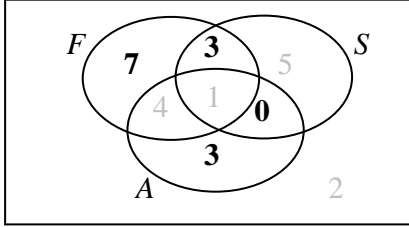
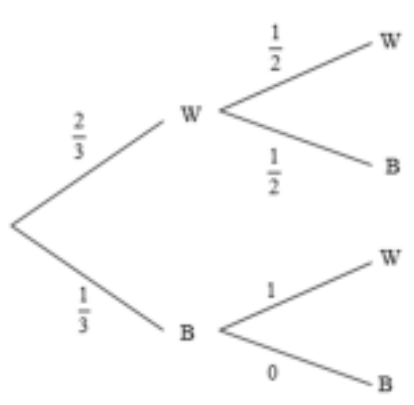


1(i)	Venn diagram completed correctly 	2	B1 for 2 values correct
1(ii)	$\frac{1}{30}$ oe	2	M1 for $\frac{5}{25} \times \frac{4}{24}$ oe
1(iii)	$\frac{45}{91}$ oe nfw	3	M2 for $\frac{5}{15} \times \frac{10}{14} \times \frac{9}{13} \times k$ where k is 1, 2 or 3 oe or M1 for $\frac{5}{15} \times \frac{10}{14} \times \frac{9}{13}$ seen and spoilt or $\frac{a}{x} \times \frac{b}{x-1} \times \frac{c}{x-2} [\times k]$ where $x = n(\text{their}F)$ <u>and</u> k is 1, 2 or 3 After 0 scored, SC1 for answer $\frac{4}{9}$ oe
2(a)	0.35 oe	2	M1 for $1 - (0.15 + 0.3 + 0.2)$ oe or B1 for 0.65 oe seen
2(b)	45	1	
3(a)	$\frac{28}{200}$ oe	1	
3(b)	$\frac{165}{200}$ oe	2	M1 for 1, 2, 3, 5 soi After 0 scored, SC1 for $\frac{114}{200}$ oe
3(c)	810	2	M1 for $\frac{19+35}{200} [\times 3000]$ oe or B1 for 810 seen

4(a)	$\frac{7}{9}$ oe	1	
4(b)	$\frac{1}{9}$ or $\frac{8}{72}$ oe nfw	3	M2 for $\frac{3}{9} \times \frac{2}{8} + \frac{2}{9} \times \frac{1}{8}$ oe or M1 for $\frac{3}{9} \times \frac{2}{8}$ or $\frac{2}{9} \times \frac{1}{8}$ seen If 0 scored, SC1 for answer $\frac{13}{81}$ or $\frac{8}{81}$
5(a)(i)a	$\frac{1}{8}$ oe	1	
5(a)(i)b	$\frac{5}{8}$ oe	1	
5(a)(ii)	$\frac{9}{64}$ oe	2	M1 for $\frac{3}{8} \times \frac{3}{8}$
5(b)	$\frac{13}{40}$ oe	3	M2 for $\frac{7}{16} \times \frac{6}{15} + \frac{6}{16} \times \frac{5}{15} + \frac{3}{16} \times \frac{2}{15}$ oe or M1 for $\frac{7}{16} \times \frac{6}{15}$ or $\frac{6}{16} \times \frac{5}{15}$ or $\frac{3}{16} \times \frac{2}{15}$ After 0 scored, SC1 for answer $\frac{47}{128}$
6(a)	$\frac{6}{35}$ oe	1	
6(b)	0 oe	1	
6(c)	$\frac{17}{35}$ oe	2	M1 for $\frac{3}{7} \times \frac{3}{5}$ oe or $\frac{4}{7} \times \frac{2}{5}$ oe
7(a)	Correct tree diagram with four branches added and the five correct probabilities $\frac{2}{3}, \frac{1}{2}, \frac{1}{2}, 1, [0]$ 	2	B1 for at least two second branches drawn and 2 or 3 probabilities completed correctly
7(b)	0	1	

