

GCSE Mathematics (1MA1)

Themed papers – Probability and Statistical Diagrams

Compiled from student-friendly mark schemes

Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn't show follow-through marks (marks that are awarded despite errors being made) or special cases.

It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.

NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme

M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect.

P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question.

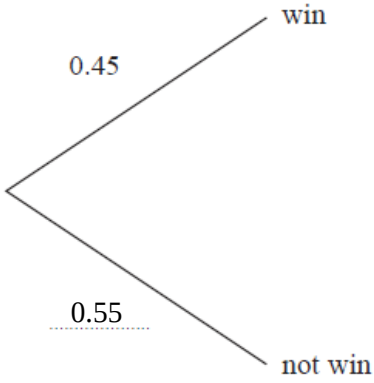
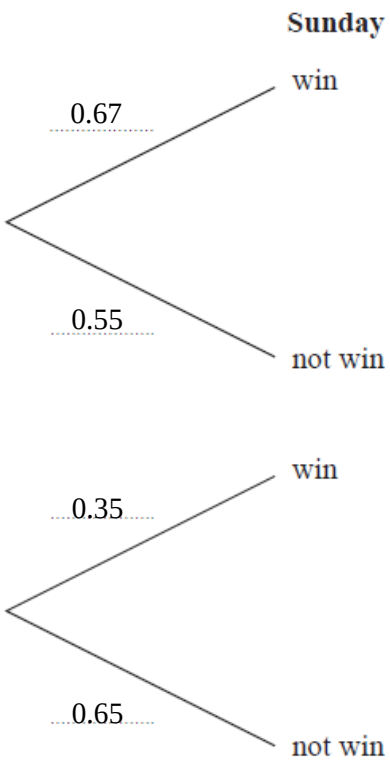
A1 – accuracy mark. This mark is generally given for a correct answer following correct working.

B1 – working mark. This mark is usually given when working and the answer cannot easily be separated.

C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.

Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

Question 1 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$1 - 0.45 = 0.55$ 	B1	This mark is given for finding the probability of not winning on Saturday in correct position
	$1 - 0.67 = 0.33$ $1 - 0.35 = 0.65$ 	B1	This mark is given for the branches for the Sunday game correct

Part	Working or answer an examiner might expect to see	Mark	Notes
(b)	$0.45 \times 0.33 = 0.1485$ $0.55 \times 0.35 = 0.1925$	M1	This mark is given for finding the probability of one win on Saturday and not on Sunday and a win on Sunday but not on Saturday
	$0.1485 + 0.1925$	M1	This mark is given for a correct method to find the total probability
	0.341	A1	This mark is given for the correct answer only

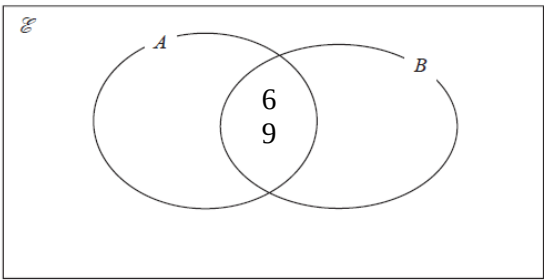
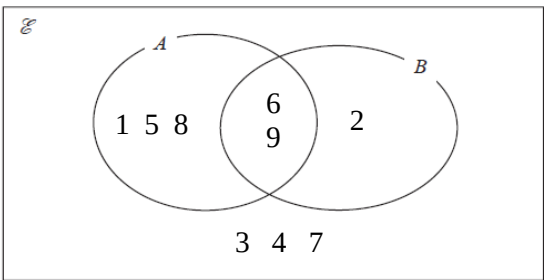
Question 2 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$1 - 0.15 = 0.85$	M1	This mark is given for finding the probability of 'not late'
	Thursday Friday <pre> graph LR T1[0.15] -- late --> T2[0.15] T1 -- late --> T3[0.85] T1 -- not late --> T4[0.15] T1 -- not late --> T5[0.85] T2 -- late T3 -- not late T4 -- late T5 -- not late </pre>	A1	This mark is given for a fully correct diagram
(b)	$0.85 \times 0.85 = 0.7225$	M1	This mark is given for a method to find the probability of being not late on both days
	$1 - 0.7225$	M1	This mark is given for a method to find the probability that Mary's train will be late on at least one of the two days
	0.2775	C1	This mark is given for the correct answer only

