GCSE MATHEMATICS

Aligned to Pearson Edexcel GCSE Mathematics (1MA1)

FOUNDATION TIER

PROBABILITY

PRACTICE BOOK

Modules 33–40 | 360 original questions

Formula guides, full worked answers and marking guidance

FREE WEBSITE EDITION

Student name: _____

Target grade: _____ Start date: _____ Completion: _____

MODULE 33–40 / P1–P8

Unit 5 Contents and Study Plan

8 MODULES | 360 ORIGINAL QUESTIONS

Name: _____ Date: _____ Score: _____ / _____

Complete Core Skills, Exam Practice, Grade 4–5 Challenge and same-topic retrieval in every module. Formula and method guides, full worked answers and marking guidance are collected at the back.

Assessment information can change. For the current paper format, calculator rules, timing, marks and qualification details, consult the official Pearson Edexcel GCSE Mathematics (1MA1) specification on the Pearson Qualifications website.

MODULE 01-08 / P1-P8
Specification Coverage Map

INDEPENDENTLY AUTHORED PRACTICE

Name: _____ Date: _____ Score: _____ / _____

This independently authored Foundation Tier practice book is organised around the skills represented by Pearson Edexcel GCSE Mathematics (1MA1) content references P1-P8. The reference identifies specification alignment only; the questions, data, diagrams and worked solutions in this book are independently created.

Pearson Edexcel is referenced only to identify the qualification for which this resource is intended. This publication does not reproduce Pearson Edexcel question papers, mark schemes, examiner reports, sample assessment materials or specification text.

For the official and most recent specification, assessment structure and Pearson Edexcel materials, use the Pearson Qualifications website directly. Do not rely on this independent resource as the authoritative source of qualification rules.

Practice emphasis: Probability scales, sample spaces, combined events, experimental probability and interpretation of probability models. The exercises are designed as independent GCSE Mathematics practice rather than replicas of Pearson Edexcel examination questions.

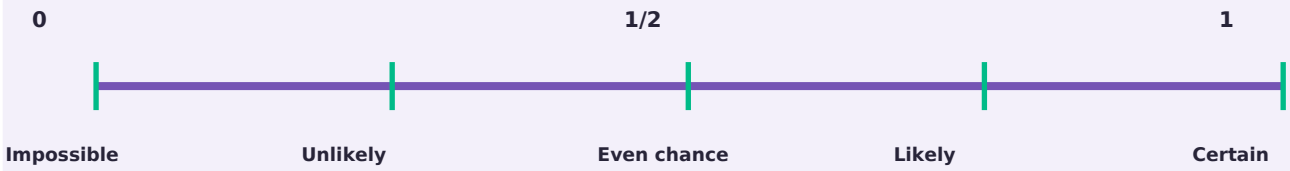
P1–P3	Experiments, fairness, relative frequency and expected outcomes
P4–P5	Complements, exhaustive outcomes and sample reliability
P6–P7	Systematic listing, Venn diagrams and sample spaces
P8	Independent and dependent combined events

MODULE 33–34 / P1, P2, P3

Probability Visual Reference: Scale and Frequency

0 TO 1 | TABLES | FREQUENCY TREES

THE 0-TO-1 PROBABILITY SCALE



FREQUENCY TREE

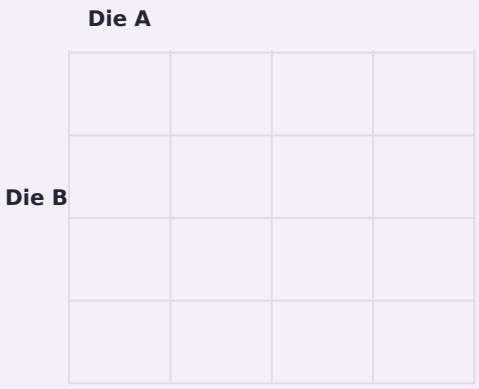
At every split, outgoing frequencies add to the incoming frequency.

MODULE 37–38 / P6, P7, P8

Probability Visual Reference: Sample Spaces and Venn Diagrams

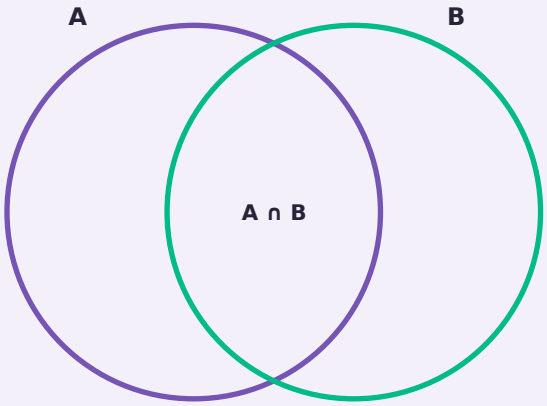
LIST | COUNT | INTERPRET

TWO-WAY SAMPLE-SPACE GRID



Each cell represents one ordered pair.

VENN DIAGRAM



Fill the intersection before the “only” regions.

SET COUNTING

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

P(event) = number in required region ÷ total

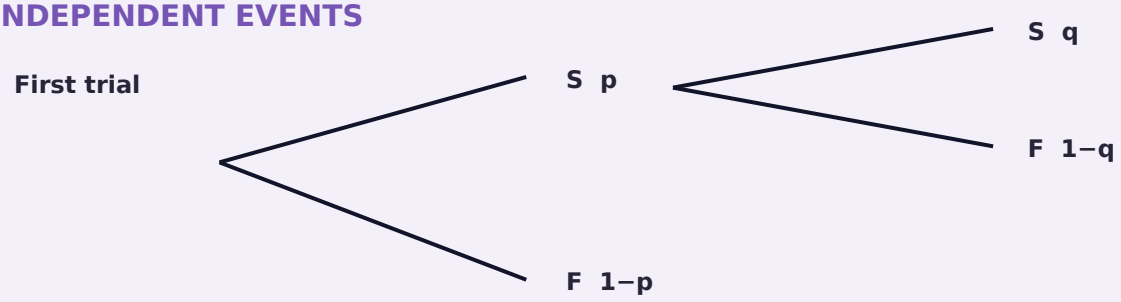
“A only” excludes the overlap. “Not A” is everything outside A.

MODULE 39–40 / P8

Probability Visual Reference: Tree Diagrams

MULTIPLY PATHS | ADD ALTERNATIVE PATHS

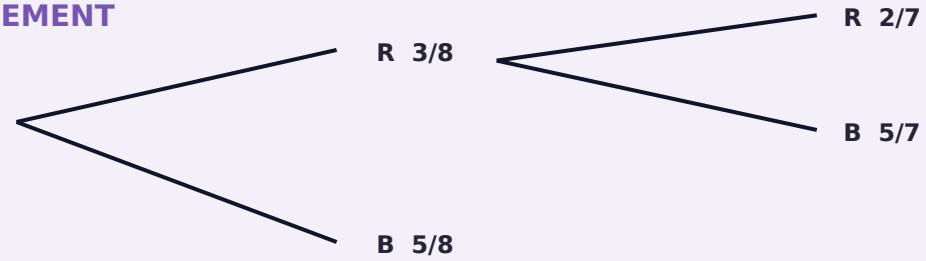
INDEPENDENT EVENTS



Later probabilities stay unchanged. Multiply along a complete path.

WITHOUT REPLACEMENT

Bag: 3 red, 5 blue



Counts change after a selection when the item is not replaced.

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Write a probability suitable for an event described as impossible. [1 mark]

2. A bag contains 2 red and 5 blue counters. Find P(red). [1 mark]

3. A fair spinner has 4 equal sections, of which 1 are marked A. Find P(A). [1 mark]

4. P(rain)=1/6. Find P(no rain). [1 mark]

5. A spinner has 6 equal sections and 2 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Write a probability suitable for an event described as unlikely. [1 mark]

7. A bag contains 3 red and 6 blue counters. Find P(red). [1 mark]

8. A fair spinner has 5 equal sections, of which 2 are marked A. Find P(A). [1 mark]

9. P(rain)=3/13. Find P(no rain). [1 mark]

10. A spinner has 7 equal sections and 3 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Write a probability suitable for an event described as even chance. [1 mark]

12. A bag contains 4 red and 7 blue counters. Find P(red). [1 mark]

13. A fair spinner has 6 equal sections, of which 3 are marked A. Find P(A). [1 mark]

14. P(rain)=2/7. Find P(no rain). [1 mark]

15. A spinner has 8 equal sections and 4 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Write a probability suitable for an event described as likely. [1 mark]

17. A bag contains 5 red and 8 blue counters. Find P(red). [1 mark]

18. A fair spinner has 7 equal sections, of which 1 are marked A. Find P(A). [1 mark]

19. P(rain)=1/3. Find P(no rain). [1 mark]

20. A spinner has 9 equal sections and 5 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Write a probability suitable for an event described as certain. [1 mark]

22. A bag contains 6 red and 9 blue counters. Find P(red). [1 mark]

23. A fair spinner has 8 equal sections, of which 2 are marked A. Find P(A). [1 mark]

24. P(rain)=3/8. Find P(no rain). [1 mark]

25. A spinner has 10 equal sections and 2 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A bag contains 7 red and 10 blue counters. Find P(red). [1 mark]

27. A fair spinner has 9 equal sections, of which 3 are marked A. Find P(A). [1 mark]

28. P(rain)=7/17. Find P(no rain). [1 mark]

29. A spinner has 11 equal sections and 3 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

30. A bag contains 8 red and 11 blue counters. Find P(red). [1 mark]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A fair spinner has 10 equal sections, of which 1 are marked A. Find P(A). [1 mark]

32. P(rain)=4/9. Find P(no rain). [1 mark]

33. A spinner has 12 equal sections and 4 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

34. A bag contains 9 red and 12 blue counters. Find P(red). [1 mark]

35. A fair spinner has 11 equal sections, of which 2 are marked A. Find P(A). [1 mark]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. P(rain)=9/19. Find P(no rain). [1 mark]

37. A spinner has 13 equal sections and 5 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

38. A bag contains 10 red and 13 blue counters. Find P(red). [1 mark]

39. A fair spinner has 12 equal sections, of which 3 are marked A. Find P(A). [1 mark]

40. P(rain)=1/2. Find P(no rain). [1 mark]

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A spinner has 14 equal sections and 2 winning sections. Is the game fair if a player is promised an even chance of winning? Explain. [2 marks]

