Extended Mathematics
Topic : Probability
Year :May 2013 -May 2024
Paper -2
Answers

Question 1

(a)	$\frac{5}{25}$ oe	**2**	**B1** for answer $\frac{5}{k}$ or $\frac{k}{25}$
(b)	$\frac{4}{25}$ oe	**2**	**B1** for answer $\frac{4}{k}$ or $\frac{k}{25}$

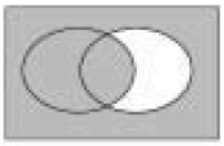
Question 2

$\frac{30}{300}$ oe www	**2**	**M1** for 30 seen or $\frac{k}{300}$ seen

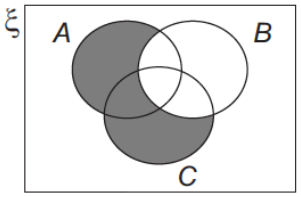
Question 3

(a) $\frac{2}{6}$ oe	**1**	
(b) 200	**1FT**	FT 600 × *their* **(a)** providing *their* **(a)** is a probability

Question 4

(a) (i) $\frac{5}{50}$ oe	**1**	
(ii) $\frac{11}{50}$ oe	**1**	
(b) $\frac{11}{16}$ oe	**1**	
(c) $\frac{380}{2450}$ oe	**2**	**M1** for $\frac{20}{50}\times\frac{19}{49}$
(d) 	**1**	

Question 5

(a) (i)	4	**1**	
(ii)	{3, 9}	**1**	
(iii)	fewer than 6 numbers from {1, 3, 5, 7, 9, 11} or ∅	**1**	
(b)		**1**	

Question 6

0.2 oe	**2**	**M1** for $1 - (0.15 + 0.3 + 0.35)$

Question 7

Sammy and correct reason with 25.7% oe shown	**2**	**B1** for 25.7% or 0.257... seen or conversion of 26% to fraction and common denominator

Question 8

0.96 oe	**3**	**M2** for $1 - 0.2 \times 0.2$ or $0.8 + 0.2 \times 0.8$ or $0.8 \times 0.8 + 0.8 \times 0.2 + 0.2 \times 0.8$ or **B1** for one of 0.2×0.2, 0.8×0.8, 0.8×0.2, 0.2×0.8 seen

Question 9

6	**1**	

Question 10

(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 11

(a)	0.16 oe	**2**	**M1** for 0.4×0.4 If zero scored **SC1** for fully correct evaluated method involving a without replacement method
(b)	0.58 oe	**4**	**M3** for $1-(0.4^2+0.5^2+0.1^2)$ oe or **M2** for $0.4^2+0.5^2+0.1^2$

Question 12

(a)		$\frac{2}{3}$ oe	**1**	
(b)		*their* $\frac{2}{3}$, $\frac{7}{8}$, $\frac{5}{8}$ oe	**2**	**B1** for either $\frac{7}{8}$ or $\frac{5}{8}$
(c)	**(i)**	$\frac{1}{24}$ oe	**2**	**M1** for $\frac{1}{3}\times\frac{1}{8}$ seen
	(ii)	$\frac{17}{24}$ oe	**3**	**M2FT** for $\frac{1}{3}\times\frac{7}{8}+\frac{2}{3}\times\frac{5}{8}$ or **M1FT** for $\frac{1}{3}\times\frac{7}{8}$ or $\frac{2}{3}\times\frac{5}{8}$

Question 13

(a)	0.6 oe	**1**	
(b)	20 0.3 oe 0.3 oe	**2**	**B1** for 20 **B1** for 0.3 oe and 0.3 oe

Question 14

$\frac{5}{6}$ oe	**3**	**M2** for $1-\frac{2}{3}\times\frac{1}{4}$ or $\frac{1}{3}+\frac{2}{3}\times\frac{3}{4}$ or $\frac{1}{3}\times\frac{3}{4}+\frac{1}{3}\times\frac{1}{4}+\frac{2}{3}\times\frac{3}{4}$ or **M1** for $\frac{2}{3}\times\frac{1}{4}$ or $\frac{1}{3}\times\frac{1}{4}+\frac{2}{3}\times\frac{3}{4}$

