01. 0580_s24_ms_43 Q: 9

Question	Answer	Marks	Partial Marks
(a)(i)	0	1	
(a)(ii)	$\frac{1}{7}$ oe	1	
(b)	$\frac{4}{49}$ oe	2	**M1** for $\frac{2}{7} \times \frac{2}{7}$
(c)(i)	$\frac{2}{21}$ oe	3	**M2** for $\frac{2}{7} \times \frac{1}{6} + \frac{1}{7} \times \frac{2}{6}$ oe or **M1** for $\frac{2}{7} \times \frac{1}{6}$ or $\frac{1}{7} \times \frac{2}{6}$ oe seen If 0 scored SC1 for $\frac{4}{49}$
(c)(ii)	$\frac{19}{21}$ oe	3	**M2** for $1 - \left(\frac{2}{7} \times \frac{1}{6}\right) - \left(\frac{2}{7} \times \frac{1}{6}\right)$ oe or **M1** for $\left(\frac{2}{7} \times \frac{1}{6}\right) + \left(\frac{2}{7} \times \frac{1}{6}\right)$ oe ALTERNATIVE **M2** for $\frac{1}{7}$ [× 1] × 3 + $\frac{2}{7} \times \frac{5}{6} \times 2$ or **M1** for $\frac{2}{7} \times \frac{5}{6}$ or $\frac{1}{7}$ [× 1] × 3 If 0 scored SC1 for $\frac{38}{49}$
(d)	3	2	**M1** for $\frac{5}{7} \times \frac{4}{6} \times \frac{2 \text{ or } 3}{5}$

02. 0580_m23_ms_42   Q: 7

Question	Answer	Marks	Partial Marks
(a)	Completed Venn diagram. ε P C 8 [9] 5 2	2	**B1** for two correct values
(b)(i)	8	1	**FT** *their* **(a)** *their* 8 dep < 24
(b)(ii)	19	1	**FT** *their* **(a)** 24 – *their* 5 dep on positive answer
(c)	$\frac{15}{92}$ oe	3	**M2** for $[2\times]\frac{9}{24}\times\frac{their\,5}{23}$ oe or **M1** for $\frac{9}{24}$ and $\frac{their\,5}{23}$ **or** $\frac{their\,5}{24}$ and $\frac{9}{23}$ If 0 scored **SC1** for answer $\frac{5}{32}$ oe
(d)	$\frac{9}{34}$ oe	2	**B1** for $\frac{9}{17}$ seen

03. 0580_w23_ms_41   Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{2}{5}$ $\frac{5}{9}, \frac{4}{9}$ $\frac{5}{9}, \frac{4}{9}$	2	**B1** for $\frac{2}{5}$ and a pair of probabilities for spinner B that sum to 1
a(ii)(a)	$\frac{1}{3}$ oe	2	**FT dep** *their* tree diagram **M1** for $\frac{3}{5}\times$ *their* $\frac{5}{9}$
a(ii)(b)	$\frac{2}{3}$ oe	1	**FT** dep $1 -$ *their* $\frac{1}{3}$
(b)	72	1	

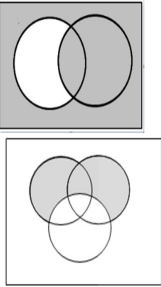| Question	Answer	Marks	Partial Marks
(c)	$\frac{20}{81}$ oe	3	**M2** for $\frac{2}{9}\times\frac{4}{9}$ $[\times 2] + \frac{2}{9}\times\frac{2}{9}$ oe or **M1** for $\frac{2}{9}\times\frac{4}{9}$ or $\frac{2}{9}\times\frac{2}{9}$ oe
(d)	$\left(\frac{5}{9}\right)^{n-1}[\times]\frac{4}{9}$ oe final answer	2	**M1** for $\left(\frac{5}{9}\right)^{n-1}$ seen

04. 0580_w23_ms_42   Q: 8

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{1}{6}$ oe	1	
(a)(ii)	25	1	**FT** *their* **(a)(i)** dep on 0 < **(a)** < 1
(b)(i)	$\frac{11}{36}$ oe	3	**M2** for $\frac{1}{6} \times \frac{2}{6} + \frac{3}{6} \times \frac{3}{6}$ oe or correct possibility diagram with 11 outcomes identified or **M1** for $\frac{1}{6} \times \frac{2}{6}$ or $\frac{3}{6} \times \frac{3}{6}$ oe or lists the 11 required outcomes or for possibility diagram but required outcomes not indicated
(b)(ii)	$\frac{2}{11}$ oe	2	**M1** for $\frac{2}{k}$ or $\frac{p}{their\,11}$ seen oe leading to answer
(c)	6	2	**M1** for $\left(\frac{4}{6}\right)^k \times \frac{2}{6} = \frac{32}{729}$ written oe soi by one trial with $k > 1$ or $2^{n-1} = 32$ or better or $3^n = 729$ or better

05. 0580_m22_ms_42   Q: 11

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{1}{6}$ oe on all late branches $\frac{5}{6}$ oe on all not late branches	2	**B1** for one correct vertical pair $\frac{1}{6}$ oe and $\frac{5}{6}$ oe
(a)(ii)	$\frac{5}{36}$ oe	2	FT *their* tree **M1** for $their\,\frac{1}{6} \times their\,\frac{5}{6}$
(b)(i)	$\left(G \cup T \cup M\right)'$ oe	1	
(b)(ii)	28	1	
(b)(iii)	$\frac{17}{50}$ oe	1	

Question	Answer	Marks	Partial Marks
(b)(iv)	$\frac{4}{7}$ oe	3	**M2** for $\frac{16}{21} \times \frac{15}{20}$ or **M1** for $\frac{n}{21} \times \frac{n-1}{20}$ or for $\frac{16}{21}$ and $\frac{15}{20}$ seen If 0 scored **SC1** for answer $\frac{256}{441}$ oe