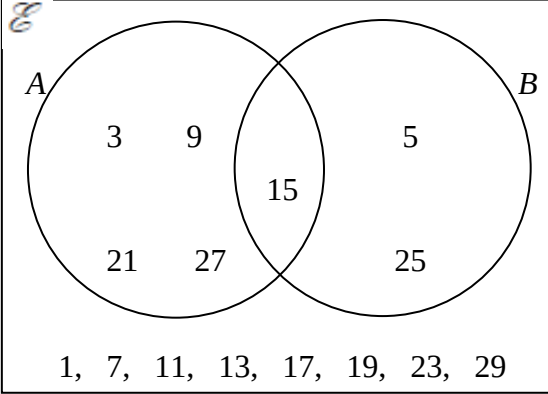
Question 3 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes																																								
	<table><tr><td></td><td>Britain</td><td>Italy</td><td>Spain</td><td>Total</td></tr><tr><td>Male</td><td></td><td>8</td><td></td><td>38</td></tr><tr><td>Female</td><td>11</td><td></td><td></td><td></td></tr><tr><td>Total</td><td>32</td><td></td><td>12</td><td>60</td></tr></table> Number of males preferring to holiday in Britain = $32 - 11 = 21$ Total number of people who preferring to holiday in Italy = $60 - (32 + 12) = 16$ Total number of females = $60 - 38 = 22$ <table><tr><td></td><td>Britain</td><td>Italy</td><td>Spain</td><td>Total</td></tr><tr><td>Male</td><td>21</td><td>8</td><td></td><td>38</td></tr><tr><td>Female</td><td>11</td><td></td><td></td><td>22</td></tr><tr><td>Total</td><td>32</td><td>16</td><td>12</td><td>60</td></tr></table>		Britain	Italy	Spain	Total	Male		8		38	Female	11				Total	32		12	60		Britain	Italy	Spain	Total	Male	21	8		38	Female	11			22	Total	32	16	12	60	P1	This mark is given for a process to find a first value
	Britain	Italy	Spain	Total																																							
Male		8		38																																							
Female	11																																										
Total	32		12	60																																							
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Female	11			22																																							
Total	32	16	12	60																																							
	Number of males preferring to holiday in France = $38 - (21 + 8) = 9$ Number of females preferring to holiday in Italy = $16 - 8 = 8$ <table><tr><td></td><td>Britain</td><td>Italy</td><td>Spain</td><td>Total</td></tr><tr><td>Male</td><td>21</td><td>8</td><td>9</td><td>38</td></tr><tr><td>Female</td><td>11</td><td>8</td><td></td><td>22</td></tr><tr><td>Total</td><td>32</td><td>16</td><td>12</td><td>60</td></tr></table>		Britain	Italy	Spain	Total	Male	21	8	9	38	Female	11	8		22	Total	32	16	12	60	P1	This mark is given for a process to find a second value																				
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Male	21	8	9	38																																							
Female	11	8		22																																							
Total	32	16	12	60																																							
	$12 - 9$ or $22 - (11 + 8) = 3$ <table><tr><td></td><td>Britain</td><td>Italy</td><td>Spain</td><td>Total</td></tr><tr><td>Male</td><td>21</td><td>8</td><td>9</td><td>38</td></tr><tr><td>Female</td><td>11</td><td>8</td><td>3</td><td>22</td></tr><tr><td>Total</td><td>32</td><td>16</td><td>12</td><td>60</td></tr></table>		Britain	Italy	Spain	Total	Male	21	8	9	38	Female	11	8	3	22	Total	32	16	12	60	P1	This mark is given for a complete process to find the number of females who preferred to holiday in Spain																				
	Britain	Italy	Spain	Total																																							
Male	21	8	9	38																																							
Female	11	8	3	22																																							
Total	32	16	12	60																																							
	$\frac{3}{22}$	A1	This mark is given for the correct answer only																																								