Question 15

$\frac{4}{25}$ oe	**2**	**M1** for $\frac{2}{5}\times\frac{2}{5}$ oe or denominator 5^2 oe

Question 16

[0].15 oe	**1**

Question 17

(a)	5 7 7 8 10 7 9 9 10 12	**1**	
(b)	7	**1**	
(c)(i)	$\frac{7}{25}$ or 0.28 or 28%	**2FT**	**FT** $\frac{their\ 7}{25}$ **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.
(c)(ii)	0	**1FT**	**FT** $\frac{their\ 0}{25}$

Question 18

rt	**3**	**B1** for each
$(1-t)\,r$		
$(1-r)t$ oe		
$(1-r)(1-t)$ oe		

Question 19

(a)	$\frac{9}{20}$ oe	**1**	
(b)(i)	$\frac{6}{20}\times\frac{5}{19}$	**M1**	
	$\frac{30}{380}$ oe	**A1**	
(b)(ii)	$\frac{258}{380}$ oe	**4**	**M3** for $1-\frac{3}{38}-\frac{5}{20}\times\frac{4}{19}-\frac{9}{20}\times\frac{8}{19}$ oe or **M2** for $\frac{3}{38}+\frac{5}{20}\times\frac{4}{19}+\frac{9}{20}\times\frac{8}{19}$ oe or $\frac{5}{20}\times\frac{9}{19}+\frac{6}{20}\times\frac{9}{19}+\frac{6}{20}\times\frac{5}{19}$ oe or **M1** for one correct product other than $\frac{6}{20}\times\frac{5}{19}$

Question 20

(a)	$\frac{4}{5}$ oe	**2**	**M1** for $\frac{2}{3}\times p=\frac{8}{15}$ or better
(b)	$\frac{1}{15}$ oe	**3**	**3FT** $(1-\textit{their}\ \frac{4}{5})\times\frac{1}{3}$ correctly evaluated **M2** for $(1-\textit{their}\ \frac{4}{5})\times(1-\frac{2}{3})$ oe or **M1** for $1-\textit{their}\ \frac{4}{5}$ or $1-\frac{2}{3}$

Question 21

(a)	$\frac{8}{15}$ oe	**1**	
(b)	$\frac{168}{210}$ oe	**3**	**M2** for $1-\frac{7}{15}\times\frac{6}{14}$ oe or $3(\frac{7\times8}{15\times14})$ oe or **M1** for $\frac{7}{15}\times\frac{6}{14}$ or $\frac{7}{15}\times\frac{8}{14}$ or $\frac{8}{15}\times\frac{7}{14}$ oe

Question 22

(a)	$\frac{94}{200}$ oe	**2**	**M1** for $\frac{46}{200}+\frac{48}{200}$ oe
(b)	14.1 or 14.07…	**3**	**M2** for $2\left(\frac{50}{200}\times\frac{56}{199}\right)$ oe or **M1** for $\frac{50}{200}\times\frac{56}{199}$ oe

Question 23

70	**2**	**M1** for $25\,000 \times 0.0028$ oe

Question 24

$\frac{2}{20}$ oe	**2**	**M1** for $\frac{2}{5}\times\frac{1}{4}$ oe

Question 25

(a)	0.3 oe	**2**	**M1** for 0.4×0.75
(b)	0.975 oe	**2**	**M1** for $1 - 0.4 \times 0.25 \times 0.25$ oe or $0.6 + 0.4 \times 0.75 + 0.4 \times 0.25 \times 0.75$ or $0.6 +$ *their* **(a)** $+ 0.4 \times 0.25 \times 0.75$

Question 26

$\frac{147}{160}$ 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 $\frac{9}{10}\times\frac{15}{16}$