42. Place the probability 0.65 on the probability scale and describe the event using one word. [2 marks]

43. A fair spinner is intended to give red and blue equal chances. It has 10 equal sectors. How many should be red? [2 marks]

44. A bag contains only yellow and green counters. P(yellow)=0.38. Find P(green). [1 mark]

45. Explain why a probability of 1.04 cannot be valid. [1 mark]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A coin is tossed 50 times and lands heads 18 times. Find the relative frequency of heads. [2 marks]

2. An experiment gives red 12 times, blue 18 times and green 10 times. How many trials were completed? [1 mark]

3. A frequency tree begins with 80 customers. 35 buy online and the rest buy in store. How many buy in store? [1 mark]

4. A frequency tree records 30 boys and 25 girls. 12 boys and 10 girls travel by bus. How many walk? [3 marks]

5. A team has 9 wins, 6 draws and 15 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A coin is tossed 60 times and lands heads 21 times. Find the relative frequency of heads. [2 marks]

7. An experiment gives red 14 times, blue 21 times and green 11 times. How many trials were completed? [1 mark]

8. A frequency tree begins with 90 customers. 39 buy online and the rest buy in store. How many buy in store? [1 mark]

9. A frequency tree records 32 boys and 28 girls. 13 boys and 12 girls travel by bus. How many walk? [3 marks]

10. A team has 10 wins, 8 draws and 16 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A coin is tossed 70 times and lands heads 24 times. Find the relative frequency of heads. [2 marks]

12. An experiment gives red 16 times, blue 24 times and green 12 times. How many trials were completed? [1 mark]

13. A frequency tree begins with 100 customers. 43 buy online and the rest buy in store. How many buy in store? [1 mark]

14. A frequency tree records 34 boys and 31 girls. 14 boys and 14 girls travel by bus. How many walk? [3 marks]

15. A team has 11 wins, 10 draws and 17 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A coin is tossed 80 times and lands heads 27 times. Find the relative frequency of heads. [2 marks]

17. An experiment gives red 18 times, blue 27 times and green 13 times. How many trials were completed? [1 mark]

18. A frequency tree begins with 110 customers. 47 buy online and the rest buy in store. How many buy in store? [1 mark]

19. A frequency tree records 36 boys and 34 girls. 15 boys and 16 girls travel by bus. How many walk? [3 marks]

20. A team has 12 wins, 12 draws and 18 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A coin is tossed 90 times and lands heads 30 times. Find the relative frequency of heads. [2 marks]

22. An experiment gives red 20 times, blue 30 times and green 14 times. How many trials were completed? [1 mark]

23. A frequency tree begins with 120 customers. 51 buy online and the rest buy in store. How many buy in store? [1 mark]

24. A frequency tree records 38 boys and 37 girls. 16 boys and 18 girls travel by bus. How many walk? [3 marks]

25. A team has 13 wins, 14 draws and 19 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A coin is tossed 100 times and lands heads 33 times. Find the relative frequency of heads. [2 marks]

27. An experiment gives red 22 times, blue 33 times and green 15 times. How many trials were completed? [1 mark]

28. A frequency tree begins with 130 customers. 55 buy online and the rest buy in store. How many buy in store? [1 mark]

29. A frequency tree records 40 boys and 40 girls. 17 boys and 20 girls travel by bus. How many walk? [3 marks]

30. A team has 14 wins, 16 draws and 20 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A coin is tossed 110 times and lands heads 36 times. Find the relative frequency of heads. [2 marks]

32. An experiment gives red 24 times, blue 36 times and green 16 times. How many trials were completed? [1 mark]

33. A frequency tree begins with 140 customers. 59 buy online and the rest buy in store. How many buy in store? [1 mark]

34. A frequency tree records 42 boys and 43 girls. 18 boys and 22 girls travel by bus. How many walk? [3 marks]

35. A team has 15 wins, 18 draws and 21 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A coin is tossed 120 times and lands heads 39 times. Find the relative frequency of heads. [2 marks]

37. An experiment gives red 26 times, blue 39 times and green 17 times. How many trials were completed? [1 mark]

38. A frequency tree begins with 150 customers. 63 buy online and the rest buy in store. How many buy in store? [1 mark]

39. A frequency tree records 44 boys and 46 girls. 19 boys and 24 girls travel by bus. How many walk? [3 marks]

40. A team has 16 wins, 20 draws and 22 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A coin is tossed 130 times and lands heads 42 times. Find the relative frequency of heads. [2 marks]

42. An experiment gives red 28 times, blue 42 times and green 18 times. How many trials were completed? [1 mark]

43. A frequency tree begins with 160 customers. 67 buy online and the rest buy in store. How many buy in store? [1 mark]

44. A frequency tree records 46 boys and 49 girls. 20 boys and 26 girls travel by bus. How many walk? [3 marks]

45. A team has 17 wins, 22 draws and 23 losses. Estimate P(not losing) from these results. [2 marks]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. An event has probability 1/6 and an experiment is repeated 60 times. Find the expected frequency. [2 marks]

2. A machine succeeds 20 times in 50 tests. Estimate how many successes in 200 further tests. [3 marks]

3. The probability of a defective item is 1/5. The expected number defective is 20. How many items are inspected? [3 marks]

4. One estimate of a probability uses 20 trials and another uses 200 trials. Which estimate is generally more reliable? [1 mark]

5. The theoretical probability is 1/4 and an experiment gives relative frequency 6/25. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. An event has probability 1/3 and an experiment is repeated 90 times. Find the expected frequency. [2 marks]

7. A machine succeeds 23 times in 60 tests. Estimate how many successes in 240 further tests. [3 marks]

8. The probability of a defective item is 3/10. The expected number defective is 36. How many items are inspected? [3 marks]

9. One estimate of a probability uses 30 trials and another uses 250 trials. Which estimate is generally more reliable? [1 mark]

10. The theoretical probability is 1/2 and an experiment gives relative frequency 14/55. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. An event has probability 1/2 and an experiment is repeated 120 times. Find the expected frequency. [2 marks]

12. A machine succeeds 26 times in 70 tests. Estimate how many successes in 280 further tests. [3 marks]

13. The probability of a defective item is 2/5. The expected number defective is 56. How many items are inspected? [3 marks]

14. One estimate of a probability uses 40 trials and another uses 300 trials. Which estimate is generally more reliable? [1 mark]

15. The theoretical probability is 3/4 and an experiment gives relative frequency 4/15. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. An event has probability 2/3 and an experiment is repeated 150 times. Find the expected frequency. [2 marks]

17. A machine succeeds 29 times in 80 tests. Estimate how many successes in 320 further tests. [3 marks]

18. The probability of a defective item is 1/2. The expected number defective is 80. How many items are inspected? [3 marks]

19. One estimate of a probability uses 50 trials and another uses 350 trials. Which estimate is generally more reliable? [1 mark]

20. The theoretical probability is 1/4 and an experiment gives relative frequency 18/65. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. An event has probability 5/6 and an experiment is repeated 180 times. Find the expected frequency. [2 marks]

22. A machine succeeds 32 times in 90 tests. Estimate how many successes in 360 further tests. [3 marks]

23. The probability of a defective item is 1/5. The expected number defective is 36. How many items are inspected? [3 marks]

24. One estimate of a probability uses 60 trials and another uses 400 trials. Which estimate is generally more reliable? [1 mark]

25. The theoretical probability is 1/2 and an experiment gives relative frequency 2/7. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. An event has probability 1/6 and an experiment is repeated 210 times. Find the expected frequency. [2 marks]

27. A machine succeeds 35 times in 100 tests. Estimate how many successes in 400 further tests. [3 marks]

28. The probability of a defective item is 3/10. The expected number defective is 60. How many items are inspected? [3 marks]

29. One estimate of a probability uses 70 trials and another uses 450 trials. Which estimate is generally more reliable? [1 mark]

30. The theoretical probability is 3/4 and an experiment gives relative frequency 22/75. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. An event has probability 1/3 and an experiment is repeated 240 times. Find the expected frequency. [2 marks]

32. A machine succeeds 38 times in 110 tests. Estimate how many successes in 440 further tests. [3 marks]

33. The probability of a defective item is 2/5. The expected number defective is 88. How many items are inspected? [3 marks]

34. One estimate of a probability uses 80 trials and another uses 500 trials. Which estimate is generally more reliable? [1 mark]

35. The theoretical probability is 1/4 and an experiment gives relative frequency 3/10. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. An event has probability 1/2 and an experiment is repeated 270 times. Find the expected frequency. [2 marks]

37. A machine succeeds 41 times in 120 tests. Estimate how many successes in 480 further tests. [3 marks]

38. The probability of a defective item is 1/2. The expected number defective is 120. How many items are inspected? [3 marks]

39. One estimate of a probability uses 90 trials and another uses 550 trials. Which estimate is generally more reliable? [1 mark]

40. The theoretical probability is 1/2 and an experiment gives relative frequency 26/85. State one valid reason why they differ. [1 mark]

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. An event has probability 2/3 and an experiment is repeated 300 times. Find the expected frequency. [2 marks]

42. A machine succeeds 44 times in 130 tests. Estimate how many successes in 520 further tests. [3 marks]

43. The probability of a defective item is 1/5. The expected number defective is 52. How many items are inspected? [3 marks]

44. One estimate of a probability uses 100 trials and another uses 600 trials. Which estimate is generally more reliable? [1 mark]

45. The theoretical probability is 3/4 and an experiment gives relative frequency 14/45. State one valid reason why they differ. [1 mark]

MODULE 36 / P4

Complements and Exhaustive Outcomes

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=2/15 and P(B)=4/15. Find P(C). [2 marks]

2. P(A)=1/10. Find P(not A). [1 mark]

3. A and B are mutually exclusive. P(A)=1/5 and P(B)=3/10. Find P(A or B). [2 marks]

4. A bag contains only red, blue and green counters. There are 30 counters, 8 red and 10 blue. Find P(green). [2 marks]

5. A spinner has probabilities proportional to 2:3:5 for A, B and C. Find P(B). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=3/16 and P(B)=5/16. Find P(C). [2 marks]

