SOLUTIONS

GCSE Maths: Probability

Mark schemes for the Grade 4 starter questions

Questions	**15**
Total marks	**54**
Sub-topics covered	**5**
Papers drawn from	**14**
Years	**2017 to 2024**

The official Edexcel mark scheme for every question in the Probability question booklet, in the same order.

Question numbers match: Question 7 here answers Question 7 there.

M marks are for method, A marks for accuracy, B marks stand alone.
'oe' means or equivalent; 'cao' means correct answer only.

P2 Expected Outcomes

Question 1

November 2023 · Paper 3 · Q2

2 marks

2	80	M1 A1	for complete method, eg 200×0.4 or for $\frac{80}{200}$ for the answer cao	

P3 Relative Frequency and Theoretical Probability

Question 2

November 2017 · Paper 2 · Q4

3 marks

4		$\frac{1}{11}$	P1 P1 A1	for starting the process, eg by writing down a correct ratio or using a given number of cubes for one relationship, eg 2B 1Y or B:Y = 2:1 or 4G 1B or G:B = 4:1 or 8G, 1Y or G:Y = 8:1 oe or yellow = 2, blue = 4, or states 2:1:8 oe in any order (can be algebraic) for complete process to find possible number of each colour or equivalent ratio, eg 8G 2B 1Y or G:B:Y = 8:2:1 oe or yellow = 2, blue = 4, green = 16 oe (can be algebraic) $\frac{1}{11}$ oe

P4 Probabilities Summing to One

Question 3

June 2017 · Paper 2 · Q1

3 marks

1		98	P1 P1 A1 P1 P1 A1	for process to find P(1), eg. 1 – 0.17 – 0.18 – 0.09 – 0.15 – 0.1 (= 0.31) or for a process to find P(1 or 3), eg. 1 – 0.17 – 0.09 – 0.15 – 0.1 (= 0.49) for process to find the number of 3s eg. 0.18 × 200 (=36) or process to find the number of 1s, e.g. P(1) × 200 (= 62), or process to find the number of (1 or 3)s, eg [P(1) + 0.18] × 200 or for process to find any expected frequency using any probability × 200 eg. 0.17 × 200 cao OR for process to find P(2 or 4 or 5 or 6), eg. 0.17 + 0.09 + 0.15 + 0.1 (= 0.51) for process to find the number of (2 or 4 or 5 or 6)s, eg. "0.51" × 200 (= 102) cao

Question 4

November 2021 · Paper 3 · Q6

4 marks

6	(a)	0.5, 0.3	P1 A1	for $1 - 0.05 - 0.15$ (= 0.8) oe	Award this mark for any two probabilities that sum to 0.8
	(b)	120	M1 A1	$18 \div 0.15$ oe **or** $6 + 18 + a + b$ where $a + b = 96$ cao	

Question 5

June 2018 · Paper 3 · Q6

5 marks

6	(a)	8	P1	for process to find sum of unknown probabilities, eg $1 - 0.45 - 0.25$ (= 0.3) **OR** to find the total number of counters in the bag, eg $\frac{18}{0.45}$ (= 40) **OR** to find the number of yellow counters, eg $\frac{0.25}{0.45} \times 18$ (= 10)	Award mark for any two probabilities given that sum to 0.3 eg given in the table.
			P1	for process to find P(red) = 0.2 oe **or** P(white) = 0.1 oe **OR** for process to find the total number of red and white counters, eg "40" – 18 – "10" (=12) **OR** for process to derive an equation in x, eg $2x + x = 1 - 0.45 - 0.25$ or $2x + x =$ "0.3" or $x = 0.1$	Award P2 for P(red) or P(white) (could be shown in table) Equations could be given as written statements or working but must be fully equivalent.
			P1	for a complete process to find the number of red counters, eg $\frac{2 \times 0.1}{0.45} \times 18$ or $\frac{2}{3} \times$ "12" or $0.2 \times$ "40" or $\frac{0.2}{0.025}$	
			A1	cao	
	(b)	Explanation	C1	for explanation eg 0.5 multiplied by an odd number will never be a whole number, for half of a number to be an integer that number must be even, you can't have half a marble	

P6 Enumerating Sets and Combinations

Question 6

November 2024 · Paper 2 · Q4

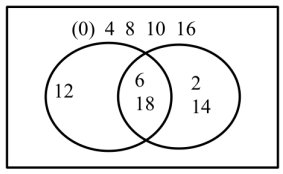
2 marks

4	statements	C1	for identifying that the number 17 should only be in the intersection **Acceptable examples** 17 should only be in the middle Take 17 out of (set) A only appropriate 17 crossed out on the Venn diagram **Not acceptable examples** Tom should put 17 in B Should have two 17's in the middle Take 17 out of (set) A Needs to remove a 17 17 is on twice	Accept correct descriptions using correct set notation for both marks Diagram may be used to support statements
		C1	for identifying that the number 1 is missing from the diagram **Acceptable examples** 1 should be in the outside region He should put 1 outside the circles Tom needs to put the number 1 on the diagram include 1 (outside $A \cup B$) 1 added to the diagram in the correct region **Not acceptable examples** Add the remaining numbers There are missing odd numbers between 0 and 20 put all the odd numbers outside the circles add the odd numbers in the $\mathscr{E}$ box include the even numbers 1 should be outside the Venn diagram	

Question 7

November 2021 · Paper 1 · Q2

3 marks

2	Venn Diagram	C1	for one correct region	
		C1	for two correct regions	Ignore all entries except the region you are marking for each mark
		C1	for all regions correct	

