x3/5=6/25. Exactly one has two disjoint routes: 2/5x2/5+3/5x3/5=13/25. Also P(A given B)=P(A)=2/5, which verifies the independence condition. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 12

Tree diagrams with replacement

12 curated questions | complete solutions

Chapter focus

Branch probabilities, path products and combined outcomes

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 12: Tree diagrams with replacement

Q01 | 4 MARKS

A biased coin has P(head)=1/2 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A biased coin has P(head)=1/5 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. Your solution must justify the main method or assumption and include a final check.

Chapter 12: Tree diagrams with replacement

Q03 | 4 MARKS

A biased coin has P(head)=1/2 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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.

Q04 | 4 MARKS

A biased coin has P(head)=1/5 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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.

Chapter 12: Tree diagrams with replacement

Q05 | 4 MARKS

A biased coin has P(head)=1/2 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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.

Q06 | 4 MARKS

A biased coin has P(head)=1/5 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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 12: Tree diagrams with replacement

Q07 | 4 MARKS

A biased coin has P(head)=1/2 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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.

Q08 | 4 MARKS

A biased coin has P(head)=1/5 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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.

Chapter 12: Tree diagrams with replacement

Q09 | 4 MARKS

A biased coin has P(head)=1/2 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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.

Q10 | 4 MARKS

A biased coin has P(head)=1/5 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. 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.

Chapter 12: Tree diagrams with replacement

Q11 | 5 MARKS

You must show your working.
A biased coin has P(head)=3/10 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A biased coin has P(head)=2/5 and is tossed three times independently. Use a tree-path argument to find P(exactly two heads) and P(at least one head). Explain why the branch probabilities stay unchanged. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/2)^2(1/2). Hence P(exactly two)=3/8. P(at least one)=1-P(no heads)=1-(1/2)^3=7/8. Replacement/independent trials keep each branch probability constant. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/5)^2(4/5). Hence P(exactly two)=12/125. P(at least one)=1-P(no heads)=1-(4/5)^3=61/125. Replacement/independent trials keep each branch probability constant. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/2)^2(1/2). Hence P(exactly two)=3/8. P(at least one)=1-P(no heads)=1-(1/2)^3=7/8. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/5)^2(4/5). Hence P(exactly two)=12/125. P(at least one)=1-P(no heads)=1-(4/5)^3=61/125. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/2)^2(1/2). Hence P(exactly two)=3/8. P(at least one)=1-P(no heads)=1-(1/2)^3=7/8. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/5)^2(4/5). Hence P(exactly two)=12/125. P(at least one)=1-P(no heads)=1-(4/5)^3=61/125. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/2)^2(1/2). Hence P(exactly two)=3/8. P(at least one)=1-P(no heads)=1-(1/2)^3=7/8. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/5)^2(4/5). Hence P(exactly two)=12/125. P(at least one)=1-P(no heads)=1-(4/5)^3=61/125. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/2)^2(1/2). Hence P(exactly two)=3/8. P(at least one)=1-P(no heads)=1-(1/2)^3=7/8. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

There are C(3,2)=3 paths with two heads, each probability (1/5)^2(4/5). Hence P(exactly two)=12/125. P(at least one)=1-P(no heads)=1-(4/5)^3=61/125. Replacement/independent trials keep each branch probability constant. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

There are C(3,2)=3 paths with two heads, each probability (3/10)^2(7/10). Hence P(exactly two)=189/1000. P(at least one)=1-P(no heads)=1-(7/10)^3=657/1000. Replacement/independent trials keep each branch probability constant. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

There are C(3,2)=3 paths with two heads, each probability (2/5)^2(3/5). Hence P(exactly two)=36/125. P(at least one)=1-P(no heads)=1-(3/5)^3=98/125. Replacement/independent trials keep each branch probability constant. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 13

Tree diagrams without replacement

12 curated questions | complete solutions

Chapter focus

Changing denominators, dependence and multi-stage selection

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

This chapter is independently authored and specification-mapped. It does not reproduce OCR questions, mark schemes, logos or proprietary layouts.