7. P(A)=1/5. Find P(not A). [1 mark]

8. A and B are mutually exclusive. P(A)=3/10 and P(B)=2/5. Find P(A or B). [2 marks]

9. A bag contains only red, blue and green counters. There are 35 counters, 9 red and 12 blue. Find P(green). [2 marks]

10. A spinner has probabilities proportional to 3:4:6 for A, B and C. Find P(B). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=4/17 and P(B)=6/17. Find P(C). [2 marks]

12. P(A)=3/10. Find P(not A). [1 mark]

13. A and B are mutually exclusive. P(A)=2/5 and P(B)=1/2. Find P(A or B). [2 marks]

14. A bag contains only red, blue and green counters. There are 40 counters, 10 red and 14 blue. Find P(green). [2 marks]

15. A spinner has probabilities proportional to 4:5:7 for A, B and C. Find P(B). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=5/18 and P(B)=7/18. Find P(C). [2 marks]

17. P(A)=2/5. Find P(not A). [1 mark]

18. A and B are mutually exclusive. P(A)=1/5 and P(B)=3/5. Find P(A or B). [2 marks]

19. A bag contains only red, blue and green counters. There are 45 counters, 11 red and 16 blue. Find P(green). [2 marks]

20. A spinner has probabilities proportional to 5:6:8 for A, B and C. Find P(B). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=6/19 and P(B)=8/19. Find P(C). [2 marks]

22. A and B are mutually exclusive. P(A)=3/10 and P(B)=3/10. Find P(A or B). [2 marks]

23. A bag contains only red, blue and green counters. There are 50 counters, 12 red and 18 blue. Find P(green). [2 marks]

24. A spinner has probabilities proportional to 6:7:9 for A, B and C. Find P(B). [2 marks]

25. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=7/20 and P(B)=9/20. Find P(C). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A and B are mutually exclusive. P(A)=2/5 and P(B)=2/5. Find P(A or B). [2 marks]

27. A bag contains only red, blue and green counters. There are 55 counters, 13 red and 20 blue. Find P(green). [2 marks]

28. A spinner has probabilities proportional to 7:8:10 for A, B and C. Find P(B). [2 marks]

29. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=8/21 and P(B)=10/21. Find P(C). [2 marks]

30. A and B are mutually exclusive. P(A)=1/5 and P(B)=1/2. Find P(A or B). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A bag contains only red, blue and green counters. There are 60 counters, 14 red and 22 blue. Find P(green). [2 marks]

32. A spinner has probabilities proportional to 8:9:11 for A, B and C. Find P(B). [2 marks]

33. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=9/22 and P(B)=1/2. Find P(C). [2 marks]

34. A and B are mutually exclusive. P(A)=3/10 and P(B)=3/5. Find P(A or B). [2 marks]

35. A bag contains only red, blue and green counters. There are 65 counters, 15 red and 24 blue. Find P(green). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A spinner has probabilities proportional to 9:10:12 for A, B and C. Find P(B). [2 marks]

37. Three mutually exclusive outcomes A, B and C are exhaustive. P(A)=10/23 and P(B)=12/23. Find P(C). [2 marks]

38. A and B are mutually exclusive. P(A)=2/5 and P(B)=3/10. Find P(A or B). [2 marks]

39. A bag contains only red, blue and green counters. There are 70 counters, 16 red and 26 blue. Find P(green). [2 marks]

40. A spinner has probabilities proportional to 10:11:13 for A, B and C. Find P(B). [2 marks]

MODULE 36 / P4

Complements and Exhaustive Outcomes

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Four exhaustive outcomes have probabilities 0.18, 0.27, 0.31 and p. Find p. [2 marks]

42. Mutually exclusive events A, B and C are exhaustive. P(A)=1/5 and P(B)=3/10. Find P(C). [2 marks]

43. A fair die is rolled. Find P(the result is 1, 2, 3, 4, 5 or 6). [1 mark]

44. Events R and S are mutually exclusive with P(R)=0.42 and P(S)=0.35. Find P(R or S). [2 marks]

45. P(not T)=0.63. Find P(T). [1 mark]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A coin and a fair 3-section spinner are used. How many outcomes are in the sample space? [2 marks]

2. Fair spinners numbered 1 to 4 and 1 to 5 are spun. Find P(total=5). [3 marks]

3. How many different three-digit numbers can be made using 1, 2 and 3 once each? [2 marks]

4. A shirt has 3 colours, 2 sizes and 3 styles. How many combinations are possible? [2 marks]

5. A fair six-sided die is rolled. Find P(the result is at most 3). [1 mark]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A coin and a fair 4-section spinner are used. How many outcomes are in the sample space? [2 marks]

7. Fair spinners numbered 1 to 5 and 1 to 6 are spun. Find P(total=6). [3 marks]

8. How many different three-digit numbers can be made using 1, 2 and 4 once each? [2 marks]

9. A shirt has 4 colours, 3 sizes and 4 styles. How many combinations are possible? [2 marks]

10. A fair six-sided die is rolled. Find P(the result is at most 4). [1 mark]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A coin and a fair 5-section spinner are used. How many outcomes are in the sample space? [2 marks]

12. Fair spinners numbered 1 to 6 and 1 to 7 are spun. Find P(total=7). [3 marks]

13. How many different three-digit numbers can be made using 1, 2 and 5 once each? [2 marks]

14. A shirt has 5 colours, 2 sizes and 2 styles. How many combinations are possible? [2 marks]

15. A fair six-sided die is rolled. Find P(the result is at most 5). [1 mark]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A coin and a fair 6-section spinner are used. How many outcomes are in the sample space? [2 marks]

17. Fair spinners numbered 1 to 4 and 1 to 8 are spun. Find P(total=8). [3 marks]

18. How many different three-digit numbers can be made using 1, 2 and 6 once each? [2 marks]

19. A shirt has 3 colours, 3 sizes and 3 styles. How many combinations are possible? [2 marks]

20. Fair spinners numbered 1 to 5 and 1 to 5 are spun. Find P(total=5). [3 marks]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. How many different three-digit numbers can be made using 1, 2 and 7 once each? [2 marks]

22. A shirt has 4 colours, 2 sizes and 4 styles. How many combinations are possible? [2 marks]

23. Fair spinners numbered 1 to 6 and 1 to 6 are spun. Find P(total=6). [3 marks]

24. A shirt has 5 colours, 3 sizes and 2 styles. How many combinations are possible? [2 marks]

25. Fair spinners numbered 1 to 4 and 1 to 7 are spun. Find P(total=7). [3 marks]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Fair spinners numbered 1 to 5 and 1 to 8 are spun. Find P(total=8). [3 marks]

27. Fair spinners numbered 1 to 6 and 1 to 5 are spun. Find P(total=5). [3 marks]

28. Two fair spinners are numbered 1 to 4 and 1 to 3. How many ordered outcomes are in the sample space? [2 marks]

29. A fair 4-section spinner numbered 1 to 4 and a fair die are used. Find P(the total is 4). [3 marks]

30. Two fair spinners are numbered 1 to 4 and 1 to 4. How many ordered outcomes are in the sample space? [2 marks]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A fair 5-section spinner numbered 1 to 5 and a fair die are used. Find P(the total is 5). [3 marks]

32. Two fair spinners are numbered 1 to 4 and 1 to 5. How many ordered outcomes are in the sample space? [2 marks]

33. A fair 6-section spinner numbered 1 to 6 and a fair die are used. Find P(the total is 6). [3 marks]

34. Two fair spinners are numbered 1 to 4 and 1 to 6. How many ordered outcomes are in the sample space? [2 marks]

35. A fair 4-section spinner numbered 1 to 4 and a fair die are used. Find P(the total is 7). [3 marks]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Two fair spinners are numbered 1 to 4 and 1 to 7. How many ordered outcomes are in the sample space? [2 marks]

37. A fair 5-section spinner numbered 1 to 5 and a fair die are used. Find P(the total is 4). [3 marks]

38. Two fair spinners are numbered 1 to 4 and 1 to 8. How many ordered outcomes are in the sample space? [2 marks]

39. A fair 6-section spinner numbered 1 to 6 and a fair die are used. Find P(the total is 5). [3 marks]

40. Two fair spinners are numbered 1 to 4 and 1 to 9. How many ordered outcomes are in the sample space? [2 marks]

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A fair 4-section spinner numbered 1 to 4 and a fair die are used. Find P(the total is 6). [3 marks]

42. Two fair spinners are numbered 1 to 4 and 1 to 10. How many ordered outcomes are in the sample space? [2 marks]

43. A fair 5-section spinner numbered 1 to 5 and a fair die are used. Find P(the total is 7). [3 marks]

44. Two fair spinners are numbered 1 to 4 and 1 to 11. How many ordered outcomes are in the sample space? [2 marks]

45. A fair 6-section spinner numbered 1 to 6 and a fair die are used. Find P(the total is 4). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. In a group of 40, 18 study art, 16 study music and 6 study both. How many study neither? [3 marks]

2. In a group of 50, 22 like tea, 25 like coffee and 8 like both. How many like tea only? [2 marks]

3. Out of 45 people, 20 use app A, 18 use app B and 7 use both. Find P(A or B). [3 marks]

4. A Venn diagram represents 60 people, with 10 in the intersection A∩B. Find P(A and B). [1 mark]

5. A Venn diagram has 9 in A only, 5 in both, 11 in B only and 7 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. In a group of 45, 20 study art, 17 study music and 7 study both. How many study neither? [3 marks]

7. In a group of 55, 24 like tea, 26 like coffee and 9 like both. How many like tea only? [2 marks]

8. Out of 50 people, 21 use app A, 20 use app B and 8 use both. Find P(A or B). [3 marks]

9. A Venn diagram represents 65 people, with 11 in the intersection A∩B. Find P(A and B). [1 mark]

10. A Venn diagram has 10 in A only, 6 in both, 13 in B only and 8 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. In a group of 50, 22 study art, 18 study music and 8 study both. How many study neither? [3 marks]