Question 8

June 2024 · Paper 1 · Q4

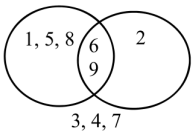
3 marks

4	(a)	10, 11, 13, 14, 16, 17	B1	cao	
	(b)	$\frac{5}{9}$	M1	for identification of 10, 12, 14, 15, 18 **or** for $\frac{a}{9}$ where $1 \le a \le 8$, a an integer, or $\frac{5}{b}$ where $b > 5$, b an integer **or** for incorrect form, eg 5 : 9	
			A1	oe	Accept any equivalent fraction, decimal form, 0.55(5...) or 0.56 or percentage form, 55.(5...)% or 56%

Question 9

June 2019 · Paper 3 · Q1

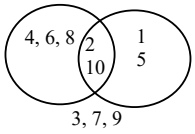
5 marks

1	(a)	6, 9	M1	for 6, 9 in the intersection only	Ignore all entries except the region you are marking for each method mark
		1, 5, 8 2 3, 4, 7	M1	for 1, 5, 8 in set A only or 2 in set B only or 3, 4, 7 in set $(A \cup B)'$ only	
			C1	for all numbers correctly placed in the Venn Diagram	
	(b)	$\frac{2}{9}$	M1	ft for identification of 2 or 9 or ft diagram	Need not be written in correct form at this stage eg could be a ratio 2 : 9 Repeated digits in the diagram should be counted as 2 elements
			A1	$\frac{2}{9}$ oe or ft diagram	Accept any equivalent fraction, decimal form 0.22(22..) or percentage form 22(.22…)%

Question 10

November 2020 · Paper 2 · Q2

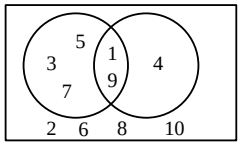
5 marks

2	(a)	Venn diagram	M1	for correct numbers in at least one region	Ignore all entries except the region you are marking for each method mark
			M1	for correct numbers in at least two regions	
			A1	for all regions correct	
	(b)	$\frac{2}{10}$	M1	for $\frac{a}{10}$ where $0 < a < 10$ and a is an integer **or** $\frac{2}{b}$ where $b > 2$ and b is an integer **or** ft diagram	Need not be written in correct form at this stage eg could be a ratio 2 : 10 Repeated digits in the diagram should be counted as 2 elements
			A1	$\frac{2}{10}$ oe **or** ft diagram	Accept any equivalent fraction, decimal form 0.2 or percentage form 20%

Question 11

June 2023 · Paper 1 · Q5

5 marks

5	(a)	Venn diagram	B3	for a fully correct Venn diagram	Ignore all entries except the region you are marking for each method mark
			(B2	for two or three of the four regions correct)	
			(B1	for just one of the four regions correct)	
	(b)	$\frac{7}{10}$	M1	(ft diagram) for $\frac{a}{10}$ where $0 < a < 10$ and a is an integer or $\frac{7}{b}$ where $b > 7$ and b is an integer **or** $1 - \frac{3}{10}$ **or** 7 : 10	Repeated digits in the diagram should be counted as 2 elements
			A1	(ft diagram) for $\frac{7}{10}$ oe	Accept any equivalent fraction, or 0.7 or 70%

P8 Combined Events: Independent and Dependent

Question 12

June 2018 · Paper 3 · Q4

2 marks

4	Probabilities should sum to 1	C1	for stating that the probabilities should total 1 eg 0.25 should be 0.35	
	0.35 and 0.65 reversed	C1	for recognising that the 0.35 and 0.65 in the first branches for the 2nd throw should be reversed eg, "for the second throw, the probability it lands on 4 should be 0.65"	Can be shown on the diagram

Question 13

November 2020 · Paper 3 · Q5

4 marks

5	(a)	$\frac{1}{3}, \frac{2}{3}$ $\frac{1}{3}, \frac{2}{3}, \frac{1}{3}, \frac{2}{3}$	B2	six fully correct probabilities	Accept any equivalent fraction, decimal form 0.33(3...) and 0.66(6...) or 0.67 or percentage form 33(.3...)% and 66(.6...)% or 67%
			(B1	at least 2 correct probabilities)	
	(b)	$\frac{2}{9}$	M1	for $\frac{1}{3} \times \frac{2}{3}$ oe or ft probabilities from diagram	
			A1	for $\frac{2}{9}$ oe	Accept any equivalent fraction, decimal form 0.22(2...) or percentage form 22(.2...)%

Question 14

June 2024 · Paper 3 · Q6

4 marks

6	(a)	0.4	B1	for 0.4 in correct position	Accept equivalent fractions or percentages for probabilities
		0.45, 0.55, 0.45	B1	for the correct probabilities for coin **B** in the correct place on the branches	
	(b)	0.33	M1	for a correct method, eg 0.6 × 0.55 only	
			A1	for 0.33 oe	An answer of $\frac{0.33}{1}$ scores M1A0

Question 15

November 2024 · Paper 3 · Q4

4 marks

4	(a)	(0.3) 0.7 0.3 0.7 0.3 0.7	B2 (B1	all probabilities correctly placed for 0.7 correctly placed for Game 1)	Accept equivalent fractions or percentages for probabilities
	(b)	0.49	M1 A1	for a correct method, ft their tree diagram eg 0.7×0.7 only oe, ft their tree diagram	ft their diagram provided probabilities are less than 1 An answer of $\frac{0.49}{1}$ scores M1A0 unless 0.49 seen