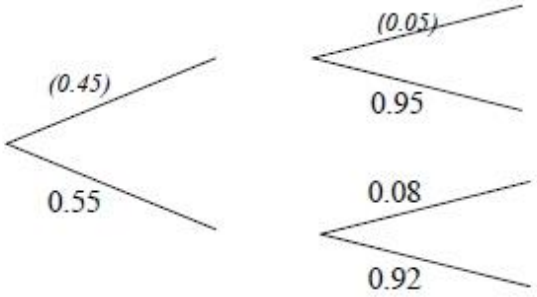
Tree Diagrams Mark Scheme

Q1.

Question	Answer		Additional guidance	Mark
(a)	B1	for 0.7, 0.4 and 0.8 in correct positions		(1)
(b)	M1 M1 A1 ft	0.3×0.6 or "0.7" × "0.8" 0.3×0.6 + "0.7" × "0.8" 0.74	1st M1 for a correct product of (their) probabilities 2nd M1 for complete method using their probabilities Allow ft provided probabilities are between 0 and 1	(3)
(c)	M1 A1	$\frac{0.3 \times 0.6}{0.3 \times 0.6 + \text{"0.7"} \times \text{"0.8"}}$ 0.243…	M1 for correct method for conditional probability Allow ft provided probabilities are between 0 and 1 A1 for awrt 0.24	(2)

Q2.

Question	Scheme	Marks
(a)		M1 A1 (2)
(b)	0.45×0.05 + 'their 0.55' × 'their 0.08' = **0.0665** or 6.65% or $\frac{133}{2000}$	M1 M1 A1 (3)
(c)	$\frac{0.45\times0.05}{\text{'their } 0.0665'}$ = awrt **0.338** or $\frac{45}{133}$	M1 A1 (2) [7]

	Notes
	Accept correct equivalent fractions or percentages to same accuracy throughout this question.
(a)	M1 for two correct probabilities, in correct positions. A1 for fully correct tree
(b)	1st **M1** for either product (from their tree - implied by 'their 0.0225' or 'their 0.044' seen – may be with tree) **2nd M1** for sum of two correct products (ft from their tree) **A1** allow 0.067 or 6.7% (Condone 0.066 or 6.6%). Correct answer scores M1M1A1 **BUT Do not follow through their tree for M1 marks in part (b) if no working is given.**
(c)	Must be conditional probability (with correct numerator) for M1 e.g. $\frac{0.0225}{\text{'their } 0.0665'}$ ...is M1 A1 accept 0.34 or 34% (Condone 0.33 or 33%). NB: A common incorrect answer is $\frac{5}{13}$, M0A0

Q3.

Question	Scheme	Marks
(a)	0.4×0.4 or $1 - (0.24 + 0.24 + 0.36)$ $(= 0.16)$	B1 (1)
(b)	$(0.24 + 0.24 =) 0.48$ or $(0.5 - 0.48 =) 0.02$ This is close to 0.5 (so nearly evens)	B2 (2)
(c)	He would expect (about) 36 times (for double tails) So (25 is) fewer than (or not the same as) expected. o.e.	M1 A1 (2)
	ALT. $\frac{25}{100}$ $(= 0.25)$ o.e. This is lower than (or not the same as) expected. o.e.	M1 A1 [5]

	Notes
	Accept equivalent fractions or percentages for probability.
(a)	B1 for a correct equivalent calculation (that would lead to answer 0.16). Condone poor notation and words (e.g. 'timesed by..'). Note: product may be shown on tree. Answer 0.16 not required.
(b)	B2 for complete reasoning which mentions 0.48 (or 0.02) **and** recognises evens = 0.5 e.g. '0.02 off (evens)' scores B2, BUT '0.48 is nearly evens' alone is B1 Accept '0.48 and 0.52 are close' for B2 Otherwise allow B1 for a partial answer which recognises there are two ways to get one head and one tail. e.g. HT & TH, OR 0.24 (+) 0.24 (note 0.24 may be seen as 0.4×0.6), OR 0.48 or 0.02 seen without a comparison
(c)	M1 for 0.36×100, or $25 \div 100$, or 36 (or 11) or 0.25 seen A1 for clear working with a correct comparison. (e.g. $0.36 \neq 0.25$)

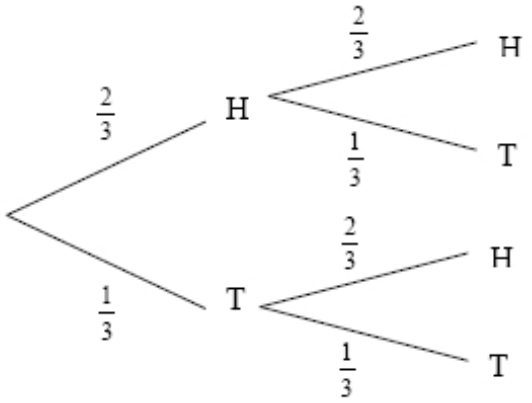
Q4.