12. In a group of 60, 26 like tea, 27 like coffee and 10 like both. How many like tea only? [2 marks]

13. Out of 55 people, 22 use app A, 22 use app B and 9 use both. Find P(A or B). [3 marks]

14. A Venn diagram represents 70 people, with 12 in the intersection A∩B. Find P(A and B). [1 mark]

15. A Venn diagram has 11 in A only, 7 in both, 15 in B only and 9 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. In a group of 55, 24 study art, 19 study music and 9 study both. How many study neither? [3 marks]

17. In a group of 65, 28 like tea, 28 like coffee and 11 like both. How many like tea only? [2 marks]

18. Out of 60 people, 23 use app A, 24 use app B and 10 use both. Find P(A or B). [3 marks]

19. A Venn diagram represents 75 people, with 13 in the intersection A∩B. Find P(A and B). [1 mark]

20. A Venn diagram has 12 in A only, 8 in both, 17 in B only and 10 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. In a group of 60, 26 study art, 20 study music and 10 study both. How many study neither? [3 marks]

22. In a group of 70, 30 like tea, 29 like coffee and 12 like both. How many like tea only? [2 marks]

23. Out of 65 people, 24 use app A, 26 use app B and 11 use both. Find P(A or B). [3 marks]

24. A Venn diagram represents 80 people, with 14 in the intersection A∩B. Find P(A and B). [1 mark]

25. A Venn diagram has 13 in A only, 9 in both, 19 in B only and 11 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. In a group of 65, 28 study art, 21 study music and 11 study both. How many study neither? [3 marks]

27. In a group of 75, 32 like tea, 30 like coffee and 13 like both. How many like tea only? [2 marks]

28. Out of 70 people, 25 use app A, 28 use app B and 12 use both. Find P(A or B). [3 marks]

29. A Venn diagram represents 85 people, with 15 in the intersection A∩B. Find P(A and B). [1 mark]

30. A Venn diagram has 14 in A only, 10 in both, 21 in B only and 12 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. In a group of 70, 30 study art, 22 study music and 12 study both. How many study neither? [3 marks]

32. In a group of 80, 34 like tea, 31 like coffee and 14 like both. How many like tea only? [2 marks]

33. Out of 75 people, 26 use app A, 30 use app B and 13 use both. Find P(A or B). [3 marks]

34. A Venn diagram represents 90 people, with 16 in the intersection A∩B. Find P(A and B). [1 mark]

35. A Venn diagram has 15 in A only, 11 in both, 23 in B only and 13 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. In a group of 75, 32 study art, 23 study music and 13 study both. How many study neither? [3 marks]

37. In a group of 85, 36 like tea, 32 like coffee and 15 like both. How many like tea only? [2 marks]

38. Out of 80 people, 27 use app A, 32 use app B and 14 use both. Find P(A or B). [3 marks]

39. A Venn diagram represents 95 people, with 17 in the intersection A∩B. Find P(A and B). [1 mark]

40. A Venn diagram has 16 in A only, 12 in both, 25 in B only and 14 in neither. Find P(not A). [3 marks]

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. In a group of 80, 34 study art, 24 study music and 14 study both. How many study neither? [3 marks]

42. In a group of 90, 38 like tea, 33 like coffee and 16 like both. How many like tea only? [2 marks]

43. Out of 85 people, 28 use app A, 34 use app B and 15 use both. Find P(A or B). [3 marks]

44. A Venn diagram represents 100 people, with 18 in the intersection A∩B. Find P(A and B). [1 mark]

45. A Venn diagram has 17 in A only, 13 in both, 27 in B only and 15 in neither. Find P(not A). [3 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A biased coin has P(heads)=1/5. It is tossed twice independently. Find P(two heads). [2 marks]

2. For each independent game, P(win)=1/3. Find P(win then lose). [2 marks]

3. An independent trial has success probability 1/4. It is repeated twice. Find P(at least one success). [3 marks]

4. Independent events A and B have P(A)=1/5 and P(B)=1/3. Find P(A and B). [2 marks]

5. Two independent trials have P(success on first)=1/5 and P(success on second)=2/5. Find P(exactly one success). [4 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A biased coin has P(heads)=2/5. It is tossed twice independently. Find P(two heads). [2 marks]

7. For each independent game, P(win)=1/2. Find P(win then lose). [2 marks]

8. An independent trial has success probability 1/2. It is repeated twice. Find P(at least one success). [3 marks]

9. Independent events A and B have P(A)=2/5 and P(B)=1/2. Find P(A and B). [2 marks]

10. Two independent trials have P(success on first)=2/5 and P(success on second)=3/5. Find P(exactly one success). [4 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A biased coin has P(heads)=3/5. It is tossed twice independently. Find P(two heads). [2 marks]

12. For each independent game, P(win)=2/3. Find P(win then lose). [2 marks]

13. An independent trial has success probability 3/4. It is repeated twice. Find P(at least one success). [3 marks]

14. Independent events A and B have P(A)=3/5 and P(B)=2/3. Find P(A and B). [2 marks]

15. Two independent trials have P(success on first)=3/5 and P(success on second)=2/5. Find P(exactly one success). [4 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A biased coin has P(heads)=4/5. It is tossed twice independently. Find P(two heads). [2 marks]

17. Independent events A and B have P(A)=4/5 and P(B)=1/3. Find P(A and B). [2 marks]

18. Two independent trials have P(success on first)=1/5 and P(success on second)=3/5. Find P(exactly one success). [4 marks]

19. Independent events A and B have P(A)=1/5 and P(B)=1/2. Find P(A and B). [2 marks]

20. Two independent trials have P(success on first)=2/5 and P(success on second)=2/5. Find P(exactly one success). [4 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Independent events A and B have P(A)=2/5 and P(B)=2/3. Find P(A and B). [2 marks]

22. Two independent trials have P(success on first)=3/5 and P(success on second)=3/5. Find P(exactly one success). [4 marks]

23. Independent events A and B have P(A)=3/5 and P(B)=1/3. Find P(A and B). [2 marks]

24. Independent events A and B have P(A)=4/5 and P(B)=1/2. Find P(A and B). [2 marks]

25. Independent events A and B have P(A)=1/5 and P(B)=2/3. Find P(A and B). [2 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. An independent trial has P(success)=2/15 and is repeated 2 times. Find P(success every time). [3 marks]

27. An independent event has probability 1/12. It is tested twice. Find P(no successes). [3 marks]

28. An independent trial has P(success)=3/16 and is repeated 3 times. Find P(success every time). [4 marks]

29. An independent event has probability 2/13. It is tested twice. Find P(no successes). [3 marks]

30. An independent trial has P(success)=4/17 and is repeated 2 times. Find P(success every time). [3 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. An independent event has probability 3/14. It is tested twice. Find P(no successes). [3 marks]

32. An independent trial has P(success)=5/18 and is repeated 3 times. Find P(success every time). [4 marks]

33. An independent event has probability 4/15. It is tested twice. Find P(no successes). [3 marks]

34. An independent trial has P(success)=6/19 and is repeated 2 times. Find P(success every time). [3 marks]

35. An independent event has probability 5/16. It is tested twice. Find P(no successes). [3 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. An independent trial has P(success)=7/20 and is repeated 3 times. Find P(success every time). [4 marks]

37. An independent event has probability 6/17. It is tested twice. Find P(no successes). [3 marks]

38. An independent trial has P(success)=8/21 and is repeated 2 times. Find P(success every time). [3 marks]

39. An independent event has probability 7/18. It is tested twice. Find P(no successes). [3 marks]

40. An independent trial has P(success)=9/22 and is repeated 3 times. Find P(success every time). [4 marks]

MODULE 39 / P7, P8

Independent Events and Probability Trees

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. An independent event has probability 8/19. It is tested twice. Find P(no successes). [3 marks]

42. An independent trial has P(success)=10/23 and is repeated 2 times. Find P(success every time). [3 marks]

43. An independent event has probability 9/20. It is tested twice. Find P(no successes). [3 marks]

44. An independent trial has P(success)=11/24 and is repeated 3 times. Find P(success every time). [4 marks]

45. An independent event has probability 10/21. It is tested twice. Find P(no successes). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

CORE SKILLS | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A bag has 3 red and 5 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

2. A group has 5 girls and 7 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

3. A bag has 4 red and 6 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

4. A box has 10 good and 2 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

5. A bag has 3 red and 4 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

CORE SKILLS | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A bag has 4 red and 6 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

7. A group has 6 girls and 8 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

8. A bag has 5 red and 7 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

9. A box has 11 good and 3 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

10. A bag has 4 red and 5 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

CORE SKILLS | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. A bag has 5 red and 7 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

12. A group has 7 girls and 9 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

13. A bag has 6 red and 8 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

14. A box has 12 good and 4 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

15. A bag has 5 red and 6 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A bag has 6 red and 8 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

17. A group has 8 girls and 10 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

18. A bag has 7 red and 9 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

19. A box has 13 good and 5 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

20. A bag has 6 red and 7 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A bag has 7 red and 9 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

22. A group has 9 girls and 11 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

23. A bag has 8 red and 10 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

24. A box has 14 good and 2 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

25. A bag has 7 red and 8 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A bag has 8 red and 10 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

27. A group has 10 girls and 12 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

28. A bag has 9 red and 11 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

29. A box has 15 good and 3 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

30. A bag has 8 red and 9 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

GRADE 4–5 CHALLENGE | PART A

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A bag has 9 red and 11 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

32. A group has 11 girls and 13 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

33. A bag has 10 red and 12 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

34. A box has 16 good and 4 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

35. A bag has 9 red and 10 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

GRADE 4–5 CHALLENGE | PART B

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A bag has 10 red and 12 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

37. A group has 12 girls and 14 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

38. A bag has 11 red and 13 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

39. A box has 17 good and 5 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

40. A bag has 10 red and 11 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: _____ / _____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. A bag has 11 red and 13 blue counters. Two are taken without replacement. Find P(both red). [3 marks]

42. A group has 13 girls and 15 boys. Two are selected without replacement. Find P(one girl and one boy). [4 marks]

43. A bag has 12 red and 14 blue counters. Two are taken without replacement. Find P(at least one red). [4 marks]

44. A box has 18 good and 2 defective components. Two are chosen without replacement. Find P(both good). [3 marks]

45. A bag has 11 red and 12 blue counters. One counter is selected, replaced, then another is selected. Find P(one of each colour). [3 marks]

MODULE 33–34 / P1–P8

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 33 | Probability Language, Scales and Fairness | P2, P3

- Probability lies from 0 to 1 inclusive: impossible = 0, even chance = 1/2, certain = 1.
- For equally likely outcomes, P(event) = favourable outcomes ÷ total outcomes.
- Complement rule: P(not A) = 1 − P(A).
- A fair process gives the stated outcomes equal chances; check the physical model and the probabilities.

