1	(a)		$\frac{2}{5}, \frac{3}{5}$ oe	2	B1	correct probabilities for spinner **A**
			$\frac{4}{5}, \frac{1}{5}, \frac{4}{5}, \frac{1}{5}$ oe		B1	correct probabilities for spinner **B**
	(b)	$'\frac{2}{5}'\times'\frac{4}{5}'\left(=\frac{8}{25}\right)$ **or** $'\frac{2}{5}'\times'\frac{1}{5}'\left(=\frac{2}{25}\right)$ **or** $'\frac{3}{5}'\times'\frac{4}{5}'\left(=\frac{12}{25}\right)$ **or** $'\frac{3}{5}'\times'\frac{1}{5}'\left(=\frac{3}{25}\right)$oe		3	M1	ft from (a) provided 0 < probability <1
		$1-'\frac{8}{25}'$ **or** $'\frac{2}{25}'+'\frac{12}{25}'+'\frac{3}{25}'$ **or** $'\frac{2}{25}'+'\frac{3}{5}'$oe			M1	ft from (a) for a complete method
			$\frac{17}{25}$		A1	oe
						Total 5 marks

2	(a)		$\frac{3}{10}, \frac{7}{12}, \frac{5}{12}, \frac{7}{12}, \frac{5}{12}$	2	B2	B1 for $\frac{3}{10}$ oe B1 for all other correct probabilities 2d.p truncated or rounded (e.g 0.58 or 0.41 or 0.42)

3	(a)			2	B1	for $\frac{13}{20}$ and $\frac{7}{20}$ on the first branch (0.65 and 0.35)
			Correct probabilities on the tree diagram		B1	for $\frac{12}{19}, \frac{7}{19}, \frac{13}{19}$ and $\frac{6}{19}$ on the second branch (accept 2 dp or better 0.6315..., 0.3684..., 0.6842..., 0.3157...)
	(b)	$\frac{7}{20}\times\frac{6}{19}$ oe only		2	M1	ft from (a) as long as probabilities less than 1
		$\frac{21}{190}$	$\frac{21}{190}$		A1	for $\frac{21}{190}$ oe or 0.11… (at least 2 dp)
						Total 4 marks

4	(a)		0.3		B1	oe first race branch correct
			0.6, 0.4, 0.6	2	B1	oe second race branches correct
	(b)	0.7 × "0.6" (= 0.42) oe **or** "0.3" × "0.4" (= 0.12) oe **or** 0.7 × 0.4 (= 0.28) oe **or** "0.3" × "0.6" (= 0.18) oe			M1	ft their tree diagram dep on probabilities being less than 1
		"0.42" + "0.12" oe **or** 1 – "0.28" – "0.18"oe			M1	ft complete method to find probability that Emilie wins exactly one of the races
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	0.54	3	A1	oe, eg $\frac{27}{50}$ ft from their tree diagram on M marks only
	(c)	0.7 × 0.4 × (1 – 0.6) (= 0.112) oe **or** "0.54" × 0.3 (= 0.162) oe **or** 0.7×"0.6"×0.3+"0.3"×"0.4"×0.3(= 0.162)			M1	ft
		eg "0.112" + "0.162"			M1	ft For a fully correct method
		Working not required, so correct answer scores full marks (unless from obvious incorrect working) *NB: allow decimals, fractions or percentages with % as oe for probability*	0.274	3	A1	oe, eg $\frac{137}{500}$ ft from (a) and (b) on M marks only
						Total 8 marks

5	(a)	0.6×0.9		2	M1	oe
			0.54		A1	oe e.g. $\frac{27}{50}, \frac{54}{100}$, 54%
	(b)	$0.6 \times 0.1 (= 0.06)$ **or** $0.4 \times 0.25 (= 0.1)$ **or** $0.4 \times 0.75 (= 0.3)$		3	M1	oe
		$0.6 \times 0.1 + 0.4 \times 0.25$ **or** $1 - (0.4 \times 0.75) - \text{“0.54”}$			M1	oe, ft their answer from (a)
			0.16		A1	oe e.g. $\frac{4}{25}, \frac{8}{50}, \frac{16}{100}$, 16%
						Total 5 marks