Chapter 13: Tree diagrams without replacement

Q01 | 4 MARKS

A bag contains 7 red and 7 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A bag contains 4 red and 6 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Chapter 13: Tree diagrams without replacement

Q03 | 4 MARKS

A bag contains 7 red and 5 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A bag contains 4 red and 11 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Chapter 13: Tree diagrams without replacement

Q05 | 4 MARKS

A bag contains 7 red and 10 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A bag contains 4 red and 9 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Chapter 13: Tree diagrams without replacement

Q07 | 4 MARKS

A bag contains 7 red and 8 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A bag contains 4 red and 7 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Chapter 13: Tree diagrams without replacement

Q09 | 4 MARKS

A bag contains 7 red and 6 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A bag contains 4 red and 5 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Chapter 13: Tree diagrams without replacement

Q11 | 5 MARKS

You must show your working.
A bag contains 5 red and 7 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A bag contains 6 red and 9 blue counters. Two are selected without replacement. Find P(two red) and P(one of each colour). Show the changing denominators and combine all valid orders. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

P(RR)=7/14x6/13=3/13. One of each can be RB or BR: 7/14x7/13+7/14x7/13=7/13. The second denominator is 13 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

P(RR)=4/10x3/9=2/15. One of each can be RB or BR: 4/10x6/9+6/10x4/9=8/15. The second denominator is 9 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

P(RR)=7/12x6/11=7/22. One of each can be RB or BR: 7/12x5/11+5/12x7/11=35/66. The second denominator is 11 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

P(RR)=4/15x3/14=2/35. One of each can be RB or BR: 4/15x11/14+11/15x4/14=44/105. The second denominator is 14 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

P(RR)=7/17x6/16=21/136. One of each can be RB or BR: 7/17x10/16+10/17x7/16=35/68. The second denominator is 16 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

P(RR)=4/13x3/12=1/13. One of each can be RB or BR: 4/13x9/12+9/13x4/12=6/13. The second denominator is 12 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

P(RR)=7/15x6/14=1/5. One of each can be RB or BR: 7/15x8/14+8/15x7/14=8/15. The second denominator is 14 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

P(RR)=4/11x3/10=6/55. One of each can be RB or BR: 4/11x7/10+7/11x4/10=28/55. The second denominator is 10 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

P(RR)=7/13x6/12=7/26. One of each can be RB or BR: 7/13x6/12+6/13x7/12=7/13. The second denominator is 12 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

P(RR)=4/9x3/8=1/6. One of each can be RB or BR: 4/9x5/8+5/9x4/8=5/9. The second denominator is 8 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

P(RR)=5/12x4/11=5/33. One of each can be RB or BR: 5/12x7/11+7/12x5/11=35/66. The second denominator is 11 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

P(RR)=6/15x5/14=1/7. One of each can be RB or BR: 6/15x9/14+9/15x6/14=18/35. The second denominator is 14 because the first counter is not replaced. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

Question	Score / marks	Repair target	Retest date
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HIGHER TIER

UNIT 5 | CHAPTER 14

Conditional probability from tables

12 curated questions | complete solutions

Chapter focus

Restricted sample spaces and given-that denominators

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

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Chapter 14: Conditional probability from tables

Q01 | 4 MARKS

A two-way table represents 310 people. There are 80 in A, 102 in B and 40 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A two-way table represents 340 people. There are 83 in A, 73 in B and 43 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Chapter 14: Conditional probability from tables

Q03 | 4 MARKS

A two-way table represents 370 people. There are 86 in A, 79 in B and 46 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A two-way table represents 400 people. There are 89 in A, 85 in B and 27 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Chapter 14: Conditional probability from tables

Q05 | 4 MARKS

A two-way table represents 430 people. There are 92 in A, 91 in B and 30 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A two-way table represents 460 people. There are 95 in A, 97 in B and 33 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Chapter 14: Conditional probability from tables

Q07 | 4 MARKS

A two-way table represents 490 people. There are 98 in A, 103 in B and 36 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A two-way table represents 520 people. There are 66 in A, 74 in B and 39 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Chapter 14: Conditional probability from tables