06. 0580_s22_ms_41 Q: 8

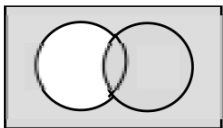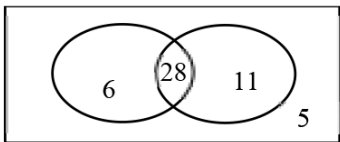| Question	Answer	Marks	Partial Marks
(a)(i)	$A \cap B$	1	
(a)(ii)		2	**B1** for each
(b)(i)	$\frac{9}{11}$	1	
(b)(ii)	$\frac{36}{121}$ oe	3	**M2** for $2 \times \frac{2}{11} \times \frac{9}{11}$ oe or **M1** for $\frac{2}{11} \times \frac{9}{11}$ oe If 0 scored **SC1** for $\frac{36}{110}$
(c)(i)	3, 5, 28, 14 correctly placed	2	**B1** for 28 in the intersection
(c)(ii)	$\frac{28}{50}$ oe	1	**FT** *their* 28 where *their* $28 < 50$
(c)(iii)	$\frac{123}{175}$ oe	2	**M1** for $\frac{42}{50} \times \frac{41}{49}$
(c)(iv)	$\frac{63}{88}$ oe	2	FT *their* 28 **M1** for $\frac{their\,28}{33} \times \frac{their\,28 - 1}{32}$

07.0580_s22_ms_42 Q: 6

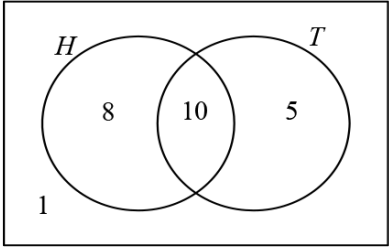| Question	Answer	Marks	Partial Marks
(a)	42 028	2	**M1** for $\dfrac{380}{500}$ oe soi isw
(b)	$\dfrac{47}{66}$ oe	4	0.712[1…] **M3** for $2\left(\dfrac{5}{12}\times\dfrac{4}{11}\right)+2\left(\dfrac{4}{12}\times\dfrac{3}{11}\right)+2\left(\dfrac{5}{12}\times\dfrac{3}{11}\right)$ oe or $1-\left(\dfrac{5}{12}\times\dfrac{4}{11}+\dfrac{4}{12}\times\dfrac{3}{11}+\dfrac{3}{12}\times\dfrac{2}{11}\right)$ oe or **M2** for sum of 3 or more correct product pairs and no incorrect pairs or for $\dfrac{5}{12}\times\dfrac{4}{11}+\dfrac{4}{12}\times\dfrac{3}{11}+\dfrac{3}{12}\times\dfrac{2}{11}$ and no other pairs or **M1** for $\dfrac{k}{12}\times\dfrac{j}{11}$ seen If 0 scored **SC1** for answer $\dfrac{94}{144}$ oe
(c)	52	2	**M1** for $x\times\dfrac{100-16}{100}=43.68$ oe or better
(d)(i)	70 or 70.16[5…] or 70.17 or 70.2	3	**M2** for $\dfrac{29\,750 \text{ to } 29\,800}{400+25}$ or $\dfrac{29\,750 \text{ to } 29\,800}{400+24}$ or $\dfrac{29\,800-50}{400\text{ to }425}$ or **B1** for 29 750 or 29 850 or 29 849 or 375 or 425 or 424 seen
(d)(ii)	2399 or 2400 nfww	2	**B1** for 27 450 or 27 550 or 27 549 or 29 850 or 29 849 seen

Question	Answer	Marks	Partial Marks
(a)(i)	$\dfrac{1}{15}$ oe	3	**M2** for $2 \times \dfrac{1}{6} \times \dfrac{1}{5}$ oe or **M1** for $\dfrac{1}{6} \times \dfrac{1}{5}$ oe or list or indication of 2 correct pairs If 0 scored, **SC1** for answer $\dfrac{1}{18}$ oe
(a)(ii)	$\dfrac{7}{15}$ oe	3	**M2** for $\left(\dfrac{4}{6} \times \dfrac{3}{5}\right) + 2\left(\dfrac{1}{6} \times \dfrac{1}{5}\right)$ oe or $14\left(\dfrac{1}{6} \times \dfrac{1}{5}\right)$ oe or $1 - 2\left(\dfrac{2}{6} \times \dfrac{4}{5}\right)$ or **M1** for $\left(\dfrac{4}{6} \times \dfrac{3}{5}\right)$ or $2\left(\dfrac{1}{6} \times \dfrac{1}{5}\right)$ oe or $2\left(\dfrac{2}{6} \times \dfrac{4}{5}\right)$ or correct identification of 14 pairs If 0 scored, **SC1** for answer $\dfrac{5}{9}$
(b)	$\dfrac{1}{10}$ oe nfww	4	**M3** for $6\left(\dfrac{1}{6} \times \dfrac{1}{5} \times \dfrac{1}{4}\right) + 6\left(\dfrac{1}{6} \times \dfrac{1}{5} \times \dfrac{1}{4}\right)$ oe or **M2** for $6\left(\dfrac{1}{6} \times \dfrac{1}{5} \times \dfrac{1}{4}\right)$ oe or $2\left(\dfrac{1}{6} \times \dfrac{1}{5} \times \dfrac{1}{4}\right)$ oe or **M1** for $k\left(\dfrac{1}{6} \times \dfrac{1}{5} \times \dfrac{1}{4}\right)$ where k is an integer and $1 \leqslant k \leqslant 12$ but not $k = 2$ or $k = 6$ or identifies -2, 2 and 5 or -3, 3 and 5 as the 3 cards needed If 0 scored, **SC1** for answer $\dfrac{1}{18}$