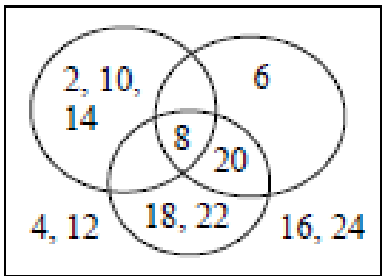
Question 4 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)		M1	This mark is given for placing numbers 6 and 9 in the intersection of A and B
		M1	This mark is given for placing numbers 1, 5 and 8 in set A only or the number 2 in set B only or the numbers 3, 4 7 outside $A \cup B$
		C1	This mark is given for a fully correct Venn diagram
(b)	There are 2 numbers in $A \cap B$ There are 9 numbers in the universal set	M1	This mark is given for one of these two statements seen
	$\frac{2}{9}$	A1	This mark is given for a correct answer only

Question 5 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for labels on the Venn diagram
		M1	This mark is given for 15 shown in the intersection
		M1	This mark is given for 5 and 25 in only set B or 3, 9, 21 and 27 in only set A or 1, 7, 11, 13, 17, 19, 23, 29 in $(A \cup B)'$
		C1	This mark is given for all numbers correctly placed in the Venn Diagram
(b)	$\frac{7}{a}$ where $a \geq 7$ or $\frac{b}{15}$, where $b \leq 15$	P1	This mark is given for a correct numerator or denominator
	$\frac{7}{15}$	A1	This mark is given for the correct answer only

Question 6 (Total 6 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)		C4	Four marks are given for a fully correct Venn diagram (3 marks for at least 6 numbers in the correct position) (2 marks for at least 4 numbers in the correct position) (1 mark for at least 2 numbers in the correct position)
(b)	$A \cap B = \{8\}$	M1	This mark is given for finding the number of members of $A \cap B$
	$\frac{1}{12}$	A1	This mark is given for the correct answer only

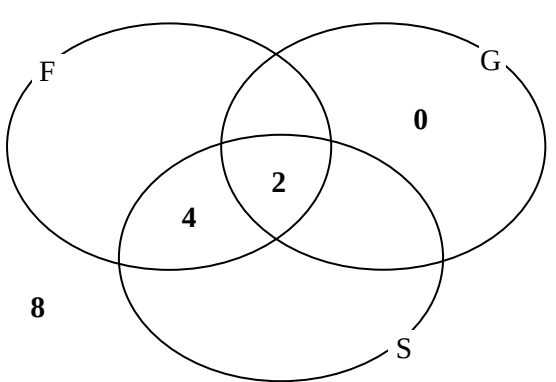
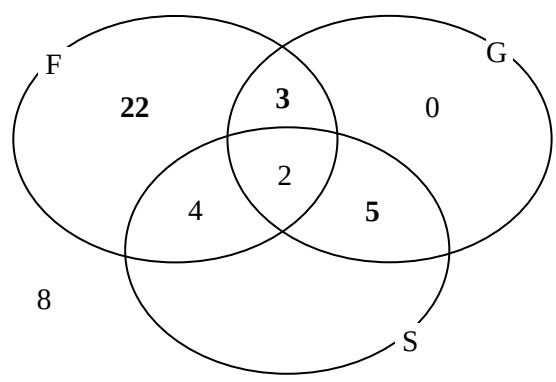
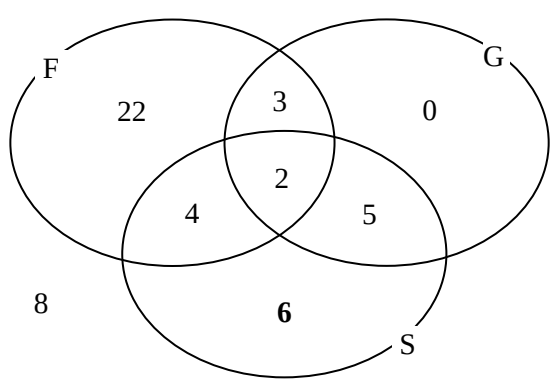
Question 7 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	The denominator for the 2nd student is incorrect (it should be 29) or The probabilities for the 2nd student do not add up to 1 (they add to $\frac{29}{30}$)	C1	This mark is given for a correct comment
(b)	No, the probabilities should be multiplied together rather than added	C1	This mark is given for a correct conclusion with a supporting comment