WORKED CHECK

A fair spinner has 8 equal sections, of which 2 are marked A. Find P(A).
Equal sections are equally likely: P(A)=2/8=1/4.

MODULE 34 | Experiments, Frequency Tables and Frequency Trees | P1, P3

- Relative frequency = observed frequency ÷ number of trials.
- Frequencies on branches must add to the frequency entering that split.
- Combine branches only when they describe distinct outcomes.
- Experimental probability is an estimate based on observed results, not a guarantee.

WORKED CHECK

A frequency tree begins with 120 customers. 51 buy online and the rest buy in store. How many buy in store?
Branches must total 120: 120−51=69.

MODULE 35–36 / P1–P8

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 35 | Expected Frequency and Relative Frequency | P2, P3, P5

- Expected frequency = probability × number of trials.
- Estimated probability = observed frequency ÷ number of trials.
- A larger unbiased sample tends to give a more stable estimate.
- Expected frequency is a long-run prediction and need not equal the result of one experiment.

WORKED CHECK

The probability of a defective item is 1/5. The expected number defective is 36. How many items are inspected?

Expected=p×trials, so trials=36÷1/5=180.

MODULE 36 | Complements and Exhaustive Outcomes | P4

- Probabilities of an exhaustive set sum to 1.
- P(not A) = 1 − P(A).
- For mutually exclusive events, P(A or B) = P(A) + P(B).
- Do not add probabilities directly when events can happen together.

WORKED CHECK

A bag contains only red, blue and green counters. There are 50 counters, 12 red and 18 blue. Find P(green).

Green=50−12−18=20; P(green)=20/50=2/5.

MODULE 37–38 / P1–P8

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 37 | Systematic Listing and Sample Spaces | P6, P7

- Use an ordered list, two-way table or grid so no outcome is omitted or repeated.
- For two independent stages, total combinations = choices at stage 1 × choices at stage 2.
- In an equally likely sample space, probability = favourable cells ÷ total cells.
- “At most” includes the boundary; “more than” does not.

WORKED CHECK

Fair spinners numbered 1 to 6 and 1 to 6 are spun. Find P(total=6).
There are 36 equally likely ordered pairs and 5 give total 6; probability=5/36.

MODULE 38 | Venn Diagrams and Combined Sets | P6, P8

- Place the intersection first, then subtract it from each set total.
- $n(A \cup B) = n(A) + n(B) - n(A \cap B)$.
- “A only” excludes the intersection; “not A” includes every region outside A.
- Probability = number in the required region ÷ total number in the universal set.

WORKED CHECK

Out of 65 people, 24 use app A, 26 use app B and 11 use both. Find P(A or B).
$n(A \cup B)=24+26-11=39$; probability=39/65=3/5.

MODULE 39–40 / P1–P8

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 39 | Independent Events and Probability Trees | P7, P8

- Probabilities on branches from the same point sum to 1.
- Multiply probabilities along a path (“and”).
- Add probabilities of separate successful paths (“or”).
- For independent events, probabilities on later branches do not change.

WORKED CHECK

Independent events A and B have P(A)=3/5 and P(B)=1/3. Find P(A and B).
For independent events, multiply: 3/5×1/3=1/5.

MODULE 40 | Dependent Events and Mixed Probability | P1–P8

- Without replacement, both the favourable count and total count can change.
- With replacement, the probabilities remain the same for the next selection.
- For “at least one”, the complement 1 − P(none) is often efficient.
- State assumptions about independence, replacement and equally likely outcomes.

WORKED CHECK

A bag has 8 red and 10 blue counters. Two are taken without replacement. Find P(at least one red).
Complement: 1−P(two blue)=1−(10/18×9/17)=12/17.

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 0** — 1m
On the 0-to-1 scale, impossible is represented here by 0.

02 **Answer: 2/7** — 1m
P(red)=red/total=2/7=2/7.

03 **Answer: 1/4** — 1m
Equal sections are equally likely: P(A)=1/4=1/4.

04 **Answer: 5/6** — 1m
Complementary probabilities total 1: 1−1/6=5/6.

05 **Answer: No** — 2m
P(win)=1/3; an even chance is 1/2, so the claim is not correct.

06 **Answer: 0.2** — 1m
On the 0-to-1 scale, unlikely is represented here by 0.2.

07 **Answer: 1/3** — 1m
P(red)=red/total=3/9=1/3.

08 **Answer: 2/5** — 1m
Equal sections are equally likely: P(A)=2/5=2/5.

09 **Answer: 10/13** — 1m
Complementary probabilities total 1: 1−3/13=10/13.

10 **Answer: No** — 2m
P(win)=3/7; an even chance is 1/2, so the claim is not correct.

11 **Answer: 0.5** — 1m
On the 0-to-1 scale, even chance is represented here by 0.5.

12 **Answer: 4/11** — 1m
P(red)=red/total=4/11=4/11.

13 **Answer: 1/2** — 1m
Equal sections are equally likely: P(A)=3/6=1/2.

14 **Answer: 5/7** — 1m
Complementary probabilities total 1: 1−2/7=5/7.

15 **Answer: Yes** — 2m
P(win)=1/2; an even chance is 1/2, so the claim is correct.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 0.8** — 1m
On the 0-to-1 scale, likely is represented here by 0.8.

17 **Answer: 5/13** — 1m
P(red)=red/total=5/13=5/13.

18 **Answer: 1/7** — 1m
Equal sections are equally likely: P(A)=1/7=1/7.

19 **Answer: 2/3** — 1m
Complementary probabilities total 1: 1−1/3=2/3.

20 **Answer: No** — 2m
P(win)=5/9; an even chance is 1/2, so the claim is not correct.

21 **Answer: 1** — 1m
On the 0-to-1 scale, certain is represented here by 1.

22 **Answer: 2/5** — 1m
P(red)=red/total=6/15=2/5.

23 **Answer: 1/4** — 1m
Equal sections are equally likely: P(A)=2/8=1/4.

24 **Answer: 5/8** — 1m
Complementary probabilities total 1: 1−3/8=5/8.

25 **Answer: No** — 2m
P(win)=1/5; an even chance is 1/2, so the claim is not correct.

26 **Answer: 7/17** — 1m
P(red)=red/total=7/17=7/17.

27 **Answer: 1/3** — 1m
Equal sections are equally likely: P(A)=3/9=1/3.

28 **Answer: 10/17** — 1m
Complementary probabilities total 1: 1−7/17=10/17.

29 **Answer: No** — 2m
P(win)=3/11; an even chance is 1/2, so the claim is not correct.

30 **Answer: 8/19** — 1m
P(red)=red/total=8/19=8/19.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 33 / P2, P3

Probability Language, Scales and Fairness

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 1/10** — 1m
Equal sections are equally likely: P(A)=1/10=1/10.

32 **Answer: 5/9** — 1m
Complementary probabilities total 1: 1−4/9=5/9.

33 **Answer: No** — 2m
P(win)=1/3; an even chance is 1/2, so the claim is not correct.

34 **Answer: 3/7** — 1m
P(red)=red/total=9/21=3/7.

35 **Answer: 2/11** — 1m
Equal sections are equally likely: P(A)=2/11=2/11.

36 **Answer: 10/19** — 1m
Complementary probabilities total 1: 1−9/19=10/19.

37 **Answer: No** — 2m
P(win)=5/13; an even chance is 1/2, so the claim is not correct.

38 **Answer: 10/23** — 1m
P(red)=red/total=10/23=10/23.

39 **Answer: 1/4** — 1m
Equal sections are equally likely: P(A)=3/12=1/4.

40 **Answer: 1/2** — 1m
Complementary probabilities total 1: 1−1/2=1/2.

41 **Answer: No** — 2m
P(win)=1/7; an even chance is 1/2, so the claim is not correct.

42 **Answer: 0.65; likely** — 2m
0.65 lies above 0.5 but below 1, so “likely” is a suitable description.

43 **Answer: 5** — 2m
An even chance is 1/2, and 1/2 of 10 is 5.

44 **Answer: 0.62** — 1m
The two exhaustive probabilities total 1: 1−0.38=0.62.

45 **Answer: Probabilities cannot exceed 1** — 1m
Every probability lies in the interval from 0 to 1 inclusive.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 9/25** — 2m
Relative frequency = frequency/trials = 18/50 = 9/25.

02 **Answer: 40** — 1m
Total frequency = 12+18+10=40.

03 **Answer: 45** — 1m
Branches must total 80: 80−35=45.

04 **Answer: 33** — 3m
Boys walking=30-12; girls walking=25-10; total walking=33.

05 **Answer: 1/2** — 2m
Not losing means win or draw: (9+6)/30=1/2.

06 **Answer: 7/20** — 2m
Relative frequency = frequency/trials = 21/60 = 7/20.

07 **Answer: 46** — 1m
Total frequency = 14+21+11=46.

08 **Answer: 51** — 1m
Branches must total 90: 90−39=51.

09 **Answer: 35** — 3m
Boys walking=32-13; girls walking=28-12; total walking=35.

10 **Answer: 9/17** — 2m
Not losing means win or draw: (10+8)/34=9/17.

11 **Answer: 12/35** — 2m
Relative frequency = frequency/trials = 24/70 = 12/35.

12 **Answer: 52** — 1m
Total frequency = 16+24+12=52.

13 **Answer: 57** — 1m
Branches must total 100: 100−43=57.

14 **Answer: 37** — 3m
Boys walking=34-14; girls walking=31-14; total walking=37.

15 **Answer: 21/38** — 2m
Not losing means win or draw: (11+10)/38=21/38.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 27/80** — 2m
Relative frequency = frequency/trials = 27/80 = 27/80.

17 **Answer: 58** — 1m
Total frequency = 18+27+13=58.