09. 0580_m21_ms_42 Q: 4

	Answer	Mark	Partial Marks
(a)	462	1	
(b)(i)	$\dfrac{7}{15}$ oe	1	
(b)(ii)	$\dfrac{7}{15}\times\dfrac{6}{14}+\dfrac{6}{15}\times\dfrac{5}{14}+\dfrac{2}{15}\times\dfrac{1}{14}$ $=\dfrac{37}{105}$	3	**M2** for addition of two of $\dfrac{7}{15}\times\dfrac{6}{14}+\dfrac{6}{15}\times\dfrac{5}{14}+\dfrac{2}{15}\times\dfrac{1}{14}$ or **M1** for one of the products seen
(b)(iii)	$\dfrac{29}{65}$ oe	4	**M3** for $\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{5}{13}+3\times\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{6}{13}+3\times\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{2}{13}$ oe or $1-3\left(\dfrac{8}{15}\times\dfrac{7}{14}\times\dfrac{7}{13}\right)-\left(\dfrac{8}{15}\times\dfrac{7}{14}\times\dfrac{6}{13}\right)$ oe or **M2** for the sum of at least two of $\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{5}{13},\ N\times\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{6}{13},\ N\times\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{2}{13}$ seen or for $\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{13}{13}$ or $\dfrac{7}{15}\times\dfrac{6}{14}+N\times\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{k}{13}$ seen or **M1** for $\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{5}{13}$ or $N\times\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{6}{13}$ or $N\times\dfrac{7}{15}\times\dfrac{6}{14}\times\dfrac{2}{13}$ seen If 0 scored **SC1** for $\dfrac{1519}{3375}$ oe
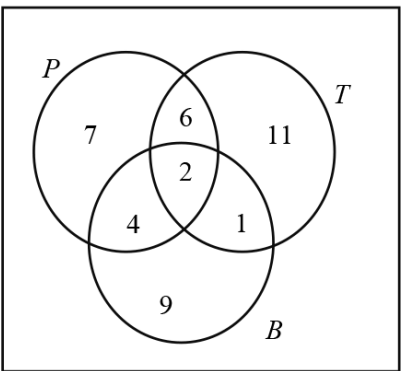
	Answer	Mark	Partial Marks
(a)		**1**	
(b)		**2**	**B1** for 2 or 3 correct elements or **M1** for $34 - x$, x and $39 - x$ correctly placed on diagram and $x = 28$
(c)(i)	8	**1**	
(c)(ii)	11	**1**	
(c)(iii)	2	**1**	
(c)(iv)	$C \cap S \cap B'$ oe	**1**	
(c)(v)	$\dfrac{19}{30}$ oe	**1**	
(c)(vi)	$\dfrac{2}{57}$ oe	**3**	**M2** for $\dfrac{4}{19} \times \dfrac{3}{18}$ or **M1** for $\dfrac{4}{19}$ seen
(c)(vii)	Equal numbers 15 or equal probability $\dfrac{15}{30}$ oe	**1**	

11. 0580_s21_ms_43 Q: 6

	Answer	Mark	Partial Marks
(a)		2	i.e. 8, 10 and 5 correctly placed **B1** for 10 correctly placed or **M1** for $18 - x$, x and $15 - x$ correctly placed on diagram and $x = 10$ seen
(b)	10	1	**FT** *their* Venn diagram
(c)	5	1	**FT** *their* Venn diagram
(d)	$\dfrac{5}{24}$ oe	1	**FT** *their* 5 on the Venn diagram
(e)	0	1	
(f)	$\dfrac{5}{17}$ oe	3	**M2** for $\dfrac{their10}{18} \times \dfrac{their9}{17}$ or **B1FT** for $\dfrac{their10}{18}$ or $\dfrac{their9}{17}$ seen After 0 scored, **SC1** for answer $\dfrac{25}{81}$ oe

12. 0580_m20_ms_42 Q: 6

	Answer	Mark	Partial Marks
(a)(i)	$\frac{1}{3}$ oe	1	
(a)(ii)	100	1	**FT** *their* **(a)(i)** $\times 300$ to at least 3 sf or rounded to the nearest integer
(b)(i)	$\frac{2}{15}$ oe	3	**M2** for $4 \times \frac{1}{6} \times \frac{1}{5}$ oe or **M1** for $k\left(\frac{1}{6} \times \frac{1}{5}\right)$ oe or list or indication of 4 correct pairs
(b)(ii)	$\frac{3}{5}$ oe	3	**M2** for $1 - \frac{4}{6} \times \frac{3}{5}$ or $2\left(\frac{2}{6} \times \frac{4}{5}\right) + \frac{2}{6} \times \frac{1}{5}$ oe or $\frac{2}{6} + \left(\frac{4}{6} \times \frac{2}{5}\right)$ oe or **M1** for $\frac{4}{6} \times \frac{3}{5}$ oe seen or $\frac{2}{6} \times \frac{4}{5}[\times 2]$ oe seen or $\frac{2}{6} \times \frac{1}{5}$ oe seen or correct identification of 18 pairs or space diagram oe

