Tree Diagrams

Mark Scheme 1

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Topic	Handling Data Statistics
Sub Topic	Tree Diagrams(Probability)
Booklet	Mark Scheme 1

Time Allowed: **56 minutes**

Score: **/46**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	70%	60%	55%	50%	<50%

Question Number	Working	Answer	Mark	Notes
1. (a)		$\frac{7}{8}$ for not late Correct binary structure ALL labels and values correct	3	B1 on lower first branch B1 4 branches needed on RHS B1
(b)	(1/8) x "(7/8)" or "(7/8)" x (1/8) or (1/8) x (1/8) (1/8) x "(7/8)" + "(7/8)" x (1/8) +(1/8) x (1/8)	$\frac{15}{64}$	3	M1 ft Any 1 "correct" product M1 ft 3 "correct" products with intention to add. Only ft probabilities < 1 or M2 for 1 –" $(\frac{7}{8})^2$ " A1 cao (0.234375)
				Total 6 marks

2. (a)		0.3 on bottom LH branch 0.8, 0.2, 0.5, 0.5 0.5, 0.5, 0.8, 0.2	3	B1 B1 Second game branches correct B1 Third game branches correct
(b)	(0.7 x "0.8")+(0.7 x "0.2"x"0.5")+("0.3"x"0.5"x "0.8")	0.75 oe	3	M2 ft M1 for 1 correct (ft) branch A1
				Alt method (1 – Jo winning) M2 1 – {(0.7x"0.2"x"0.5)+("0.3"x"0.5"x"0.2)+("0.3"x"0.5") A1
				Total 6 marks

3. (a)	Black circle = 0.3 White region = 0.6 All values "correct" for second shot		3	B1 B1 B1ft Allow ft if each group of 3 branches on second arrow all sum to1 and are consistent with first arrow branches
(b)	Any one correct product in numerical form e.g. ("0.3" x 0.1) or (0.1 x "0.3") or ("0.6" x "0.6") ("0.3"x 0.1) + (0.1x "0.3") + ("0.6" x "0.6")	0.42oe	3	M1ft e.g. (Black, Miss) or (Miss, Black) or (White, White) M1ft 3 "correct" products with intention to add A1 cao
				Total 6 marks

4. (a)	$1-\frac{1}{2}-\frac{1}{3}\left(=\frac{1}{6}\right)$	correct fractions on branches	3	M1 A1 for $\frac{1}{6}$ oe A1 correct values in correct places on full tree *Note:* (simplest form of fractions is **not** necessary) (accept $\frac{1}{6}$ and/or $\frac{1}{3}$ rounded or truncated to 2 or more decimal places eg 0.16 , 0.17 , 0.33 etc) **SC** : If M1 cannot be awarded then award B1 if top two branches in 2nd and 3rd games are **correct**
(b)	$\frac{1}{3}+\frac{1}{2}\times"\frac{1}{3}"+\frac{1}{2}\times"\frac{1}{2}"\times"\frac{1}{3}"$	$\frac{7}{12}$	3	M2 M1 for $\frac{1}{2}\times"\frac{1}{3}"$ **or** $\frac{1}{2}\times"\frac{1}{2}"\times"\frac{1}{3}"$ A1 accept 0.583... rounded or truncated to 2 or more sf
	Alternative method for (b) $1-\left("\frac{1}{6}"+\frac{1}{2}\times"\frac{1}{6}"+\frac{1}{2}\times"\frac{1}{6}"\times"\frac{1}{6}"+\frac{1}{2}\times"\frac{1}{2}"\times"\frac{1}{2}"\right)$	$\frac{7}{12}$		M1 for $\frac{1}{2}\times"\frac{1}{6}"$ or $\frac{1}{2}\times"\frac{1}{6}"\times"\frac{1}{6}"$ or $\frac{1}{2}\times"\frac{1}{2}"\times"\frac{1}{2}"$ A1 accept 0.583... rounded or truncated to 2 or more sf
				Total 6 marks

5. (a)		0.85 on lower branch Binary tree structure All labels & values correct	3	B1 on lower branch for first game B1 B1 0.15 & 0.85 in correct position + labels
(b)	0.15 x 0.15	0.0225 oe	2	M1 A1 9/400 etc
				Total 5 marks

6. D		0.3 in first fail branch 0.8, 0.2 in second attempt pass, fail branches	2	B1 B1	Branches must be labelled. Ignore extra branches leading from "pass".
(b)	"0.3" x 0.8	0.24 oe	2	M1ft A1	
(c)	("0.3" x "0.2"x 0.8) + ("0.3"x "0.2"x "0.2"x 0.8) oe	0.0576 oe	3	M2ft A1	M1ft for "0.3" x "0.2" x 0.8 (=0.048) or "0.3" x "0.2" x "0.2" x 0.8 (=0.0096) Accept 36/625
					Total 7 marks

7. (a)		0.6, 0.6, 0.4, 0.6	1	B1	For probabilities shown correctly on tree diagram.
(b)	0.6 × 0.6 × 0.4	0.144oe	2	M1 A1	Accept 18/125
(c)	0.3 + (0.7 × 0.3) + (0.7 × 0.7 × 0.3)	0.657	3	M2 A1	Accept 1 – 0.7 x 0.7 x 0.7 If not M2 then M1 for 0.7 × 0.3 or 0.7 × 0.7 × 0.3 or 0.21 or 0.147
					Total 6 marks

Question	Working	Answer	Mark	Notes
8. (a)		$\frac{5}{7}$ for does not win		B1 on lower first branch **or** on any branch labelled 'does not win'
		correct binary structure		B1 4 branches needed on RHS
		all labels and values correct	3	B1 NB. Allow decimals rounded or truncated to 3 or more sig figs $\left(\frac{2}{7} = 0.285714... ;\ \frac{5}{7} = 0.714285\right)$
(b)	"$\frac{2}{7}$"×"$\frac{2}{7}$" (=0.0813…) **or** "$\frac{2}{7}$"×"$\frac{5}{7}$" (=0.204…) **or** "$\frac{5}{7}$"×"$\frac{2}{7}$"			M1 ft for any "correct" product; allow decimals only ft probabilities < 1 **or** M2 for $1 - \left("\frac{5}{7}"\right)^2$
	"$\frac{2}{7}$"×"$\frac{2}{7}$" + "$\frac{2}{7}$"×"$\frac{5}{7}$" + "$\frac{5}{7}$"×"$\frac{2}{7}$" **or** "$\frac{2}{7}$"+"$\frac{5}{7}$"×"$\frac{2}{7}$"			M1 ft for full method
		$\frac{24}{49}$	3	A1 ft ; allow for decimal answer, accept 0.4897959… truncated or rounded to 3 or more sig figs; only accept 0.49 if preceded by more accurate answer or M2 awarded
				Total 6 marks