Q09 | 4 MARKS

A two-way table represents 550 people. There are 69 in A, 80 in B and 42 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A two-way table represents 580 people. There are 72 in A, 86 in B and 45 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Chapter 14: Conditional probability from tables

Q11 | 5 MARKS

You must show your working.
A two-way table represents 590 people. There are 73 in A, 88 in B and 46 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A two-way table represents 600 people. There are 74 in A, 90 in B and 25 in both. Calculate P(A given B), P(B given A), and explain why these conditional probabilities need not be equal. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

Given B restricts the denominator to 102: P(A given B)=40/102=20/51. Given A restricts it to 80: P(B given A)=40/80=1/2. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Given B restricts the denominator to 73: P(A given B)=43/73=43/73. Given A restricts it to 83: P(B given A)=43/83=43/83. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Given B restricts the denominator to 79: P(A given B)=46/79=46/79. Given A restricts it to 86: P(B given A)=46/86=23/43. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Given B restricts the denominator to 85: P(A given B)=27/85=27/85. Given A restricts it to 89: P(B given A)=27/89=27/89. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Given B restricts the denominator to 91: P(A given B)=30/91=30/91. Given A restricts it to 92: P(B given A)=30/92=15/46. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Given B restricts the denominator to 97: P(A given B)=33/97=33/97. Given A restricts it to 95: P(B given A)=33/95=33/95. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Given B restricts the denominator to 103: P(A given B)=36/103=36/103. Given A restricts it to 98: P(B given A)=36/98=18/49. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Given B restricts the denominator to 74: P(A given B)=39/74=39/74. Given A restricts it to 66: P(B given A)=39/66=13/22. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Given B restricts the denominator to 80: P(A given B)=42/80=21/40. Given A restricts it to 69: P(B given A)=42/69=14/23. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Given B restricts the denominator to 86: P(A given B)=45/86=45/86. Given A restricts it to 72: P(B given A)=45/72=5/8. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Given B restricts the denominator to 88: P(A given B)=46/88=23/44. Given A restricts it to 73: P(B given A)=46/73=46/73. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Given B restricts the denominator to 90: P(A given B)=25/90=5/18. Given A restricts it to 74: P(B given A)=25/74=25/74. The intersection numerator is shared, but the restricted group totals differ. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 15

Conditional probability from Venn diagrams

12 curated questions | complete solutions

Chapter focus

Intersections within a restricted set and reverse conditionals

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 15: Conditional probability from Venn diagrams

Q01 | 4 MARKS

A Venn diagram has universal total 215, n(A)=75, n(B)=60 and n(A intersection B)=35. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A Venn diagram has universal total 230, n(A)=78, n(B)=66 and n(A intersection B)=38. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Chapter 15: Conditional probability from Venn diagrams

Q03 | 4 MARKS

A Venn diagram has universal total 245, n(A)=81, n(B)=72 and n(A intersection B)=21. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A Venn diagram has universal total 260, n(A)=84, n(B)=78 and n(A intersection B)=24. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Chapter 15: Conditional probability from Venn diagrams

Q05 | 4 MARKS

A Venn diagram has universal total 275, n(A)=87, n(B)=84 and n(A intersection B)=27. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A Venn diagram has universal total 290, n(A)=60, n(B)=62 and n(A intersection B)=30. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Chapter 15: Conditional probability from Venn diagrams

Q07 | 4 MARKS

A Venn diagram has universal total 305, n(A)=63, n(B)=68 and n(A intersection B)=33. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Q08 | 4 MARKS

A Venn diagram has universal total 320, n(A)=66, n(B)=74 and n(A intersection B)=36. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Chapter 15: Conditional probability from Venn diagrams

Q09 | 4 MARKS

A Venn diagram has universal total 335, n(A)=69, n(B)=80 and n(A intersection B)=39. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Q10 | 4 MARKS

A Venn diagram has universal total 350, n(A)=72, n(B)=58 and n(A intersection B)=22. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Chapter 15: Conditional probability from Venn diagrams