Question 27

42	**2**	**M1** for $\frac{7}{15}$ [$\times 90$]

Question 28

(a)	0.22 oe	**2**	**M1** for $0.15 + 0.2 + ? + 0.43 = 1$ or better
(b)	40	**1**	

Question 29

(a)	50	**2**	**M1** for $\frac{5}{7+5+2}$ [$\times 140$] or $\frac{140}{7+5+2}$ [$\times 5$]
(b)	26	**2**	**M1** for $\frac{5+9}{n}=\frac{2}{7}$ oe or $\frac{5+9}{p+7+5+2+9}=\frac{2}{7}$ oe

Question 30

0.845 oe	**3**	**M2** for $0.7\times0.95+(1-0.7)\times0.6$ oe or **M1** for one of these products

Question 31

(a)	$\frac{3}{10}$ oe	**1**	
(b)	35	**1**	

Question 32

$\frac{19}{60}$ oe	**3**	**M2** for $\frac{8}{16}\times\frac{7}{15}+\frac{5}{16}\times\frac{4}{15}$ or **M1** for $\frac{8}{16}\times\frac{7}{15}$ or $\frac{5}{16}\times\frac{4}{15}$ If 0 scored **SC1** for $\frac{89}{256}$ oe

Question 33

0.85 oe	**1**	

Question 34

(a)	Multiples of 3 Prime numbers + | 3 | **6** | 9 2 | 5 | **8** | 11 3 | 6 | **9** | **12** **5** | **8** | **11** | **14**	**2**	**B1** for at least 4 correct entries
(b)	$\frac{2}{5}$ oe	**2**	**B2FT** for $\frac{their\,2}{their\,5}$ or **B1FT** for $\frac{their\,2}{k}$ k is any integer in the range $1 \leqslant k \leqslant 7$ or $\frac{c}{their\,5}$ c is 0, 1 or 2

Question 35

$\frac{37}{60}$ oe	**4**	**B3** for $x = 18$ or 37 [yellow] or **SC2** for answer $\frac{5}{12}$ or **M2** for $\frac{1}{12} = \frac{5}{5+x+2x+1}$ oe or **M1** for $5 + x + 2x + 1$ oe or [total number of flowers =] 60

Question 36

0.95 oe	**1**	

Question 37

(a)	$(M \cup G) \cap P'$	**1**	
(b)	22	**1**	
(c)	$\frac{8}{23}$ oe	**2**	**M1** for $\frac{k}{23}$ or $\frac{k}{3+9+5+6}$ or $\frac{8}{c}$ or $\frac{3+5}{c}$ $c \neq 1$ or for 8 and 23 identified

Question 38

0.48 oe	**2**	**M1** for $1-(0.2+0.32)$ oe

Question 39

(a)	$\frac{7}{20}$ oe or 0.35 or 35%	**2**	**M1** for $1-\left(\frac{2}{5}+\frac{1}{4}\right)$ oe
(b)	48	**1**	

Question 40

$\frac{3}{7}$ oe	**3**	**M1** for clearly identifying the 7 even outcomes 2 6, 3 5, 3 7, 3 9, 5 5, 5 7, 5 9 **M1** for clearly identifying the 3 even outcomes with just one five 3 5, 5 7 and 5 9 If 0 scored **SC1** for answer $\frac{1}{4}$ oe

Question 41

(a)(i)	$\frac{3}{4}$ oe	**1**	
(a)(ii)	45	**1**	**FT** 60 × *their* **(a)(i)** correctly evaluated