18 **Answer: 63** — 1m
Branches must total 110: 110−47=63.

19 **Answer: 39** — 3m
Boys walking=36-15; girls walking=34-16; total walking=39.

20 **Answer: 4/7** — 2m
Not losing means win or draw: (12+12)/42=4/7.

21 **Answer: 1/3** — 2m
Relative frequency = frequency/trials = 30/90 = 1/3.

22 **Answer: 64** — 1m
Total frequency = 20+30+14=64.

23 **Answer: 69** — 1m
Branches must total 120: 120−51=69.

24 **Answer: 41** — 3m
Boys walking=38-16; girls walking=37-18; total walking=41.

25 **Answer: 27/46** — 2m
Not losing means win or draw: (13+14)/46=27/46.

26 **Answer: 33/100** — 2m
Relative frequency = frequency/trials = 33/100 = 33/100.

27 **Answer: 70** — 1m
Total frequency = 22+33+15=70.

28 **Answer: 75** — 1m
Branches must total 130: 130−55=75.

29 **Answer: 43** — 3m
Boys walking=40-17; girls walking=40-20; total walking=43.

30 **Answer: 3/5** — 2m
Not losing means win or draw: (14+16)/50=3/5.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 34 / P1, P3

Experiments, Frequency Tables and Frequency Trees

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 18/55** — 2m
Relative frequency = frequency/trials = 36/110 = 18/55.

32 **Answer: 76** — 1m
Total frequency = 24+36+16=76.

33 **Answer: 81** — 1m
Branches must total 140: 140−59=81.

34 **Answer: 45** — 3m
Boys walking=42-18; girls walking=43-22; total walking=45.

35 **Answer: 11/18** — 2m
Not losing means win or draw: (15+18)/54=11/18.

36 **Answer: 13/40** — 2m
Relative frequency = frequency/trials = 39/120 = 13/40.

37 **Answer: 82** — 1m
Total frequency = 26+39+17=82.

38 **Answer: 87** — 1m
Branches must total 150: 150−63=87.

39 **Answer: 47** — 3m
Boys walking=44-19; girls walking=46-24; total walking=47.

40 **Answer: 18/29** — 2m
Not losing means win or draw: (16+20)/58=18/29.

41 **Answer: 21/65** — 2m
Relative frequency = frequency/trials = 42/130 = 21/65.

42 **Answer: 88** — 1m
Total frequency = 28+42+18=88.

43 **Answer: 93** — 1m
Branches must total 160: 160−67=93.

44 **Answer: 49** — 3m
Boys walking=46-20; girls walking=49-26; total walking=49.

45 **Answer: 39/62** — 2m
Not losing means win or draw: (17+22)/62=39/62.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 10** — 2m
Expected frequency = probability × trials = 1/6×60=10.

02 **Answer: 80** — 3m
Relative frequency=20/50; estimate=(20/50)×200=80.

03 **Answer: 100** — 3m
Expected=p×trials, so trials=20÷1/5=100.

04 **Answer: The estimate from 200 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

05 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

06 **Answer: 30** — 2m
Expected frequency = probability × trials = 1/3×90=30.

07 **Answer: 92** — 3m
Relative frequency=23/60; estimate=(23/60)×240=92.

08 **Answer: 120** — 3m
Expected=p×trials, so trials=36÷3/10=120.

09 **Answer: The estimate from 250 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

10 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

11 **Answer: 60** — 2m
Expected frequency = probability × trials = 1/2×120=60.

12 **Answer: 104** — 3m
Relative frequency=26/70; estimate=(26/70)×280=104.

13 **Answer: 140** — 3m
Expected=p×trials, so trials=56÷2/5=140.

14 **Answer: The estimate from 300 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

15 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 100** — 2m
Expected frequency = probability × trials = 2/3×150=100.

17 **Answer: 116** — 3m
Relative frequency=29/80; estimate=(29/80)×320=116.

18 **Answer: 160** — 3m
Expected=p×trials, so trials=80÷1/2=160.

19 **Answer: The estimate from 350 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

20 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

21 **Answer: 150** — 2m
Expected frequency = probability × trials = 5/6×180=150.

22 **Answer: 128** — 3m
Relative frequency=32/90; estimate=(32/90)×360=128.

23 **Answer: 180** — 3m
Expected=p×trials, so trials=36÷1/5=180.

24 **Answer: The estimate from 400 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

25 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

26 **Answer: 35** — 2m
Expected frequency = probability × trials = 1/6×210=35.

27 **Answer: 140** — 3m
Relative frequency=35/100; estimate=(35/100)×400=140.

28 **Answer: 200** — 3m
Expected=p×trials, so trials=60÷3/10=200.

29 **Answer: The estimate from 450 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

30 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 35 / P2, P3, P5

Expected Frequency and Relative Frequency

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 80** — 2m
Expected frequency = probability × trials = 1/3×240=80.

32 **Answer: 152** — 3m
Relative frequency=38/110; estimate=(38/110)×440=152.

33 **Answer: 220** — 3m
Expected=p×trials, so trials=88÷2/5=220.

34 **Answer: The estimate from 500 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

35 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

36 **Answer: 135** — 2m
Expected frequency = probability × trials = 1/2×270=135.

37 **Answer: 164** — 3m
Relative frequency=41/120; estimate=(41/120)×480=164.

38 **Answer: 240** — 3m
Expected=p×trials, so trials=120÷1/2=240.

39 **Answer: The estimate from 550 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

40 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

41 **Answer: 200** — 2m
Expected frequency = probability × trials = 2/3×300=200.

42 **Answer: 176** — 3m
Relative frequency=44/130; estimate=(44/130)×520=176.

43 **Answer: 260** — 3m
Expected=p×trials, so trials=52÷1/5=260.

44 **Answer: The estimate from 600 trials** — 1m
A larger unbiased sample usually gives a relative frequency closer to the theoretical probability.

45 **Answer: Random variation** — 1m
Finite experiments show random variation; agreement tends to improve as the number of unbiased trials increases.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 36 / P4

Complements and Exhaustive Outcomes

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 3/5** — 2m
Exhaustive probabilities sum to 1: P(C)=1−2/15−4/15=3/5.

02 **Answer: 9/10** — 1m
P(not A)=1−P(A)=1−1/10=9/10.

03 **Answer: 1/2** — 2m
Mutually exclusive events do not overlap: P(A or B)=1/5+3/10=1/2.

04 **Answer: 2/5** — 2m
Green=30−8−10=12; P(green)=12/30=2/5.

05 **Answer: 3/10** — 2m
Total ratio parts=10; P(B)=3/10=3/10.

06 **Answer: 1/2** — 2m
Exhaustive probabilities sum to 1: P(C)=1−3/16−5/16=1/2.

07 **Answer: 4/5** — 1m
P(not A)=1−P(A)=1−1/5=4/5.

08 **Answer: 7/10** — 2m
Mutually exclusive events do not overlap: P(A or B)=3/10+2/5=7/10.

09 **Answer: 2/5** — 2m
Green=35−9−12=14; P(green)=14/35=2/5.

10 **Answer: 4/13** — 2m
Total ratio parts=13; P(B)=4/13=4/13.

11 **Answer: 7/17** — 2m
Exhaustive probabilities sum to 1: P(C)=1−4/17−6/17=7/17.

12 **Answer: 7/10** — 1m
P(not A)=1−P(A)=1−3/10=7/10.

13 **Answer: 9/10** — 2m
Mutually exclusive events do not overlap: P(A or B)=2/5+1/2=9/10.

14 **Answer: 2/5** — 2m
Green=40−10−14=16; P(green)=16/40=2/5.

15 **Answer: 5/16** — 2m
Total ratio parts=16; P(B)=5/16=5/16.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 36 / P4

Complements and Exhaustive Outcomes

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 1/3** — 2m
Exhaustive probabilities sum to 1: P(C)=1−5/18−7/18=1/3.

17 **Answer: 3/5** — 1m
P(not A)=1−P(A)=1−2/5=3/5.

18 **Answer: 4/5** — 2m
Mutually exclusive events do not overlap: P(A or B)=1/5+3/5=4/5.

19 **Answer: 2/5** — 2m
Green=45−11−16=18; P(green)=18/45=2/5.

20 **Answer: 6/19** — 2m
Total ratio parts=19; P(B)=6/19=6/19.

21 **Answer: 5/19** — 2m
Exhaustive probabilities sum to 1: P(C)=1−6/19−8/19=5/19.

22 **Answer: 3/5** — 2m
Mutually exclusive events do not overlap: P(A or B)=3/10+3/10=3/5.

23 **Answer: 2/5** — 2m
Green=50−12−18=20; P(green)=20/50=2/5.

24 **Answer: 7/22** — 2m
Total ratio parts=22; P(B)=7/22=7/22.

25 **Answer: 1/5** — 2m
Exhaustive probabilities sum to 1: P(C)=1−7/20−9/20=1/5.

26 **Answer: 4/5** — 2m
Mutually exclusive events do not overlap: P(A or B)=2/5+2/5=4/5.

27 **Answer: 2/5** — 2m
Green=55−13−20=22; P(green)=22/55=2/5.

28 **Answer: 8/25** — 2m
Total ratio parts=25; P(B)=8/25=8/25.

29 **Answer: 1/7** — 2m
Exhaustive probabilities sum to 1: P(C)=1−8/21−10/21=1/7.

30 **Answer: 7/10** — 2m
Mutually exclusive events do not overlap: P(A or B)=1/5+1/2=7/10.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 36 / P4

Complements and Exhaustive Outcomes

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 2/5** — 2m
Green=60−14−22=24; P(green)=24/60=2/5.

32 **Answer: 9/28** — 2m
Total ratio parts=28; P(B)=9/28=9/28.

33 **Answer: 1/11** — 2m
Exhaustive probabilities sum to 1: P(C)=1−9/22−1/2=1/11.

34 **Answer: 9/10** — 2m
Mutually exclusive events do not overlap: P(A or B)=3/10+3/5=9/10.

35 **Answer: 2/5** — 2m
Green=65−15−24=26; P(green)=26/65=2/5.

36 **Answer: 10/31** — 2m
Total ratio parts=31; P(B)=10/31=10/31.