Q11 | 5 MARKS

You must show your working.
A Venn diagram has universal total 355, n(A)=73, n(B)=60 and n(A intersection B)=23. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
A Venn diagram has universal total 360, n(A)=74, n(B)=62 and n(A intersection B)=24. Find P(A given B), P(A complement given B), and P(B given A union B). Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

Within B, 35 are also in A, so P(A given B)=7/12. The remaining B-only count is 25, giving P(A complement given B)=5/12. Within A union B (100 members), 60 are in B, so P(B given A union B)=3/5. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Within B, 38 are also in A, so P(A given B)=19/33. The remaining B-only count is 28, giving P(A complement given B)=14/33. Within A union B (106 members), 66 are in B, so P(B given A union B)=33/53. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Within B, 21 are also in A, so P(A given B)=7/24. The remaining B-only count is 51, giving P(A complement given B)=17/24. Within A union B (132 members), 72 are in B, so P(B given A union B)=6/11. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Within B, 24 are also in A, so P(A given B)=4/13. The remaining B-only count is 54, giving P(A complement given B)=9/13. Within A union B (138 members), 78 are in B, so P(B given A union B)=13/23. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Within B, 27 are also in A, so P(A given B)=9/28. The remaining B-only count is 57, giving P(A complement given B)=19/28. Within A union B (144 members), 84 are in B, so P(B given A union B)=7/12. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Within B, 30 are also in A, so P(A given B)=15/31. The remaining B-only count is 32, giving P(A complement given B)=16/31. Within A union B (92 members), 62 are in B, so P(B given A union B)=31/46. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Within B, 33 are also in A, so P(A given B)=33/68. The remaining B-only count is 35, giving P(A complement given B)=35/68. Within A union B (98 members), 68 are in B, so P(B given A union B)=34/49. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Within B, 36 are also in A, so P(A given B)=18/37. The remaining B-only count is 38, giving P(A complement given B)=19/37. Within A union B (104 members), 74 are in B, so P(B given A union B)=37/52. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Within B, 39 are also in A, so P(A given B)=39/80. The remaining B-only count is 41, giving P(A complement given B)=41/80. Within A union B (110 members), 80 are in B, so P(B given A union B)=8/11. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Within B, 22 are also in A, so P(A given B)=11/29. The remaining B-only count is 36, giving P(A complement given B)=18/29. Within A union B (108 members), 58 are in B, so P(B given A union B)=29/54. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Within B, 23 are also in A, so P(A given B)=23/60. The remaining B-only count is 37, giving P(A complement given B)=37/60. Within A union B (110 members), 60 are in B, so P(B given A union B)=6/11. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Within B, 24 are also in A, so P(A given B)=12/31. The remaining B-only count is 38, giving P(A complement given B)=19/31. Within A union B (112 members), 62 are in B, so P(B given A union B)=31/56. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 16

Conditional probability on trees

12 curated questions | complete solutions

Chapter focus

Branch interpretation, Bayes-style reversal and evidence

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

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Chapter 16: Conditional probability on trees

Q01 | 4 MARKS

P(condition)=3/5. A test is positive with probability 7/10 when the condition is present and 1/5 when absent. Find P(positive), then P(condition given positive), using a probability tree. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

P(condition)=1/2. A test is positive with probability 7/10 when the condition is present and 1/10 when absent. Find P(positive), then P(condition given positive), using a probability tree. Your solution must justify the main method or assumption and include a final check.

Chapter 16: Conditional probability on trees

Q03 | 4 MARKS

P(condition)=2/5. A test is positive with probability 7/10 when the condition is present and 1/5 when absent. Find P(positive), then P(condition given positive), using a probability tree. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

P(condition)=3/10. A test is positive with probability 7/10 when the condition is present and 1/10 when absent. Find P(positive), then P(condition given positive), using a probability tree. Your solution must justify the main method or assumption and include a final check.