8(a)	$\frac{2}{6}$ on first branch $\frac{2}{5}, \frac{4}{5}, \frac{1}{5}$ on second set	2	B1 for two or three completed correctly
8(b)	$\frac{14}{30}$ oe	2	M1 for $\frac{4}{6} \times \frac{3}{5}$ oe or <i>their</i> $\frac{2}{6} \times \text{their} \frac{1}{5}$ oe
9(a)	$\frac{4}{7}$	1	
	$\frac{2}{7}$ (black) and $\frac{5}{7}$ (white) with two branches and both labels	1	
9(b)	$\frac{13}{35}$ oe	2	FT $\frac{3}{5} \times \frac{3}{7} + \frac{2}{5} \times (\text{their} \frac{2}{7})$ or M1 for $\frac{3}{5} \times \frac{3}{7}$; or for $\frac{2}{5} \times (\text{their} \frac{2}{7})$
10(i)	$\frac{21}{60}, \frac{7}{20}, \frac{126}{360}, 0.35$ or 35%	1	
10(ii)	$\frac{210}{3540}$ oe	2	M1 for $\frac{15}{60} \times \frac{14}{59}$ [$\times 2$] or SC1 for $\left(\frac{15}{60}\right)^2$ or answer $\frac{1}{16}$ oe
11(a)	Probabilities 0.7 and 0.3 on the correct branches	1	
11(b)(i)	0.49 oe	1	
11(b)(ii)	0.42 oe	1	FT from their diagram, provided their diagram probabilities are less than 1, and $0 < \text{ans.} < 1$.
12(a)	Correctly completed tree diagram $\frac{n-3}{n-1}$ oe $\frac{n-3}{n}$ oe $\frac{n-4}{n-1}$ oe	2	C1 for one correct probability correctly positioned
12(b)	$\frac{3}{n} \times \frac{2}{n-1} = \frac{1}{15}$	M1	
	Correct rearrangement with at least one further step to reach $n^2 - n - 90 = 0$	A1	

12(c)	10	2	B1 for solutions 10, -9 seen or M1 for $(n-10)(n+9) [= 0]$ or for $\frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times -90}}{2 \times 1}$ or better
13 (a)	$\frac{2}{10}, \frac{2}{9}, \frac{8}{9}, \frac{1}{9}$ correctly positioned	1	
(b) (i)	$\frac{56}{90}$ oe	1*	
(ii)	$\frac{32}{90}$ oe	2ft*	M1 for $\frac{8}{10} \times \frac{2}{9} + \frac{2}{10} \times \frac{8}{9}$ ft <i>their</i> tree diagram with fractions < 1
14(b)(i)	2.06[25] or 2.063 or $2\frac{1}{16}$	2	M1 for $([0 \times 24] + 1 \times 30 + 2 \times 50 + 3 \times 32 + 4 \times 16 + 5 \times 8) \div 160$
14(b)(ii)	$\frac{24}{160}$ oe	1	
14(b)(iii)	$\frac{29}{848}$ oe	2	M1 for $\frac{30}{160} \times \frac{29}{159}$ After M0, SC1 for answer $\frac{9}{256}$ oe
15(b)(i)	$\frac{1}{8}$ oe	1	
15(b)(ii)	$\frac{1}{40}$ oe	2	M1 for $\frac{k}{16} \times \frac{k-1}{15}$ or SC1 for answer $\frac{9}{256}$
16(c)	$\frac{9}{64}$	2	M1 for $\frac{3}{8} \times \frac{3}{8}$
17	$\frac{7}{11}$ oe	1	
18 (i)	$\frac{2}{4}$ oe	1	
(ii)	$\frac{2}{20}$ oe	1	
(iii)	$\frac{12}{20}$ oe	2	B1 for $\frac{3}{5} \times \frac{2}{4}$ or $\frac{2}{5} \times \frac{3}{4}$ seen
(iv)	$\frac{18}{60}$ oe	2	B1 for any correct sequence of three coins, $\frac{3}{5} \times \frac{2}{4} \times \frac{1}{3}$ or $\frac{2}{5} \times \frac{3}{4} \times \frac{1}{3}$ or $\frac{2}{5} \times \frac{1}{4} \times \frac{3}{3}$