37 **Answer: 1/23** — 2m
Exhaustive probabilities sum to 1: P(C)=1−10/23−12/23=1/23.

38 **Answer: 7/10** — 2m
Mutually exclusive events do not overlap: P(A or B)=2/5+3/10=7/10.

39 **Answer: 2/5** — 2m
Green=70−16−26=28; P(green)=28/70=2/5.

40 **Answer: 11/34** — 2m
Total ratio parts=34; P(B)=11/34=11/34.

41 **Answer: 0.24** — 2m
p=1−0.18−0.27−0.31=0.24.

42 **Answer: 1/2** — 2m
P(C)=1−1/5−3/10=1−2/10−3/10=1/2.

43 **Answer: 1** — 1m
The listed outcomes are exhaustive, so their probability is 1.

44 **Answer: 0.77** — 2m
For mutually exclusive events, add: 0.42+0.35=0.77.

45 **Answer: 0.37** — 1m
P(T)=1−P(not T)=1−0.63=0.37.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 6** — 2m
Use the product rule: 2×3=6 outcomes.

02 **Answer: 1/5** — 3m
There are 20 equally likely ordered pairs and 4 give total 5; probability=1/5.

03 **Answer: 6** — 2m
Systematic listing gives 3×2×1=6 arrangements.

04 **Answer: 18** — 2m
Product rule: 3×2×3=18.

05 **Answer: 1/2** — 1m
Favourable outcomes are 1 to 3: 3/6=1/2.

06 **Answer: 8** — 2m
Use the product rule: 2×4=8 outcomes.

07 **Answer: 1/6** — 3m
There are 30 equally likely ordered pairs and 5 give total 6; probability=1/6.

08 **Answer: 6** — 2m
Systematic listing gives 3×2×1=6 arrangements.

09 **Answer: 48** — 2m
Product rule: 4×3×4=48.

10 **Answer: 2/3** — 1m
Favourable outcomes are 1 to 4: 4/6=2/3.

11 **Answer: 10** — 2m
Use the product rule: 2×5=10 outcomes.

12 **Answer: 1/7** — 3m
There are 42 equally likely ordered pairs and 6 give total 7; probability=1/7.

13 **Answer: 6** — 2m
Systematic listing gives 3×2×1=6 arrangements.

14 **Answer: 20** — 2m
Product rule: 5×2×2=20.

15 **Answer: 5/6** — 1m
Favourable outcomes are 1 to 5: 5/6=5/6.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 12** — 2m
Use the product rule: 2×6=12 outcomes.

17 **Answer: 1/8** — 3m
There are 32 equally likely ordered pairs and 4 give total 8; probability=1/8.

18 **Answer: 6** — 2m
Systematic listing gives 3×2×1=6 arrangements.

19 **Answer: 27** — 2m
Product rule: 3×3×3=27.

20 **Answer: 4/25** — 3m
There are 25 equally likely ordered pairs and 4 give total 5; probability=4/25.

21 **Answer: 6** — 2m
Systematic listing gives 3×2×1=6 arrangements.

22 **Answer: 32** — 2m
Product rule: 4×2×4=32.

23 **Answer: 5/36** — 3m
There are 36 equally likely ordered pairs and 5 give total 6; probability=5/36.

24 **Answer: 30** — 2m
Product rule: 5×3×2=30.

25 **Answer: 1/7** — 3m
There are 28 equally likely ordered pairs and 4 give total 7; probability=1/7.

26 **Answer: 1/8** — 3m
There are 40 equally likely ordered pairs and 5 give total 8; probability=1/8.

27 **Answer: 2/15** — 3m
There are 30 equally likely ordered pairs and 4 give total 5; probability=2/15.

28 **Answer: 12** — 2m
Use the product rule: 4×3=12 ordered outcomes.

29 **Answer: 1/8** — 3m
There are 24 equally likely ordered pairs. 3 have total 4, so the probability is 1/8.

30 **Answer: 16** — 2m
Use the product rule: 4×4=16 ordered outcomes.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 37 / P6, P7

Systematic Listing and Sample Spaces

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 2/15** — 3m
There are 30 equally likely ordered pairs. 4 have total 5, so the probability is 2/15.

32 **Answer: 20** — 2m
Use the product rule: 4×5=20 ordered outcomes.

33 **Answer: 5/36** — 3m
There are 36 equally likely ordered pairs. 5 have total 6, so the probability is 5/36.

34 **Answer: 24** — 2m
Use the product rule: 4×6=24 ordered outcomes.

35 **Answer: 1/6** — 3m
There are 24 equally likely ordered pairs. 4 have total 7, so the probability is 1/6.

36 **Answer: 28** — 2m
Use the product rule: 4×7=28 ordered outcomes.

37 **Answer: 1/10** — 3m
There are 30 equally likely ordered pairs. 3 have total 4, so the probability is 1/10.

38 **Answer: 32** — 2m
Use the product rule: 4×8=32 ordered outcomes.

39 **Answer: 1/9** — 3m
There are 36 equally likely ordered pairs. 4 have total 5, so the probability is 1/9.

40 **Answer: 36** — 2m
Use the product rule: 4×9=36 ordered outcomes.

41 **Answer: 1/6** — 3m
There are 24 equally likely ordered pairs. 4 have total 6, so the probability is 1/6.

42 **Answer: 40** — 2m
Use the product rule: 4×10=40 ordered outcomes.

43 **Answer: 1/6** — 3m
There are 30 equally likely ordered pairs. 5 have total 7, so the probability is 1/6.

44 **Answer: 44** — 2m
Use the product rule: 4×11=44 ordered outcomes.

45 **Answer: 1/12** — 3m
There are 36 equally likely ordered pairs. 3 have total 4, so the probability is 1/12.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 12** — 3m
n(A∪B)=18+16−6=28; neither=40−28=12.

02 **Answer: 14** — 2m
Tea only = total tea − both = 22−8=14.

03 **Answer: 31/45** — 3m
n(A∪B)=20+18−7=31; probability=31/45=31/45.

04 **Answer: 1/6** — 1m
P(A∩B)=intersection/total=10/60=1/6.

05 **Answer: 9/16** — 3m
Not A includes B-only and neither: (11+7)/32=9/16.

06 **Answer: 15** — 3m
n(A∪B)=20+17−7=30; neither=45−30=15.

07 **Answer: 15** — 2m
Tea only = total tea − both = 24−9=15.

08 **Answer: 33/50** — 3m
n(A∪B)=21+20−8=33; probability=33/50=33/50.

09 **Answer: 11/65** — 1m
P(A∩B)=intersection/total=11/65=11/65.

10 **Answer: 21/37** — 3m
Not A includes B-only and neither: (13+8)/37=21/37.

11 **Answer: 18** — 3m
n(A∪B)=22+18−8=32; neither=50−32=18.

12 **Answer: 16** — 2m
Tea only = total tea − both = 26−10=16.

13 **Answer: 7/11** — 3m
n(A∪B)=22+22−9=35; probability=35/55=7/11.

14 **Answer: 6/35** — 1m
P(A∩B)=intersection/total=12/70=6/35.

15 **Answer: 4/7** — 3m
Not A includes B-only and neither: (15+9)/42=4/7.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 21** — 3m
n(A∪B)=24+19−9=34; neither=55−34=21.

17 **Answer: 17** — 2m
Tea only = total tea − both = 28−11=17.

18 **Answer: 37/60** — 3m
n(A∪B)=23+24−10=37; probability=37/60=37/60.

19 **Answer: 13/75** — 1m
P(A∩B)=intersection/total=13/75=13/75.

20 **Answer: 27/47** — 3m
Not A includes B-only and neither: (17+10)/47=27/47.

21 **Answer: 24** — 3m
n(A∪B)=26+20−10=36; neither=60−36=24.

22 **Answer: 18** — 2m
Tea only = total tea − both = 30−12=18.

23 **Answer: 3/5** — 3m
n(A∪B)=24+26−11=39; probability=39/65=3/5.

24 **Answer: 7/40** — 1m
P(A∩B)=intersection/total=14/80=7/40.

25 **Answer: 15/26** — 3m
Not A includes B-only and neither: (19+11)/52=15/26.

26 **Answer: 27** — 3m
n(A∪B)=28+21−11=38; neither=65−38=27.

27 **Answer: 19** — 2m
Tea only = total tea − both = 32−13=19.

28 **Answer: 41/70** — 3m
n(A∪B)=25+28−12=41; probability=41/70=41/70.

29 **Answer: 3/17** — 1m
P(A∩B)=intersection/total=15/85=3/17.

30 **Answer: 11/19** — 3m
Not A includes B-only and neither: (21+12)/57=11/19.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 38 / P6, P8

Venn Diagrams and Combined Sets

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 30** — 3m
n(A∪B)=30+22−12=40; neither=70−40=30.

32 **Answer: 20** — 2m
Tea only = total tea − both = 34−14=20.

33 **Answer: 43/75** — 3m
n(A∪B)=26+30−13=43; probability=43/75=43/75.

34 **Answer: 8/45** — 1m
P(A∩B)=intersection/total=16/90=8/45.

35 **Answer: 18/31** — 3m
Not A includes B-only and neither: (23+13)/62=18/31.

36 **Answer: 33** — 3m
n(A∪B)=32+23−13=42; neither=75−42=33.

37 **Answer: 21** — 2m
Tea only = total tea − both = 36−15=21.

38 **Answer: 9/16** — 3m
n(A∪B)=27+32−14=45; probability=45/80=9/16.

39 **Answer: 17/95** — 1m
P(A∩B)=intersection/total=17/95=17/95.

40 **Answer: 39/67** — 3m
Not A includes B-only and neither: (25+14)/67=39/67.

41 **Answer: 36** — 3m
n(A∪B)=34+24−14=44; neither=80−44=36.

42 **Answer: 22** — 2m
Tea only = total tea − both = 38−16=22.

43 **Answer: 47/85** — 3m
n(A∪B)=28+34−15=47; probability=47/85=47/85.

44 **Answer: 9/50** — 1m
P(A∩B)=intersection/total=18/100=9/50.

45 **Answer: 7/12** — 3m
Not A includes B-only and neither: (27+15)/72=7/12.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 39 / P7, P8

Independent Events and Probability Trees

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 1/25** — 2m
Independent paths multiply: 1/5×1/5=1/25.

