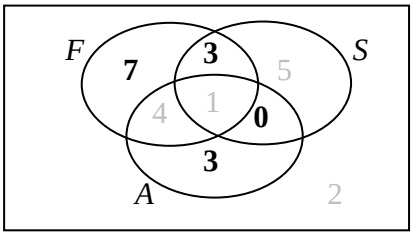
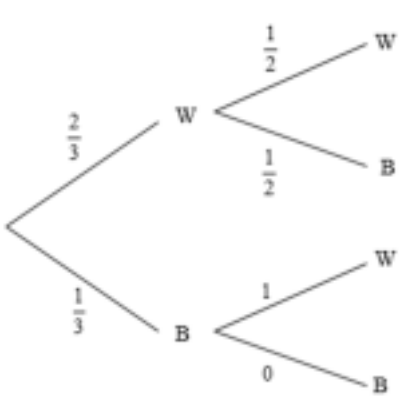
1(i)	Venn diagram completed correctly  	**2**	**B1** for 2 values correct
1(ii)	$\frac{1}{30}$ oe	**2**	**M1** for $\frac{5}{25}\times\frac{4}{24}$ oe
1(iii)	$\frac{45}{91}$ oe nfww	**3**	**M2** for $\frac{5}{15}\times\frac{10}{14}\times\frac{9}{13}\times k$ where k is 1, 2 or 3 oe or **M1** for $\frac{5}{15}\times\frac{10}{14}\times\frac{9}{13}$ seen and spoilt or $\frac{a}{x}\times\frac{b}{x-1}\times\frac{c}{x-2}[\times k]$ where x = n(*theirF*) and 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 nfww	**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** $their\frac{2}{6}\times their\frac{1}{5}$ 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** $\frac{3}{5}\times\frac{3}{7}+\frac{2}{5}\times(their\frac{2}{7})$ or **M1** for $\frac{3}{5}\times\frac{3}{7}$; or for $\frac{2}{5}\times(their\frac{2}{7})$
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 $\frac{15}{60}\times\frac{14}{59}$[×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 < 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 *their* tree diagram with fractions < 1
14(b)(i)	2.06[25] or 2.063 or $2\frac{1}{16}$	**2**	**M1** for ([0 × 24] + 1 × 30 + 2 × 50 + 3 × 32 + 4 × 16 + 5 × 8) ÷ 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><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></table>	1	
(b)			
(c)	$\frac{4}{12}$ oe ; or FT *their table*	1√	
20 **(a)**	$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$	1	
(b) **(i)**	5 6 7 8	1	
(ii)	$\left(\frac{15}{16}\right)$ $\frac{10}{16}$ $\frac{3}{16}$ 0 or FT from *their (bi)* table	1 √	
(c)	$\frac{7}{16}$ oe WWW	2 *	**M1** for $\frac{1}{4}$ × (sum of (bii) table) oe, or for $\sum x\,y$, 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 $\frac{x}{12} \times \textit{their}\frac{12-x}{11} + \frac{12-x}{12} \times \textit{their}\frac{x}{11}$ or **M1** for $\frac{x}{12} \times \textit{their}\frac{12-x}{11}$ or $\frac{12-x}{12} \times \textit{their}\frac{x}{11}$

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 =] $\frac{-(-1)\pm\sqrt{(-1)^2-4\times1\times-56}}{2\times1}$ Alternative: 8(8–1) = 56 soi	**M1**	Dep on M1 **FT** factorisation/use of formula for *their* 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**	