6		eg $\frac{4}{5} \times \frac{3}{7} (= \frac{12}{35})$ oe **or** $0.24 \times \frac{4}{7} (= \frac{96}{700})$ oe **or** eg $\frac{4}{5} \times 3 (= \frac{12}{5} = 2.4)$ **and** $0.24 \times 4 (= \frac{24}{25} = 0.96)$ (or 3.36) **or** eg $\frac{4}{5} \times 300 (= 240)$ **and** $0.24 \times 400 (= 96)$ (or 336)		3	M1	
		eg $\text{“}\frac{12}{35}\text{”} + \text{“}\frac{96}{700}\text{”} \left(= \frac{336}{700}\right)$ oe **or** $\frac{\text{“2.4”} + \text{“0.96”}}{3+4} \left(= \frac{3.36}{7}\right)$ oe **or** eg $\frac{\text{“240”} + \text{“96”}}{300+400} \left(= \frac{336}{700}\right)$ oe			M1	or 0.48 or 48% or correct unsimplified fraction eg $\frac{84}{175}$
			$\frac{12}{25}$		A1	cao
						Total 3 marks

7	(a)		0.8 and 0.2 0.3 and 0.7 0.6 and 0.4	2	B2 for all 3 correct pairs of probabilities on the correct branches (B1 for 2 correct pairs of probabilities on the correct branches) Allow equivalent fractions
	(b)	“0.8” × “0.3”		2	M1ft (Both probabilities must be less than 1)
			0.24		A1ft oe
					Total 4 marks

8	(a)		$\frac{5}{12}$	2	B1 for first choice correct 0.41(666…) to 2 dp truncated or rounded
			$\frac{7}{12}, \frac{5}{12}$		B1 for second choice correct 0.58(333…) to 2 dp truncated or rounded 0.41(666…) to 2 dp truncated or rounded
	(b)	$\text{“}\frac{5}{12}\text{”} \times \frac{5}{12}$ oe		2	M1 ft from their tree diagram 0.58(333…) to 2 dp truncated or rounded
			$\frac{25}{144}$		A1 oe 0.17(361111…) to 2 dp truncated or rounded or 17.(361111)% to 2 sf truncated or rounded
	(c)	$\frac{7}{12} \times \frac{5}{12} \times \frac{x}{15}$ oe **or** $\frac{7}{12} \times \frac{5}{12} \times y$ **or** $2 \times \frac{7}{12} \times \frac{5}{12}$ oe		3	M1 for *GRB* or *RGB* or $2 \times GR$ or $2 \times RG$
		$2 \times \frac{7}{12} \times \frac{5}{12} \times \frac{x}{15} = \frac{7}{24}$ oe **or** $2 \times \frac{7}{12} \times \frac{5}{12} \times y = \frac{7}{24}$ oe **or** $\frac{\frac{7}{24}}{2 \times \frac{7}{12} \times \frac{5}{12}} \left(= \frac{3}{5}\right)$ oe			M1 (ft their tree diagram) for a complete method 0.29(166…) to 2 dp truncated or rounded
			9		A1
					Total 7 marks

9	(a)		$\frac{5}{12}$ $\frac{8}{15}$ $\frac{7}{15}$ $\frac{8}{15}$ $\frac{7}{15}$	2	B2	for all correct probabilities $\frac{5}{12}, \frac{8}{15}, \frac{7}{15}, \frac{8}{15}, \frac{7}{15}$ (B1 for $\frac{5}{12}$ or $\frac{8}{15}, \frac{7}{15}, \frac{8}{15}, \frac{7}{15}$) oe eg for $\frac{5}{12}$ accept 0.41(666…) or 0.42, for $\frac{8}{15}$ accept 0.53(333…) or 0.53, for $\frac{7}{15}$ accept 0.46(666…) or 0.47

10	(a)		$\frac{2}{9}, \frac{7}{9}$	2	B1 for correct probabilities for the first card Allow equivalent probabilities e.g 0.2
			$\frac{1}{8}, \frac{7}{8}, \frac{2}{8}, \frac{6}{8}$		B1 for correct probabilities for the second card Allow equivalent probabilities

11	(a)		0.1 and 0.6	1	B1	oe
	(b)	0.7×0.9 or $1 - (0.7 \times$ "0.1" $+ 0.3 \times 0.4 + 0.3 \times$ "0.6")		2	M1	must be considering one correct product only or 1 – (all 3 correct products only) allow ft if using 1 – P(WL or LW or LL)
		Correct answer scores full marks (unless from obvious incorrect working)	0.63		A1	oe eg 63% or $\frac{63}{100}$ allow ft if using 1 – P(WL or LW or LL)
						Total 3 marks

12	(a)		$\frac{4}{6}$ $\frac{1}{6}, \frac{5}{6}, \frac{1}{6}, \frac{5}{6}$	2	B2oe	B1 for $\frac{4}{6}$ (or $\frac{2}{3}$) on LH bottom branch B1 for all other branches correct (allow 0.66 or 0.67 or better, 0.16 or 0.17 or better, 0.83 or better)