Mark scheme

Combined probability (tree or table)

Mathematics 0580 · Questions from Paper 1, Paper 2 and Paper 4

Total marks

64

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
5	3	3	3	5	7	7	9	10	12	**64**

Question 1 [5]

1(a)	Correct tree diagram	**3**	**B1** for $\frac{1}{5}$ oe **and** $\frac{4}{5}$ seen oe **M1** for either $\frac{1}{5}$ **or** $\frac{4}{5}$ in the correct place in the **first** branch If 0 scored, **SC1** for their two probabilities adding to 1 in the **first** branch
1(b)	$\frac{16}{25}$ oe	**2**	**FT** *their* **(a)** probabilities provided 0 < each of *their* $\frac{4}{5}$ < 1 **M1** for *their* $\frac{4}{5}$ × *their* $\frac{4}{5}$

Question 2 [3]

2	$\frac{147}{160}$ oe	**3**	**M2** for $\frac{1}{10}\times\frac{3}{4}+\frac{9}{10}\times\frac{15}{16}$ or **M1** for $\frac{1}{10}\times\frac{3}{4}$ or $\frac{9}{10}\times\frac{15}{16}$

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Question 3 **[3]**

3	$\frac{1}{3}$ oe	**3**	**M1** for $\left(1-\frac{2}{5}\right)\times p=\frac{1}{10}$ oe **M1** for $\frac{2}{5}\times(1-\textit{their } p)$ where $0<\textit{their } p<1$

Question 4 **[3]**

4(a)	9 10 11	**1**	
4(b)	$\frac{2}{5}$ oe	**2**	**FT** for $\frac{\textit{their } 2}{\textit{their } 5}$ **B1FT** for $\frac{\textit{their } 2}{k}$ where $\textit{their } 2 \leqslant k \leqslant 9$ or for $\frac{c}{\textit{their } 5}$ where $0<c\leqslant \textit{their } 5$

Question 5 **[5]**

5(a)	5 7 7 8 10 7 9 9 10 12	**1**	
5(b)	7	**1**	
5(c)(i)	$\frac{7}{25}$ or 0.28 or 28%	**2FT**	**FT** $\frac{\textit{their } 7}{25}$ **B1** for $\frac{k}{25}$ If zero scored, then **SC1** for $\frac{2}{5}$ or $\frac{6}{15}$ if no values in the bottom two rows of the table.
5(c)(ii)	0	**1FT**	**FT** $\frac{\textit{their } 0}{25}$

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Question 6 **[7]**

6 (a)	$\frac{8}{14}$ and $\frac{5}{13}$	**1**	
	$\frac{6}{13}$ and $\frac{7}{13}$	**1**	
(b) (i)	$\frac{30}{182}$ oe	**2**	**M1FT** for $\frac{6}{14} \times$ *their* $\frac{5}{13}$
(ii)	$\frac{126}{182}$ oe	**3**	**M2FT** for $1 - \frac{8}{14} \times \frac{7}{13}$ or $\frac{6}{14} \times \frac{5}{13} + \frac{6}{14} \times \frac{8}{13} + \frac{8}{14} \times \frac{6}{13}$ or $\frac{6}{14} + \frac{8}{14} \times \frac{6}{13}$ oe or **M1FT** for sum of any two of $\frac{6}{14} \times \frac{5}{13}$ or $\frac{6}{14} \times \frac{8}{13}$ or $\frac{8}{14} \times \frac{6}{13}$

Question 7 **[7]**

7	**(a)**	0.7, 0.1 oe correctly placed 0.2, 0.8 oe correctly placed	**1** **1**	
	(b) (i)	0.44 nfww oe	**3**	**M2** for $1 -$ *their* $0.7 \times$ *their* 0.8 or for $0.3 +$ *their* $0.7 \times$ *their* 0.2 oe or **M1** for *their* $0.7 \times$ *their* 0.8 or for two of 0.3×0.9, $0.3 \times$ *their* 0.1, *their* $0.7 \times$ *their* 0.2
	(ii)	110	**1FT**	**FT** $250 \times$ *their* **(b)(i)**
	(c)	If late at first two stations then certain to be late at station C oe	**1**	Indication of certain event (allow 1 or 100% probability or sure) at third station if late at first two stations

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Question 8 [9]

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

Question 9 [10]

9(a)(i)	1	**1**	
9(a)(ii)	$\frac{1}{4}$ oe **nfww**	**2**	**M1** for $\frac{2}{4} \times \frac{2}{4}$ oe
9(a)(iii)	7	**2**	**M1** for trials with $\left(\frac{3}{4}\right)^k \times \frac{1}{4}$ soi
9(b)(i)	0.72 oe	**2**	**M1** for 0.9×0.8
9(b)(ii)	0.26 oe	**3**	**M2** for $0.9 \times 0.2 + 0.1 \times 0.8$ or $1 -$ *their* **(b)(i)** $- 0.1 \times 0.2$ or **M1** for 0.9×0.2 or 0.1×0.8 or $1 -$ *their* **(b)(i)** or $1 - 0.1 \times 0.2$

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Question 10 **[12]**

10 (a) (i)	$\frac{1}{36}$ **final answer**	**2**	**M1** for $\frac{1}{6}\times\frac{1}{6}$
(ii)	$\frac{1}{12}$ **final answer**	**3**	**M2** for $3\left(\frac{1}{6}\times\frac{1}{6}\right)$ oe or **M1** for identifying 3 correct pairs $(4,6)$, $(6,4)$ and (5, 5)
(b)	7	**1**	
	Refers to most combinations oe	**1**	**Dependent** on previous mark
(c)	$\frac{141}{1296}$ oe $\left[\frac{47}{432}\right]$	**5**	**M4** for $\frac{2}{36}+\left(\left[1-\frac{3}{36}\right]\times\frac{2}{36}\right)+\left(\frac{1}{36}\times\frac{3}{36}\right)$ oe or **M3** for 2 correct probabilities shown <u>added</u> from those above or **M1** for $\left(1-\frac{3}{36}\right)\times\frac{2}{36}$ seen oe And **M1** for $\frac{1}{36}\times\frac{3}{36}$ seen oe or $\frac{1}{6}\times\frac{1}{6}\times\frac{1}{6}\times\frac{1}{6}$ oe alone or added to a probability not of the form $\frac{n}{36}$

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