13. 0580_m20_ms_42   Q: 9

	Answer	Mark	Partial Marks
(a)		3	**B2** for 5 correct entries including '2' correctly placed at the intersection of the 3 sets or **M1** for $k + 8 - k + 3 - k + 6 - k = 40 - (7 + 9 + 11)$ oe or for k, $8 - k$, $3 - k$, $6 - k$, seen correctly placed on diagram with 7, 11 and 9 correctly placed
(b)	11	1	
(c)	Ø or { }	1	
(d)	$\dfrac{7}{260}$ oe	2	**M1** for $\dfrac{7}{40} \times \dfrac{6}{39}$ oe
(e)	$\dfrac{14}{95}$ oe	2	**FT** *their* Venn diagram **M1** for $\dfrac{8}{20} \times \dfrac{7}{19}$
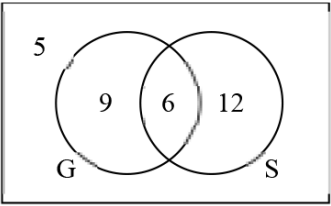
14. 0580_s20_ms_42   Q: 7

	Answer	Mark	Partial Marks
(a)	0.1	1	
(b)(i)	0.2 oe 0.6, 0.3, 0.1 oe	2	**B1** for 0.2 **B1** for 0.6, 0.3, 0.1
(b)(ii)	0.48 oe	2	**FT** *their* 0.6 from tree diagram **M1** for $0.8 \times$ *their* 0.6

	Answer	Mark	Partial Marks
(b)(iii)	0.28 oe	3	**M2** for $0.2 + 0.8 \times 0.1$ oe or **M1** for 0.2 or 0.8×0.1 or $0.8 \times (0.6 + 0.3)$
(c)	0.32 oe	3	**M2** for $0.8 \times 0.2 + 0.2 \times 0.8$ oe **M1** for one of these products

15. 0580_s20_ms_43 Q: 7

	Answer	Mark	Partial Marks
(a)(i)	$\dfrac{3}{4}, \dfrac{1}{4} \quad \dfrac{2}{5}, \dfrac{3}{5} \quad \dfrac{2}{5}, \dfrac{3}{5}$	**2**	**B1** for one correct pair
(a)(ii)	$\dfrac{3}{10}$ oe	**2**	**FT** *their* tree diagram **M1** for $\dfrac{3}{4} \times \dfrac{2}{5}$
(a)(iii)	$\dfrac{11}{20}$ oe	**3**	**M2** for $\dfrac{3}{4} \times \dfrac{3}{5} + \dfrac{1}{4} \times \dfrac{2}{5}$ or **M1** for $\dfrac{3}{4} \times \dfrac{3}{5}$ or $\dfrac{1}{4} \times \dfrac{2}{5}$
(b)	$\dfrac{36}{125}$ oe	**3**	**M2** for $\left(\dfrac{2}{5}\right)^2 \times \dfrac{3}{5} \times 3$ oe or **M1** for $\left(\dfrac{2}{5}\right)^2 \times \dfrac{3}{5}$
(c)	$\dfrac{3}{28}$ oe	**2**	**M1** for $\dfrac{3}{4} \times \dfrac{1}{7}$

16. 0580_w20_ms_41 Q: 9

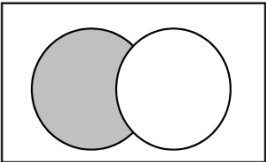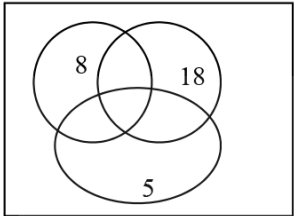|	Answer	Mark	Partial Marks
(a)(i)		2	**B1** for two correct values Or **B1** 5 outside and total in G = 15 and total in S = 18
(a)(ii)	$\frac{3}{8}$ oe	1	**FT** $\frac{their\ 12}{32}$
(a)(iii)	$\frac{2}{5}$ oe	1	**FT** $\frac{their\ 6}{15}$
(b)	96	2	**M1** for $\frac{36}{64}=\frac{54}{x}$ oe or $36=\frac{54}{(54+b)}\times100$ oe If 0 scored **SC**1 for answer 150
(c)(i)	$\frac{9}{25}$ oe	2	**M1** for $\frac{15}{25}\times\frac{15}{25}$ oe
(c)(ii)	$\frac{16}{25}$ oe	1	**FT** 1 – *their* **(c)(i)**
(d)	$\frac{17}{20}$ oe	3	**M2** for $1-\frac{10}{25}\times\frac{9}{24}$ oe or for $\frac{15}{25}\times\frac{14}{24}+\frac{15}{25}\times\frac{8}{24}+\frac{15}{25}\times\frac{2}{24}+\frac{8}{25}\times\frac{15}{24}$ $+\frac{2}{25}\times\frac{15}{24}$ oe or **M1** for one correct relevant product

17. 0580_w20_ms_42 Q: 6

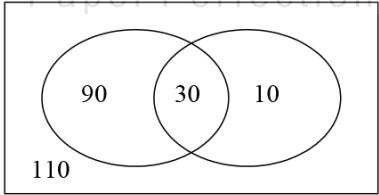|	Answer	Mark	Partial Marks
(a)(i)	$\frac{1}{3}$ oe	1	
(a)(ii)	0	1	
(a)(iii)	$\frac{1}{6}$ oe	1	
(b)(i)	$\frac{1}{15}$ oe	2	**M1** for $\frac{2}{6} \times \frac{1}{5}$ or equivalent method
(b)(ii)	$\frac{4}{15}$ oe	3	**M2** for $\frac{2}{6} \times \frac{1}{5} + \frac{3}{6} \times \frac{2}{5}$ or equivalent method or **M1** for $\frac{2}{6} \times \frac{1}{5}$ oe seen or $\frac{3}{6} \times \frac{2}{5}$ oe seen
(c)	$\frac{7}{18}$ oe	3	**M2** for $\left(\frac{1}{6}\right)^2 + \left(\frac{2}{6}\right)^2 + \left(\frac{3}{6}\right)^2$ oe or **M1** for one correct product seen or sample space with 14 correct pairs identified