02 **Answer: 2/9** — 2m
P(lose)=1−1/3=2/3; multiply: 1/3×2/3=2/9.

03 **Answer: 7/16** — 3m
Use the complement: 1−P(two failures)=1−3/4²=7/16.

04 **Answer: 1/15** — 2m
For independent events, multiply: 1/5×1/3=1/15.

05 **Answer: 11/25** — 4m
Exactly one = SF or FS: 1/5×3/5 + 4/5×2/5 = 11/25.

06 **Answer: 4/25** — 2m
Independent paths multiply: 2/5×2/5=4/25.

07 **Answer: 1/4** — 2m
P(lose)=1−1/2=1/2; multiply: 1/2×1/2=1/4.

08 **Answer: 3/4** — 3m
Use the complement: 1−P(two failures)=1−1/2²=3/4.

09 **Answer: 1/5** — 2m
For independent events, multiply: 2/5×1/2=1/5.

10 **Answer: 13/25** — 4m
Exactly one = SF or FS: 2/5×2/5 + 3/5×3/5 = 13/25.

11 **Answer: 9/25** — 2m
Independent paths multiply: 3/5×3/5=9/25.

12 **Answer: 2/9** — 2m
P(lose)=1−2/3=1/3; multiply: 2/3×1/3=2/9.

13 **Answer: 15/16** — 3m
Use the complement: 1−P(two failures)=1−1/4²=15/16.

14 **Answer: 2/5** — 2m
For independent events, multiply: 3/5×2/3=2/5.

15 **Answer: 13/25** — 4m
Exactly one = SF or FS: 3/5×3/5 + 2/5×2/5 = 13/25.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 39 / P7, P8

Independent Events and Probability Trees

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 16/25** — 2m
Independent paths multiply: 4/5×4/5=16/25.

17 **Answer: 4/15** — 2m
For independent events, multiply: 4/5×1/3=4/15.

18 **Answer: 14/25** — 4m
Exactly one = SF or FS: 1/5×2/5 + 4/5×3/5 = 14/25.

19 **Answer: 1/10** — 2m
For independent events, multiply: 1/5×1/2=1/10.

20 **Answer: 12/25** — 4m
Exactly one = SF or FS: 2/5×3/5 + 3/5×2/5 = 12/25.

21 **Answer: 4/15** — 2m
For independent events, multiply: 2/5×2/3=4/15.

22 **Answer: 12/25** — 4m
Exactly one = SF or FS: 3/5×2/5 + 2/5×3/5 = 12/25.

23 **Answer: 1/5** — 2m
For independent events, multiply: 3/5×1/3=1/5.

24 **Answer: 2/5** — 2m
For independent events, multiply: 4/5×1/2=2/5.

25 **Answer: 2/15** — 2m
For independent events, multiply: 1/5×2/3=2/15.

26 **Answer: 4/225** — 3m
Independence means multiply along the all-success path: 2/15^2=4/225.

27 **Answer: 121/144** — 3m
P(failure)=1−1/12=11/12; multiply failures: $11/12^2=121/144$.

28 **Answer: 27/4096** — 4m
Independence means multiply along the all-success path: 3/16^3=27/4096.

29 **Answer: 121/169** — 3m
P(failure)=1−2/13=11/13; multiply failures: $11/13^2=121/169$.

30 **Answer: 16/289** — 3m
Independence means multiply along the all-success path: 4/17^2=16/289.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 39 / P7, P8

Independent Events and Probability Trees

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 121/196** — 3m
P(failure)=1−3/14=11/14; multiply failures: 11/14²=121/196.

32 **Answer: 125/5832** — 4m
Independence means multiply along the all-success path: 5/18^3=125/5832.

33 **Answer: 121/225** — 3m
P(failure)=1−4/15=11/15; multiply failures: 11/15²=121/225.

34 **Answer: 36/361** — 3m
Independence means multiply along the all-success path: 6/19^2=36/361.

35 **Answer: 121/256** — 3m
P(failure)=1−5/16=11/16; multiply failures: 11/16²=121/256.

36 **Answer: 343/8000** — 4m
Independence means multiply along the all-success path: 7/20^3=343/8000.

37 **Answer: 121/289** — 3m
P(failure)=1−6/17=11/17; multiply failures: 11/17²=121/289.

38 **Answer: 64/441** — 3m
Independence means multiply along the all-success path: 8/21^2=64/441.

39 **Answer: 121/324** — 3m
P(failure)=1−7/18=11/18; multiply failures: 11/18²=121/324.

40 **Answer: 729/10648** — 4m
Independence means multiply along the all-success path: 9/22^3=729/10648.

41 **Answer: 121/361** — 3m
P(failure)=1−8/19=11/19; multiply failures: 11/19²=121/361.

42 **Answer: 100/529** — 3m
Independence means multiply along the all-success path: 10/23^2=100/529.

43 **Answer: 121/400** — 3m
P(failure)=1−9/20=11/20; multiply failures: 11/20²=121/400.

44 **Answer: 1331/13824** — 4m
Independence means multiply along the all-success path: 11/24^3=1331/13824.

45 **Answer: 121/441** — 3m
P(failure)=1−10/21=11/21; multiply failures: 11/21²=121/441.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

WORKED ANSWERS | QUESTIONS 1–15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 **Answer: 3/28** — 3m
Without replacement: 3/8×2/7=3/28.

02 **Answer: 35/66** — 4m
Add GB and BG: 5/12×7/11 + 7/12×5/11 = 35/66.

03 **Answer: 2/3** — 4m
Complement: 1−P(two blue)=1−(6/10×5/9)=2/3.

04 **Answer: 15/22** — 3m
Counts change after the first choice: 10/12×9/11=15/22.

05 **Answer: 24/49** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(3/7×4/7)=24/49.

06 **Answer: 2/15** — 3m
Without replacement: 4/10×3/9=2/15.

07 **Answer: 48/91** — 4m
Add GB and BG: 6/14×8/13 + 8/14×6/13 = 48/91.

08 **Answer: 15/22** — 4m
Complement: 1−P(two blue)=1−(7/12×6/11)=15/22.

09 **Answer: 55/91** — 3m
Counts change after the first choice: 11/14×10/13=55/91.

10 **Answer: 40/81** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(4/9×5/9)=40/81.

11 **Answer: 5/33** — 3m
Without replacement: 5/12×4/11=5/33.

12 **Answer: 21/40** — 4m
Add GB and BG: 7/16×9/15 + 9/16×7/15 = 21/40.

13 **Answer: 9/13** — 4m
Complement: 1−P(two blue)=1−(8/14×7/13)=9/13.

14 **Answer: 11/20** — 3m
Counts change after the first choice: 12/16×11/15=11/20.

15 **Answer: 60/121** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(5/11×6/11)=60/121.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

WORKED ANSWERS | QUESTIONS 16–30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 **Answer: 15/91** — 3m
Without replacement: 6/14×5/13=15/91.

17 **Answer: 80/153** — 4m
Add GB and BG: 8/18×10/17 + 10/18×8/17 = 80/153.

18 **Answer: 7/10** — 4m
Complement: 1−P(two blue)=1−(9/16×8/15)=7/10.

19 **Answer: 26/51** — 3m
Counts change after the first choice: 13/18×12/17=26/51.

20 **Answer: 84/169** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(6/13×7/13)=84/169.

21 **Answer: 7/40** — 3m
Without replacement: 7/16×6/15=7/40.

22 **Answer: 99/190** — 4m
Add GB and BG: 9/20×11/19 + 11/20×9/19 = 99/190.

23 **Answer: 12/17** — 4m
Complement: 1−P(two blue)=1−(10/18×9/17)=12/17.

24 **Answer: 91/120** — 3m
Counts change after the first choice: 14/16×13/15=91/120.

25 **Answer: 112/225** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(7/15×8/15)=112/225.

26 **Answer: 28/153** — 3m
Without replacement: 8/18×7/17=28/153.

27 **Answer: 40/77** — 4m
Add GB and BG: 10/22×12/21 + 12/22×10/21 = 40/77.

28 **Answer: 27/38** — 4m
Complement: 1−P(two blue)=1−(11/20×10/19)=27/38.

29 **Answer: 35/51** — 3m
Counts change after the first choice: 15/18×14/17=35/51.

30 **Answer: 144/289** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(8/17×9/17)=144/289.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.

MODULE 40 / P1–P8

Dependent Events and Mixed Probability

WORKED ANSWERS | QUESTIONS 31–45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 **Answer: 18/95** — 3m
Without replacement: 9/20×8/19=18/95.

32 **Answer: 143/276** — 4m
Add GB and BG: 11/24×13/23 + 13/24×11/23 = 143/276.

33 **Answer: 5/7** — 4m
Complement: 1−P(two blue)=1−(12/22×11/21)=5/7.

34 **Answer: 12/19** — 3m
Counts change after the first choice: 16/20×15/19=12/19.

35 **Answer: 180/361** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(9/19×10/19)=180/361.

36 **Answer: 15/77** — 3m
Without replacement: 10/22×9/21=15/77.

37 **Answer: 168/325** — 4m
Add GB and BG: 12/26×14/25 + 14/26×12/25 = 168/325.

38 **Answer: 33/46** — 4m
Complement: 1−P(two blue)=1−(13/24×12/23)=33/46.

39 **Answer: 136/231** — 3m
Counts change after the first choice: 17/22×16/21=136/231.

40 **Answer: 220/441** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(10/21×11/21)=220/441.

41 **Answer: 55/276** — 3m
Without replacement: 11/24×10/23=55/276.

42 **Answer: 65/126** — 4m
Add GB and BG: 13/28×15/27 + 15/28×13/27 = 65/126.

43 **Answer: 18/25** — 4m
Complement: 1−P(two blue)=1−(14/26×13/25)=18/25.

44 **Answer: 153/190** — 3m
Counts change after the first choice: 18/20×17/19=153/190.

45 **Answer: 264/529** — 3m
With replacement, probabilities stay constant. Add RB and BR: 2×(11/23×12/23)=264/529.

Award method marks where the correct operation or set-up is shown. Check probabilities lie from 0 to 1 and simplify fractions where appropriate.