(b)	$\frac{47}{66}$ oe	4	**M3** for $1-\left(\frac{5}{12}\times\frac{4}{11}+\frac{4}{12}\times\frac{3}{11}+\frac{3}{12}\times\frac{2}{11}\right)$ oe or **M2** for $\left(\frac{5}{12}\times\frac{4}{11}+\frac{4}{12}\times\frac{3}{11}+\frac{3}{12}\times\frac{2}{11}\right)$ oe or $\left(\frac{5}{12}\times\frac{4}{11}+\frac{5}{12}\times\frac{3}{11}+\frac{4}{12}\times\frac{3}{11}\right)$ oe or **M1** for $\frac{5}{12}\times\frac{4}{11}$ or $\frac{5}{12}\times\frac{3}{11}$ or $\frac{4}{12}\times\frac{3}{11}$ or $\frac{3}{12}\times\frac{2}{11}$ oe If 0 scored, **SC1** for $\frac{47}{72}$ oe
(c)	5	2	**M1** for correct trial to at least two balls one of which is not green

Question 42

7	2	**B1** for answer 6 or **M1** for $\left(\frac{2}{3}\right)^{k}\left(\frac{1}{3}\right)$ shown with $k > 1$ or $\left(\frac{2}{3}\right)^{an+b}\left(\frac{1}{3}\right)=\frac{64}{2187}$ oe or for $3^{n}=2187$ soi or $2^{n-1}=64$ or $3^{n-1}=729$ or better

Question 43

(a)	0.11 oe	2	**M1** for $1-(0.3+0.16+0.18+0.25)$ oe or **B1** for 0.89 oe
(b)	0.46 oe	2	**M1** for $0.3+0.16$

Question 44

$\frac{1}{3}$ 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 45

0.4 oe	2	**M1** for $1-(0.2+0.05+0.35)$ oe or **B1** for 0.6 oe

Question 46

$\frac{20}{39}$ oe	**3**	**M2** for $\frac{5}{13}\times\frac{8}{12}[\times 2]$ oe or **M1** for $\frac{5}{13}$ or $\frac{8}{12}$ or $\frac{5}{12}$ or $\frac{8}{13}$ If 0 scored **SC1** for answer $\frac{80}{169}$ oe

Question 47

0.22 oe	**2**	**M1** for 1 – (0.3 + 0.35 + 0.13) oe or B1 for 0.78 oe

Question 48

(a)	0.11 oe	**2**	**M1** for 1 – (0.4 + 0.32 + 0.17) oe
(b)	576	**1**	

Question49

$\frac{2}{3}$ oe nfww	**4**	**M3** for $\frac{2}{13}\times\frac{11}{12}+\frac{5}{13}\times\frac{8}{12}+\frac{6}{13}\times\frac{7}{12}$ oe or $1-\left(\frac{2}{13}\times\frac{1}{12}+\frac{5}{13}\times\frac{4}{12}+\frac{6}{13}\times\frac{5}{12}\right)$ oe or **M2** for sum of three or more correct product pairs and no incorrect pairs or for $\frac{2}{13}\times\frac{1}{12}+\frac{5}{13}\times\frac{4}{12}+\frac{6}{13}\times\frac{5}{12}$ and no other pairs or **M1** for $\frac{j}{13}\times\frac{k}{12}$ If 0 scored **SC1** for answer $\frac{104}{169}$ oe

Question 50

14	**1**	

Question 51

(a)	54	**2**	**M1** for $\frac{3}{20}[\times 360]$ oe or $\frac{360}{20}[\times 3]$ oe
(b)	$\frac{17}{20}$ oe	**1**	

Question 52

0.85 oe	**1**	

Question 53

93	**2**	**M1** for $\frac{3}{40}[\times 1240]$ oe or $\frac{1240}{40}[\times 3]$ oe or $\frac{40}{3}=\frac{1240}{x}$ oe

Question 54

0.225 oe	**4**	**M3** for $\left(1-\frac{0.25}{0.4}\right)\times(1-0.4)$ oe OR **M2** for $\frac{0.25}{0.4}$ or **M1** for $0.4 \times p = 0.25$ oe **M1** for (1 –*their*P(Jen red))×(1 – 0.4) oe

Question 55

(a)	0.4 oe	**1**	
(b)	42 0.2 0.2	**2**	**B1** for 42 **B1** for 0.2 and 0.2 If B0 scored **SC1** for *their* two probabilities being half *their* **(a)**