18. 0580_w20_ms_43   Q: 4

	Answer	Mark	Partial Marks
(a)(i)	$\frac{1}{11}$ oe	1	
(a)(ii)	$\frac{1}{110}$ oe	2	**M1** for $\frac{1}{11} \times \frac{1}{10}$ oe
(a)(iii)	$\frac{4}{55}$ oe	3	**M2** for $\left(\frac{2}{11} \times \frac{1}{10}\right) + \left(\frac{3}{11} \times \frac{2}{10}\right)$ oe **or M1** for $\left(\frac{2}{11} \times \frac{1}{10}\right)$ or $\left(\frac{3}{11} \times \frac{2}{10}\right)$ seen oe
(b)(i)	$\frac{1}{165}$ oe	2	**M1** for $\frac{3}{11} \times \frac{2}{10} \times \frac{1}{9}$ oe
(b)(ii)	$\frac{1}{5}$ oe	5	**M4** for $3\left(\frac{2}{11} \times \frac{1}{10} \times \left[\frac{9}{9}\right]\right) + 3\left(\frac{3}{11} \times \frac{2}{10} \times \frac{8}{9}\right)$ oe or **M3** for $3\left(\frac{3}{11} \times \frac{2}{10} \times \frac{8}{9}\right)$ or **M2** for $3\left(\frac{2}{11} \times \frac{1}{10} \times \left[\frac{9}{9}\right]\right)$ or $\frac{3}{11} \times \frac{2}{10} \times \frac{8}{9}$ oe or **M1** for $\frac{2}{11} \times \frac{1}{10} \times \left[\frac{k}{9}\right]$ where k is 3, 6 or 9
(b)(iii)	$\frac{131}{165}$ oe	2	**M1** for $1 - (\textit{their }\textbf{(b)(i)} + \textit{their }\textbf{(b)(ii)})$ oe

19. 0580_m19_ms_42   Q: 3

	Answer	Mark	Partial Marks
(a)	$\dfrac{5}{9}$ oe	1	
(b)	$\dfrac{80}{153}$ oe	3	**M2** for $2 \times \dfrac{10}{18} \times \dfrac{8}{17}$ oe or **M1** for $\dfrac{10}{18} \times \dfrac{8}{17}$ oe If 0 scored, **SC1** for $\dfrac{160}{324}$ oe
(c)	$\dfrac{11}{51}$ oe	4	**M3** for $\dfrac{10}{18} \times \dfrac{9}{17} \times \dfrac{8}{16} + \dfrac{8}{18} \times \dfrac{7}{17} \times \dfrac{6}{16}$ oe or **M2** for $\dfrac{10}{18} \times \dfrac{9}{17} \times \dfrac{8}{16}$ oe or $\dfrac{8}{18} \times \dfrac{7}{17} \times \dfrac{6}{16}$ oe or **M1** for $\dfrac{10}{18}, \dfrac{9}{17}, \dfrac{8}{16}$ or $\dfrac{8}{18}, \dfrac{7}{17}, \dfrac{6}{16}$ If 0 scored, **SC1** for $\dfrac{1512}{5832}$ oe

20. 0580_m19_ms_42 Q: 9

	Answer	Mark	Partial Marks
(a)(i)(a)	$\in$	**1**	
(a)(i)(b)	$A \cap B$	**1**	
(a)(ii)	B or A'	**1**	
(b)		**1**	
(c)(i)	$3x + 7 = 19$ oe	**M1**	must see 19 and 7
	$3x = 19 - 7$ or better leading to $x = 4$	**A1**	with no errors seen
(c)(ii)		**2**	**B1** for 2 correct
(c)(iii)	$\varnothing$ or { }	**1**	
(c)(iv)	15	**1**	

21. 0580_s19_ms_41 Q: 6

	Answer	Mark	Partial Marks
(a)		**2**	**B1** for any one correct
(b)	110	**1**	**FT** *their* 110 in Venn diagram
(c)	$\dfrac{10}{240}$ oe	**1**	**FT** $\dfrac{their\,10}{240}$

	Answer	Mark	Partial Marks
(d)	$\dfrac{870}{1560}$ oe	**3**	**M2** for $\dfrac{their\,30}{40} \times \dfrac{their\,30-1}{39}$ or **M1** for $\dfrac{p}{q} \times \dfrac{p-1}{q-1}$ $\ p < q\ $ or for $\dfrac{their\,30}{40}$ soi

22. 0580_s19_ms_42 Q: 3

	Answer	Mark	Partial Marks
(a)	$1 - r$	**1**	
(b)(i)	$(1 - r)(1.3 - r)$ [= 0.4]	**1**	**FT** *their*(a) dep on (a) being an expression in r
(b)(ii)	$1.3 - 1.3r - r + r^2$ or better nfww	**M1**	**FT** *their* (b)(i)
	$0.9 - 2.3r + r^2 [= 0]$ OR $13 - 13r - 10r + 10r^2 = 4$ oe	**M1**	**Strict FT** *their* expansion to a quadratic then equating to 0.4 and then collecting to 3 terms on 'one side' OR **Strict FT** *their* expansion to a quadratic = 0.4 all multiplied by 10
	$10r^2 - 23r + 9 = 0$	**A1**	no errors or omissions seen

	Answer	Mark	Partial Marks
(b)(iii)	$(5r - 9)(2r - 1)$ [= 0]	**B2**	or **B2** for e.g. $5r(2r - 1) - 9(2r - 1)$ **and then** $5r - 9 = 0$ **and** $2r - 1 = 0$ or **B1** for $5r(2r - 1) - 9(2r - 1)$ [= 0] or $2r(5r - 9) - 1(5r - 9)$ [= 0] or $(5r + a)(2r + b)$ [= 0] where a, b are integers and $ab = +9$ or $2a + 5b = -23$ If 0 scored, **SC1** for $5r - 9$ **and** $2r - 1$ seen but not in factorised form
	$[r =] \dfrac{9}{5}$ oe $[r =] \dfrac{1}{2}$ oe	**B1**	
(b)(iv)	0.8 or $\dfrac{4}{5}$ oe	**1**	