19	(a)	<table border="1"> <tbody> <tr><td>-</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>3</td><td>-</td><td>5</td><td>6</td></tr> <tr><td>4</td><td>5</td><td>-</td><td>7</td></tr> <tr><td>5</td><td>6</td><td>7</td><td>-</td></tr> </tbody> </table>	-	3	4	5	3	-	5	6	4	5	-	7	5	6	7	-	1	
	-	3	4	5																
	3	-	5	6																
4	5	-	7																	
5	6	7	-																	
(b)																				
(c)	$\frac{4}{12}$ oe ; or FT <i>their table</i>		1 [✓]																	
20	(a)	$\frac{1}{4} \frac{1}{4} \frac{1}{4} \frac{1}{4}$	1																	
	(b) (i)	5 6 7 8	1																	
	(ii)	$\binom{15}{16} \frac{10}{16} \frac{3}{16} 0$ or FT from <i>their (bi) table</i>	1 [✓]																	
	(c)	$\frac{7}{16}$ oe WWW	2 *	M1 for $\frac{1}{4} \times$ (sum of (bii) table) oe, or for $\sum xy$, attempt, where x and y are corresponding values in the two tables																
21	(a)	$\frac{28}{80}$ oe	1																	
	(b) (i)	$\frac{992}{6320}$ oe	2	M1 for $2 \times \frac{32}{80} \times \frac{31}{79}$ or $\frac{32}{80} \times \frac{31}{80}$																
	(ii)	$\frac{64}{6320}$ oe	2	M1 for $\frac{4}{80} \times \frac{8}{79}$ or $2 \times \frac{4}{80} \times \frac{8}{80}$																
22		$\frac{2}{5}$ cao	2	B1 for $\frac{8+10+22}{100}$ oe After 0 scored, SC1 for answer $\frac{17}{25}$																
23(a)		$\frac{12-x}{11}, \frac{x}{11}, \frac{11-x}{11}$ oe correctly placed	2	B1 for one correct																
23(b)		$\frac{x(12-x)}{66}$ oe simplified single fraction final answer	3	M2 for $\frac{x}{12} \times their \frac{12-x}{11} + \frac{12-x}{12} \times their \frac{x}{11}$ or M1 for $\frac{x}{12} \times their \frac{12-x}{11}$ or $\frac{12-x}{12} \times their \frac{x}{11}$																

23c	$\frac{x}{12} \times \frac{x-1}{11} = \frac{14}{33}$	M1	
	$x^2 - x - 56 = 0$ oe Alternative: $x(x-1) = 56$ cao	A1	
	$(x-8)(x+7) [= 0]$ or [x =] $\frac{-(-1) \pm \sqrt{(-1)^2 - 4 \times 1 \times -56}}{2 \times 1}$ Alternative: $8(8-1) = 56$ soi	M1	Dep on M1 FT factorisation/use of formula for <i>their</i> 3-term quadratic
24	0.13	2	M1 for $1 - (0.15 + 0.3 + 0.42)$ or B1 for 0.87 seen
25(a)(ii)	23, 43, 53	2	B1 for three correct and one incorrect or for two correct and none incorrect
25(a)(iii)	0.3 or $\frac{6}{20}$ oe	2	B1 for $\frac{6}{k}$ where k is an integer > 6 or for 24, 32, 36, 52, 56 and 64 identified
25(b)(i)	35, 22, 38	1	
25(b)(ii)	$\frac{77}{200}$ or 0.385	2	B1 for $\frac{46+31}{k}$ where k is an integer > 77 or SC1 for $\frac{105}{200}$ or 0.525
25(b)(iii)	Large sample	B1	
	$\frac{46}{200}$ is a lot bigger than $\frac{1}{6}$ oe or $\frac{22}{200}$ is a lot smaller than $\frac{1}{6}$ oe	B1	