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$0.07 \times 0.98 = 0.0686$ $0.93 \times 0.11 = 0.1203$	M1	This mark is given for one correct product seen
	$0.0686 + 0.1203$	M1	This mark is given for a fully correct method to calculate the probability
	0.1709	A1	This mark is given for the correct answer only

Question 9 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		P1	This mark is given for a process to show some of the information given
		P1	This mark is given for a process to show at least three of the unknown amounts from the information given 5 people speak German and Spanish but not French 3 people speak French and German but not Spanish 22 people speak French but not German or Spanish
		P1	This mark is given for a complete process to find the number of people who speak only Spanish ($50 - 44 = 6$)
	$\frac{6}{50} \times \frac{6-1}{50-1} = \frac{6}{50} \times \frac{5}{49}$	P1	This mark is given for a process to find the probability that two people chosen at random speak only Spanish
	$\frac{6}{490}$	A1	This mark is given for the correct answer (or an equivalent fraction)

Mark scheme for 1MA1 Higher themed papers: Probability and Statistical Diagrams

Performance data:

Q	Taken from			Total Marks available	TOPIC	Spec Ref	AO	% Mean marks	Edexcel mean averages Marks of candidates who achieved grade:										
	Q	Series	Paper						ALL	9	8	7	6	5	4	3	2	1	U
1a	15a	June 2018	2H	2	Probability	P8/P9	3	96	1.92	1.99	1.97	1.96	1.95	1.92	1.86	1.68	-	-	1.25
1b	15b	June 2018	2H	3	Probability	P8/P9	2	65	1.96	2.92	2.81	2.63	2.24	1.57	0.82	0.33	-	-	0.13
2a	10a	June 2019	2H	2	Probability	P6, P4	2	97	1.94	1.99	1.99	1.99	1.97	1.93	1.84	1.67	-	-	1.3
2b	10b	June 2019	2H	3	Probability	P6, P8	1	58	1.73	2.8	2.53	2.18	1.78	1.25	0.69	0.31	-	-	0.14
3	8	June 2018	2H	4	Probability	P1, P3, S2	3	80	3.18	3.75	3.53	3.37	3.24	3.08	2.80	2.28	-	-	1.63
4a	1a	June 2019	3H	3	Probability	P6	2	93	2.80	2.95	2.91	2.88	2.84	2.76	2.60	2.27	-	-	1.66
4b	1b	June 2019	3H	2	Probability	P3, P8	1	80	1.59	1.93	1.83	1.71	1.59	1.47	1.29	1.01	-	-	0.68
5a	1a	June 2017	3H	4	Probability	P6	2	80	3.20	3.75	3.54	3.37	3.24	3.08	2.81	2.32	-	-	1.61
5b	1b	June 2017	3H	2	Probability	P3, 8	2	56	1.13	1.79	1.52	1.29	1.12	0.95	0.73	0.49	-	-	0.26
6a	1a	Nov 2018	2H	4	Statistics	P6	2	72	2.89	3.70	3.50	3.35	3.26	3.22	2.94	2.57	-	-	1.83
6b	1b	Nov 2018	2H	2	Statistics	P3, P8	2	37	0.74	1.90	1.68	1.17	0.89	0.86	0.72	0.50	-	-	0.41
7a	12a	June 2017	2H	1	Probability	P9	2	72	0.72	0.93	0.89	0.84	0.77	0.66	0.49	0.26	-	-	0.1
7b	12b	June 2017	2H	1	Probability	P8	2	59	0.59	0.87	0.83	0.76	0.66	0.49	0.27	0.11	-	-	0.05
8	11	Nov 2019	3H	3	Probability	P6	1	38	1.14	3	2.62	2.57	2.24	1.57	0.67	0.24	-	-	0.04
9	20	June 2018	3H	5	Probability	P8, P9	2	19	0.94	3.39	2.05	1.2	0.68	0.35	0.16	0.06	-	-	0.03
				41					26.47	37.66	34.2	31.27	28.47	25.16	20.69	16.1	-	-	11.12