23. 0580_s19_ms_43 Q: 8

	Answer	Mark	Partial Marks
(a)(i)	$\dfrac{x-1}{x+2}$	**2**	**B1** for either numerator or denominator correct
(a)(ii)(a)	$\dfrac{x}{x+3} \times \dfrac{x-1}{x+2} = \dfrac{7}{15}$	**B1**	**FT** *their* **(a)(i)** $= \dfrac{7}{15}$
	$15x(x-1) = 7(x+3)(x+2)$	**M1**	Removes all algebraic fractions **FT** *their* equation if in comparable form
	$15x^2 - 15x = 7x^2 + 21x + 14x + 42$	**M1**	Correctly expands all brackets **FT** *their* equation if in comparable form
	$[8x^2 - 50x - 42 = 0]$ $4x^2 - 25x - 21 = 0$	**A1**	With no errors or omissions seen and one further stage seen after final M1
(a)(ii)(b)	$(4x + 3)(x - 7) \ [= 0]$	**M2**	**M1** for $4x(x - 7) + 3(x - 7)$ or $x(4x + 3) - 7(4x + 3)$ or for $(4x + a)(x + b)$ where either $ab = -21$ or $4b + a = -25$ If **0** scored, **SC1** for $4x + 3$ **and** $x - 7$ seen but not in factorised form
	7 and $-\dfrac{3}{4}$	**B1**	
(a)(ii)(c)	7	**1**	**FT** *their* positive solution

	Answer	Mark	Partial Marks
(b)	$\dfrac{1}{6}$ oe	**4**	**M3** for $\dfrac{5}{9} \times \dfrac{4}{8} \times \dfrac{3}{7} + \dfrac{4}{9} \times \dfrac{3}{8} \times \dfrac{2}{7}$ or **M2** for $\dfrac{5}{9} \times \dfrac{4}{8} \times \dfrac{3}{7}$ or $\dfrac{4}{9} \times \dfrac{3}{8} \times \dfrac{2}{7}$ or **M1** for $\dfrac{5}{9}, \dfrac{4}{8}, \dfrac{3}{7}$ seen or $\dfrac{4}{9}, \dfrac{3}{8}, \dfrac{2}{7}$ seen If **0** scored, **SC1** for $\dfrac{5^3 + 4^3}{729}$ oe

	Answer	Mark	Partial Marks
(a)(i)	$\dfrac{4}{5}$ oe	1	
(a)(ii)	$\dfrac{4}{5}$ oe	1	
(b)(i)	$\dfrac{6}{20}$ oe nfww	3	**M2** for $\dfrac{1}{5}\times\dfrac{3}{4}+\dfrac{3}{5}\times\dfrac{1}{4}$ oe or $2\times\dfrac{1}{5}\times\dfrac{3}{4}$ oe or **M1** for $\dfrac{1}{5}\times\dfrac{3}{4}$ alone or $\dfrac{3}{5}\times\dfrac{1}{4}$ alone or for answer $\dfrac{3}{20}$ nfww After 0 scored, **SC1** for answer $\dfrac{6}{25}$
(b)(ii)	$\dfrac{8}{20}$ oe nfww	3	**M2** for $1-\dfrac{4}{5}\times\dfrac{3}{4}$ or $\dfrac{1}{5}\times1+\dfrac{4}{5}\times\dfrac{1}{4}$ oe or $2\times\dfrac{1}{5}\times1$ or $2\times\dfrac{1}{5}\times\dfrac{3}{4}+2\times\dfrac{1}{5}\times\dfrac{1}{4}$ or *their* (b)(i) + $2\times\dfrac{1}{5}\times\dfrac{1}{4}$ or **M1** for answer $\dfrac{2\text{ or }4\text{ or }5\text{ or }6\text{ or }7}{20}$ oe nfww After 0 scored, **SC1** for answer $\dfrac{8}{25}$

25. 0580_w19_ms_43 Q: 8

	Answer	Mark	Partial Marks
(a)(i)	$\frac{2}{5}$ oe	2	**M1** for $\frac{4}{6} \times \frac{3}{5}$
(a)(ii)	$\frac{3}{5}$ oe	1	**FT** $1 - their \frac{12}{30}$ oe
(b)	$\frac{5}{7}$ oe nfww	4	**M3** for $\frac{2}{7} + \frac{5}{7} \times \frac{2}{6} + \frac{5}{7} \times \frac{4}{6} \times \frac{2}{5}$ oe or for $1 - \frac{5}{7} \times \frac{4}{6} \times \frac{3}{5}$ oe or **M1** for each of $\frac{5}{7} \times \frac{2}{6}$ and $\frac{5}{7} \times \frac{4}{6} \times \frac{2}{5}$ oe or completed tree diagram with appropriate probabilities shown

26. 0580_s18_ms_41 Q: 9

	Answer	Mark	Partial Marks
(a)	$\frac{5}{8}$ $\frac{3}{8}$ $\frac{1}{6}$ $\frac{5}{6}$ $\frac{7}{10}$ $\frac{3}{10}$	3	**B1** for each pair

	Answer	Mark	Partial Marks
(b)	$\frac{5}{48}$ oe	2	**M1FT** for $their \frac{5}{8} \times their \frac{1}{6}$
(c)	$\frac{304}{480}$ oe	3	**M2** for $their \frac{5}{8} \times their \frac{5}{6} + their \frac{3}{8} \times their \frac{3}{10}$ oe or **M1** for $their \frac{5}{8} \times their \frac{5}{6}$ or $their \frac{3}{8} \times their \frac{3}{10}$