Chapter 16: Conditional probability on trees

Q05 | 4 MARKS

P(condition)=3/5. A test is positive with probability 7/10 when the condition is present and 1/5 when absent. Find P(positive), then P(condition given positive), using a probability tree. 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.

Q06 | 4 MARKS

P(condition)=1/2. A test is positive with probability 7/10 when the condition is present and 1/10 when absent. Find P(positive), then P(condition given positive), using a probability tree. 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.

Chapter 16: Conditional probability on trees

Q07 | 4 MARKS

P(condition)=2/5. A test is positive with probability 7/10 when the condition is present and 1/5 when absent. Find P(positive), then P(condition given positive), using a probability tree. 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.

Q08 | 4 MARKS

P(condition)=3/10. A test is positive with probability 7/10 when the condition is present and 1/10 when absent. Find P(positive), then P(condition given positive), using a probability tree. 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.

Chapter 16: Conditional probability on trees

Q09 | 4 MARKS

P(condition)=3/5. A test is positive with probability 7/10 when the condition is present and 1/5 when absent. Find P(positive), then P(condition given positive), using a probability tree. 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.

Q10 | 4 MARKS

P(condition)=1/2. A test is positive with probability 7/10 when the condition is present and 1/10 when absent. Find P(positive), then P(condition given positive), using a probability tree. 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 16: Conditional probability on trees

Q11 | 5 MARKS

You must show your working.
P(condition)=3/5. A test is positive with probability 4/5 when the condition is present and 1/5 when absent. Find P(positive), then P(condition given positive), using a probability tree. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
P(condition)=3/10. A test is positive with probability 9/10 when the condition is present and 1/10 when absent. Find P(positive), then P(condition given positive), using a probability tree. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 3/5x7/10+2/5x1/5=1/2. Restricting to positive outcomes gives P(condition given positive)=(3/5x7/10)/1/2=21/25. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 1/2x7/10+1/2x1/10=2/5. Restricting to positive outcomes gives P(condition given positive)=(1/2x7/10)/2/5=7/8. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 2/5x7/10+3/5x1/5=2/5. Restricting to positive outcomes gives P(condition given positive)=(2/5x7/10)/2/5=7/10. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 3/10x7/10+7/10x1/10=7/25. Restricting to positive outcomes gives P(condition given positive)=(3/10x7/10)/7/25=3/4. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 3/5x7/10+2/5x1/5=1/2. Restricting to positive outcomes gives P(condition given positive)=(3/5x7/10)/1/2=21/25. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 1/2x7/10+1/2x1/10=2/5. Restricting to positive outcomes gives P(condition given positive)=(1/2x7/10)/2/5=7/8. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 2/5x7/10+3/5x1/5=2/5. Restricting to positive outcomes gives P(condition given positive)=(2/5x7/10)/2/5=7/10. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 3/10x7/10+7/10x1/10=7/25. Restricting to positive outcomes gives P(condition given positive)=(3/10x7/10)/7/25=3/4. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 3/5x7/10+2/5x1/5=1/2. Restricting to positive outcomes gives P(condition given positive)=(3/5x7/10)/1/2=21/25. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 1/2x7/10+1/2x1/10=2/5. Restricting to positive outcomes gives P(condition given positive)=(1/2x7/10)/2/5=7/8. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 3/5x4/5+2/5x1/5=14/25. Restricting to positive outcomes gives P(condition given positive)=(3/5x4/5)/14/25=6/7. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Positive paths are condition-and-positive plus no-condition-and-positive: 3/10x9/10+7/10x1/10=17/50. Restricting to positive outcomes gives P(condition given positive)=(3/10x9/10)/17/50=27/34. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 17

Binomial-style repeated-event reasoning

12 curated questions | complete solutions

Chapter focus

Exactly, at least and complementary repeated independent outcomes

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

Chapter 17: Binomial-style repeated-event reasoning

Q01 | 4 MARKS

An event has probability 1/2 on each of 5 independent trials. Find the probability of exactly 3 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

An event has probability 1/5 on each of 4 independent trials. Find the probability of exactly 2 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. Your solution must justify the main method or assumption and include a final check.