Question	Answer		Additional guidance	Mark
(a)	B1	for 0.7, 0.4 and 0.8 in correct positions		(1)
(b)	M1 M1 A1 ft	0.3×0.6 or "0.7" × "0.8" 0.3×0.6 + "0.7" × "0.8" 0.74	1st M1 for a correct product of (their) probabilities 2nd M1 for complete method using their probabilities Allow ft provided probabilities are between 0 and 1	(3)
(c)	M1 A1	$\frac{0.3 \times 0.6}{0.3 \times 0.6 + \text{"0.7"} \times \text{"0.8"}}$ 0.243…	M1 for correct method for conditional probability Allow ft provided probabilities are between 0 and 1 A1 for awrt 0.24	(2)

Q5.

	5ST1F_01 Mark Scheme	Marks
(a)	$^5/_6$ for first dice, not a six	B1
	$^5/_6$, $^1/_6$, $^5/_6$ for second dice outcomes in correct order	B1 (2)
(b)	Yes she is right (oe) as chance of getting two sixes is 1 in 36 or $^1/_6 \times {}^1/_6$ or $^1/_{36}$ or 0.02(777…), o.e. (allow 0.02/0.03)	B2 (2)
	(OR incomplete answer scores B1)	**[4]**
	Notes	
(b)	Calculation may be with tree diagram. B2 requires correct conclusion with a reason referring to <u>both</u> dice, with no contradictory comments, no incorrect answer to $^1/_6 \times {}^1/_6$. Other acceptable reasons (not exhaustive): e.g. 'only 1/6 chance <u>on each</u> dice', or 'there are five other numbers <u>on each</u> dice'. **If B2 not scored then allow B1 for** EITHER: • Correct reason (or working) with no conclusion/wrong conclusion, OR: • Correct conclusion with partially correct reason, e.g.: ◦ with incorrect answer to $^1/_6 \times {}^1/_6$ ◦ with reference to only one dice being unlikely (condone 'less than even chance of a six') ◦ condone 'only 1/6 (or 2/12) chance of 2 sixes' **NB: reference to adding fractions scores 0/2**	

Q6.

Question	Scheme		Marks
(a)	$\frac{1}{3}$ o.e. (Allow 0.33)		B1 (1)
(b)		Correct shape tree	B1
		Outcomes (H/T)	dB1
		Probabilities $\frac{1}{3}$, $\frac{2}{3}$	dB1 ft (3)
(c)	$\frac{1}{3}\times\frac{1}{3}$	(can be implied)	M1
	$=\frac{1}{9}$ (allow awrt 0.11)		A1 cao (2) **[6]**

Notes	
(a)	Any equivalent fraction/decimal/percentage. Allow 0.33
(b)	B1 for tree with correct structure. dB1 dep on 1st B1 for sufficient labels to identify 4 correct routes/outcomes (HH/HT/TH/TT) dB1ft dep on 1st B1 for correct corresponding probabilities on all arcs. (allow 0.66 or 0.67 for $\frac{2}{3}$ and allow ft of their probability from (a)) (Condone labels on arcs and probabilities at ends.)
(c)	M1 for correct product using their probability from (a), or using their tree. (This mark can be implied by their answer if working not shown.) A1 for equivalent fraction/decimal/percentage. (allow $0.33\times0.33=0.1089$)

Q7.

Question	Scheme	Marks
(i)	$p = 0.7$ oe	B1
(ii)	'0.7'^{2}	M1
	$= 0.49$ oe	A1
		(3)

Notes	
(ii)	M1 for 'their (a)(i)'^{2}

Q8.

Question	Scheme	Marks
(a)	$\frac{2}{9}\times\frac{1}{8}$	M1
	$= \frac{2}{72}$ o.e. (e.g. $0.02\dot{7}$)	A1
		(2)
(b)	P(RR′ or WW′ or BB′) =	M1
	$\frac{2}{9}\times\frac{3+4}{8}+\frac{3}{9}\times\frac{2+4}{8}+\frac{4}{9}\times\frac{2+3}{8}$ $\left(=\frac{6+8}{72}+\frac{6+12}{72}+\frac{8+12}{72}\right)$	M1
	$= \frac{52}{72}$ o.e. e.g. $\frac{13}{18}$, 0.72, 72%	A1
		(3)
ALT.	1 – P(RR or WW or BB) =	M1
	$1-\left(\left(\frac{2}{9}\times\frac{1}{8}\right)$ *or their (a)* $+\frac{3}{9}\times\frac{2}{8}+\frac{4}{9}\times\frac{3}{8}\right)$	M1
	$= \frac{52}{72}$ o.e.	A1ft
		[5]

	Notes
(a)	M1: condone $\frac{2}{9}\times\frac{2}{9}$ or $\frac{a}{b}\times\frac{a-1}{b-1}$ if $a<b$
	A1: accept equivalent fraction, decimal or percentage, accept 0.028 or better
(b)	1st M1: identify outcomes RR′, WW′ and BB′ or equivalent 6 combinations of R/W/B (e.g. on a tree) (Implied by correct sum of products)
	2nd M1: at least one correct product seen $\left(\text{e.g. } \frac{2}{9}\times\frac{3}{8}\right)$
	A1: accept equivalent fraction, decimal or percentage to 2 significant figures. e.g. 0.72... or better
	Note sampling with replacement: final answer $\frac{52}{81}$ (o.e.) or awrt 0.642 implies M1M0A0
ALT.	1st M1: identify RR, WW and BB (e.g. on a tree) **AND** subtraction from 1
	2nd M1: at least one correct product used **AND** subtraction from 1
	A1ft: dependent on both M1 but allow ft from their (a) for RR.