27. 0580_s18_ms_41 Q: 10

	Answer	Mark	Partial Marks
(a)	75	**3**	**M2** for 79.5 ÷ 1.06 oe or **M1** for 79.5 associated with 106 [%]
(b)	962.5 cao	**2**	**B1** for 35 or 27.5 seen
(c)(i)	16	**1**	
(c)(ii)	50	**1**	
(c)(iii)	$\dfrac{4}{50}$ oe	**2**	**FT** *their* **(c)(ii)** for 1 or 2 marks **B1** for $\dfrac{4}{k}$, $k > 4$ or $\dfrac{k}{their\,50}$, $k < 50$
(c)(iv)	19	**1**	

28. 0580_s18_ms_43 Q: 4

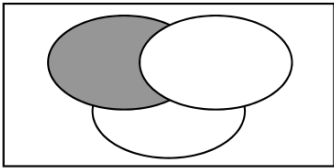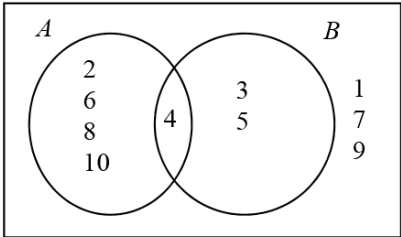|	Answer	Mark	Partial Marks
(a)(i)	$\dfrac{8}{20}$ oe	**3**	**M2** for $\dfrac{2}{5} \times \dfrac{1}{4} + \dfrac{3}{5} \times \dfrac{2}{4}$ or **M1** for one of these products OR **M1** for probability tree identifying all 20 outcomes with the correct 8 identified OR **M1** for completed possibility space / 2-way table identifying the 8 possible outcomes out of 20, oe **SC1** for $\dfrac{13}{25}$ with replacement

	Answer	**Mark**	**Partial Marks**
(a)(ii)	$\dfrac{9}{25}$ oe	3	**M2** for $\dfrac{2}{5} \times \dfrac{3}{5} + \dfrac{3}{5} \times \dfrac{1}{5}$ oe or **M1** for one of these products OR **M1** for probability tree identifying all 25 outcomes with the correct 9 identified OR **M1** for completed possibility space / 2-way table identifying the 9 possible outcomes out of 25, oe
(a)(iii)	Jojo and e.g. $\dfrac{40}{100} > \dfrac{36}{100}$	1	**1FT** *their* **(i)** and **(ii)** dep on being in range 0 to 1
(b)	$\dfrac{24}{60}$ oe	3	**M2** for $\dfrac{2}{5} \times \dfrac{3}{4} \times \dfrac{1}{3} + \dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{1}{3} + \dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{2}{3}$ oe or **M1** for any one correct product OR **M1** for 4, 5, 4 and 5, 4, 4 and 5, 5, 4 clearly identified on a tree or in a list

29. $0580\_w18\_ms\_41$ Q: 6

	Answer	**Mark**	**Partial Marks**
(a)(i)	14	1	
(a)(ii)	16	1	
(a)(iii)	$\dfrac{20}{462}$ oe	3	**M2** for $\dfrac{5}{22} \times \dfrac{4}{21}$ or **M1** for $\dfrac{5}{22}$ seen

	Answer	Mark	Partial Marks
(a)(iv)	Correct shading	**1**	
(b)(i)	Fully correct Venn diagram	**4**	**B1** for each correct region
(b)(ii)	3 4 5	**1**	**FT** *their* **(b)(i)**

30. 0580_w18_ms_42   Q: 12

	Answer	Mark	Partial Marks
(a)(i)	$\dfrac{10}{20} \times \dfrac{9}{19}$ oe	**M2**	**B1** for $\dfrac{9}{19}$ oe seen
(a)(ii)	$\dfrac{62}{95}$ oe	**4**	**M3** for $\dfrac{6}{20} \times \dfrac{14}{19} + \dfrac{10}{20} \times \dfrac{10}{19} + \dfrac{4}{20} \times \dfrac{16}{19}$ oe or $1 - \dfrac{6}{20} \times \dfrac{5}{19} - \dfrac{10}{20} \times \dfrac{9}{19} - \dfrac{4}{20} \times \dfrac{3}{19}$ oe or **M2** for the sum of two products of different flavours isw or **M1** for one correct product of different flavours isw
(b)	$\dfrac{5}{57}$ oe	**3**	**M2** for $N \times \left(\dfrac{4}{20} \times \dfrac{3}{19} \times \dfrac{16}{18} \right) + \dfrac{4}{20} \times \dfrac{3}{19} \times \dfrac{2}{18}$ oe or for $3\left(\dfrac{4}{20} \times \dfrac{3}{19} \times \dfrac{16}{18} \right)$ oe or $1 - \{ N \times \left(\dfrac{4}{20} \times \dfrac{16}{19} \times \dfrac{15}{18} \right) + \dfrac{16}{20} \times \dfrac{15}{19} \times \dfrac{14}{18} \}$ oe or **M1** for $\dfrac{4}{20} \times \dfrac{3}{19} \times \dfrac{k}{18}$ oe seen