Chapter 17: Binomial-style repeated-event reasoning

Q03 | 4 MARKS

An event has probability 1/2 on each of 5 independent trials. Find the probability of exactly 3 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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.

Q04 | 4 MARKS

An event has probability 1/5 on each of 4 independent trials. Find the probability of exactly 2 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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.

Chapter 17: Binomial-style repeated-event reasoning

Q05 | 4 MARKS

An event has probability 1/2 on each of 5 independent trials. Find the probability of exactly 3 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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.

Q06 | 4 MARKS

An event has probability 1/5 on each of 4 independent trials. Find the probability of exactly 2 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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 17: Binomial-style repeated-event reasoning

Q07 | 4 MARKS

An event has probability 1/2 on each of 5 independent trials. Find the probability of exactly 3 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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.

Q08 | 4 MARKS

An event has probability 1/5 on each of 4 independent trials. Find the probability of exactly 2 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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.

Chapter 17: Binomial-style repeated-event reasoning

Q09 | 4 MARKS

An event has probability 1/2 on each of 5 independent trials. Find the probability of exactly 3 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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.

Q10 | 4 MARKS

An event has probability 1/5 on each of 4 independent trials. Find the probability of exactly 2 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. 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.

Chapter 17: Binomial-style repeated-event reasoning

Q11 | 5 MARKS

You must show your working.
An event has probability 3/10 on each of 5 independent trials. Find the probability of exactly 3 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. Your solution must justify the main method or assumption and include a final check.

Q12 | 6 MARKS

You must show your working.
An event has probability 2/5 on each of 4 independent trials. Find the probability of exactly 2 occurrences and of at least one occurrence. Explain the combinatorial multiplier in the exact calculation. Your solution must justify the main method or assumption and include a final check.

Worked solutions

Q01 | 4 MARKS

Exactly 3: choose the 3 successful positions in C(5,3)=10 ways. Probability=10x(1/2)^3x(1/2)^2=5/16. At least one=1-P(none)=1-(1/2)^5=31/32. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Exactly 2: choose the 2 successful positions in C(4,2)=6 ways. Probability=6x(1/5)^2x(4/5)^2=96/625. At least one=1-P(none)=1-(4/5)^4=369/625. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Exactly 3: choose the 3 successful positions in C(5,3)=10 ways. Probability=10x(1/2)^3x(1/2)^2=5/16. At least one=1-P(none)=1-(1/2)^5=31/32. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Exactly 2: choose the 2 successful positions in C(4,2)=6 ways. Probability=6x(1/5)^2x(4/5)^2=96/625. At least one=1-P(none)=1-(4/5)^4=369/625. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Exactly 3: choose the 3 successful positions in C(5,3)=10 ways. Probability=10x(1/2)^3x(1/2)^2=5/16. At least one=1-P(none)=1-(1/2)^5=31/32. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Exactly 2: choose the 2 successful positions in C(4,2)=6 ways. Probability=6x(1/5)^2x(4/5)^2=96/625. At least one=1-P(none)=1-(4/5)^4=369/625. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Exactly 3: choose the 3 successful positions in C(5,3)=10 ways. Probability=10x(1/2)^3x(1/2)^2=5/16. At least one=1-P(none)=1-(1/2)^5=31/32. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Exactly 2: choose the 2 successful positions in C(4,2)=6 ways. Probability=6x(1/5)^2x(4/5)^2=96/625. At least one=1-P(none)=1-(4/5)^4=369/625. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Exactly 3: choose the 3 successful positions in C(5,3)=10 ways. Probability=10x(1/2)^3x(1/2)^2=5/16. At least one=1-P(none)=1-(1/2)^5=31/32. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Exactly 2: choose the 2 successful positions in C(4,2)=6 ways. Probability=6x(1/5)^2x(4/5)^2=96/625. At least one=1-P(none)=1-(4/5)^4=369/625. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Exactly 3: choose the 3 successful positions in C(5,3)=10 ways. Probability=10x(3/10)^3x(7/10)^2=1323/10000. At least one=1-P(none)=1-(7/10)^5=83193/100000. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Exactly 2: choose the 2 successful positions in C(4,2)=6 ways. Probability=6x(2/5)^2x(3/5)^2=216/625. At least one=1-P(none)=1-(3/5)^4=544/625. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Chapter completion record