	Answer	Mark	Partial Marks
(a)(i)	$\dfrac{3}{5} > \dfrac{1}{4}$ oe or $\dfrac{12k}{20k}$ and $\dfrac{5k}{20k}$ or 0.6 and 0.25 or 60% and 25%	1	
(a)(ii)	$\dfrac{11}{20}$ oe	3	**M2** for $\dfrac{3}{5} \times \dfrac{3}{4} + \dfrac{2}{5} \times \dfrac{1}{4}$ oe or $1 - \dfrac{3}{5} \times \dfrac{1}{4} - \dfrac{2}{5} \times \dfrac{3}{4}$ oe or **M1** for $\dfrac{3}{5} \times \dfrac{3}{4}$ or $\dfrac{2}{5} \times \dfrac{1}{4}$ oe (but not as part of a larger product)
(b)(i)	$\dfrac{6}{60}$ oe	2	**M1** for $\dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{1}{3}$ oe If 0 scored, **SC1** for answer $\dfrac{27}{125}$ oe
(b)(ii)	0	1	Accept $\dfrac{0}{60}$

	Answer	Mark	Partial Marks
(c)	$\dfrac{11}{25}$ oe	3	**M2** for $\dfrac{3}{5} \times \dfrac{3}{5} + \dfrac{2}{5} \times \dfrac{1}{5}$ oe or $1 - \dfrac{3}{5} \times \dfrac{2}{5} - \dfrac{2}{5} \times \dfrac{4}{5}$ oe or **M1** for $\dfrac{3}{5} \times \dfrac{3}{5}$ or $\dfrac{2}{5} \times \dfrac{1}{5}$ or for a correct tree showing all 25 outcomes with the 11 correct outcomes identified

32. 0580_m17_ms_42   Q: 4

	ANSWER	MARK	PARTIAL MARKS
(a)	$\frac{1}{8}$ oe	3	**M2** for $\frac{1}{2}\left(1-\frac{1}{6}-\frac{1}{4}-\frac{1}{3}\right)$ oe or **M1** for $\frac{1}{6}+\frac{1}{4}+\frac{1}{3}$ seen oe or idea that all sum to 1
(b)	$\frac{7}{12}$ oe	2	**M1** for $\frac{1}{3}+\frac{1}{4}$ oe
(c) (i)	$\frac{1}{16}$ oe	2	**M1** for $\frac{1}{4}\times\frac{1}{4}$ oe
(ii)	$\frac{2}{24}$ oe	3	**M2** for $2\times\frac{1}{6}\times\frac{1}{4}$ oe or **M1** for $\frac{1}{6}\times\frac{1}{4}$ oe
(d)	12	1	

33. 0580_s17_ms_42   Q: 6

	ANSWER	MARK	PARTIAL MARKS
(a)	$\frac{1}{3},\frac{6}{7}$ correctly placed	**1**	
	$\frac{4}{7},\frac{3}{7}$ correctly placed	**1**	

	ANSWER	MARK	PARTIAL MARKS
(b)	$\frac{2}{21}$ oe	2	**M1** for $\frac{2}{3}\times\frac{1}{7}$
(c)(i)	$\frac{15}{21}$ oe	3	**M2** for $\frac{2}{3}\times\frac{6}{7}+\frac{1}{3}\times\frac{3}{7}$ oe or **M1** for $\frac{2}{3}\times\frac{6}{7}$ oe or $\frac{1}{3}\times\frac{3}{7}$ oe seen
(c)(ii)	50	2FT	**FT** $(70\times$ *their* **(c)(i)**) rounded up or down to integer **M1** for $70\times$ *their* **(c)(i)**
(d)	$\frac{10}{243}$ oe	2	**M1** for $\frac{2}{3}\times\frac{1}{3}\times\frac{1}{3}\times\frac{1}{3}\times\frac{1}{3}[\times k]$ oe nfww where k is positive integer less than 5

34. 0580_w17_ms_41   Q: 9

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	52	**2**	**M1** for $(1 - 0.35) \times 80$ oe
(a)(ii)	84	**1**	
(b)(i)	$\dfrac{27}{729}$ oe	**2**	**M1** for $\dfrac{3}{9} \times \dfrac{3}{9} \times \dfrac{3}{9}$
(b)(ii)	$\dfrac{144}{729}$ oe	**3**	**M2** for $\dfrac{2}{9} \times \dfrac{3}{9} \times \dfrac{4}{9} \times 6$ oe or **M1** for $\dfrac{2}{9} \times \dfrac{3}{9} \times \dfrac{4}{9}$ oe isw
(c)	$\dfrac{42}{60}$ oe	**4**	**M3** for $\dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{1}{3} + \dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{2}{3} \times 3$ oe or **M2** for $\dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{2}{3} \times 3$ oe or for $\dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{1}{3} + \left(\dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{2}{3}\right)[\times 2]$ or **M1** for $\dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{1}{3}$ or $\dfrac{3}{5} \times \dfrac{2}{4} \times \dfrac{2}{3}$ oe isw or for PPG, PGP, GPP and PPP selected soi

35. 0580_w17_ms_42   Q: 7

	ANSWER	MARK	PARTIAL MARKS
(a)	$\dfrac{5}{6}$	**1**	
(b)	$\dfrac{4}{36}$ oe	**2**	**M1** for $\dfrac{2}{6} \times \dfrac{2}{6}$
(c)	20	**1**	

	ANSWER	MARK	PARTIAL MARKS
(d)(i)	Diagram completed correctly x x 3 3 3 9 x x 2 2 2 6 x x 2 2 2 6 x x 2 2 2 6 x x 1 1 1 3	2	**B1** for 3 correct columns or for 4 correct rows
(d)(ii)(a)	$\dfrac{9}{36}$ oe	1FT	**FT** *their* **(d)(i)**
(d)(ii)(b)	$\dfrac{4}{36}$ oe	1FT	**FT** *their* **(d)(i)**
(e)	$\dfrac{512}{7776}$ oe	2	**M1** for $\left(\dfrac{4}{6}\right)^{k} \times \dfrac{2}{6}$ oe $\quad k = 3, 4$ or 5 only