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HIGHER TIER

UNIT 5 | CHAPTER 18

Reverse and algebraic probability

12 curated questions | complete solutions

Chapter focus

Unknown probabilities, equations, validity and connected Higher modelling

Assessment progression

All questions require developed working. Questions 1-4 secure Higher methods; Questions 5-8 connect representations; Questions 9-12 develop Grade 7-9 reasoning.

You must show your working for every question worth 5 marks or more.

Source-use notice

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Chapter 18: Reverse and algebraic probability

Q01 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=3/5; if A does not occur, P(win)=2/5. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. Your solution must justify the main method or assumption and include a final check.

Q02 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=3/4; if A does not occur, P(win)=1/4. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. Your solution must justify the main method or assumption and include a final check.

Chapter 18: Reverse and algebraic probability

Q03 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=2/3; if A does not occur, P(win)=1/3. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. Your solution must justify the main method or assumption and include a final check.

Q04 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=7/9; if A does not occur, P(win)=2/9. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. Your solution must justify the main method or assumption and include a final check.

Chapter 18: Reverse and algebraic probability

Q05 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=5/7; if A does not occur, P(win)=2/7. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. Your solution must justify the main method or assumption and include a final check.

Q06 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=3/5; if A does not occur, P(win)=2/5. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. 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.

Chapter 18: Reverse and algebraic probability

Q07 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=3/4; if A does not occur, P(win)=1/4. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. 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.

Q08 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=2/3; if A does not occur, P(win)=1/3. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. 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.

Chapter 18: Reverse and algebraic probability

Q09 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=7/9; if A does not occur, P(win)=2/9. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. 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.

Q10 | 4 MARKS

A two-stage game uses P(A)=p. If A occurs, P(win)=5/7; if A does not occur, P(win)=2/7. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. 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.

Chapter 18: Reverse and algebraic probability

Q11 | 5 MARKS

You must show your working.
A two-stage game uses P(A)=p. If A occurs, P(win)=3/4; if A does not occur, P(win)=1/4. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. 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 | 6 MARKS

You must show your working.
A two-stage game uses P(A)=p. If A occurs, P(win)=7/9; if A does not occur, P(win)=2/9. The overall probability of winning is 1/2. Form and solve an equation for p, then check that your answer is a valid probability. 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.

Worked solutions

Q01 | 4 MARKS

Total probability gives p(3/5)+(1-p)(2/5)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q02 | 4 MARKS

Total probability gives p(3/4)+(1-p)(1/4)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q03 | 4 MARKS

Total probability gives p(2/3)+(1-p)(1/3)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q04 | 4 MARKS

Total probability gives p(7/9)+(1-p)(2/9)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q05 | 4 MARKS

Total probability gives p(5/7)+(1-p)(2/7)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. The written justification should identify the decisive method or assumption; the check should confirm the result independently or test it against the context.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q06 | 4 MARKS

Total probability gives p(3/5)+(1-p)(2/5)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q07 | 4 MARKS

Total probability gives p(3/4)+(1-p)(1/4)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q08 | 4 MARKS

Total probability gives p(2/3)+(1-p)(1/3)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q09 | 4 MARKS

Total probability gives p(7/9)+(1-p)(2/9)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q10 | 4 MARKS

Total probability gives p(5/7)+(1-p)(2/7)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Worked solutions

Q11 | 5 MARKS

Total probability gives p(3/4)+(1-p)(1/4)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

Q12 | 6 MARKS

Total probability gives p(7/9)+(1-p)(2/9)=1/2. Expanding and solving gives p=1/2. Since 0<=1/2<=1 and substitution recreates 1/2, it is valid. 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.

Credit a correct method and accurate progress; reserve the final mark for the required answer, justification or contextual conclusion.

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