Topic 11 Probability (Post-TT) [51] MARKSCHEME

1.

Sight of: 5/10 × 4/9 or 3/10 × 2/9 or 2/10 × 1/9 — M1

Correct evaluation of at least two correct products — M1
20/90, 6/90, 2/90 or equivalent

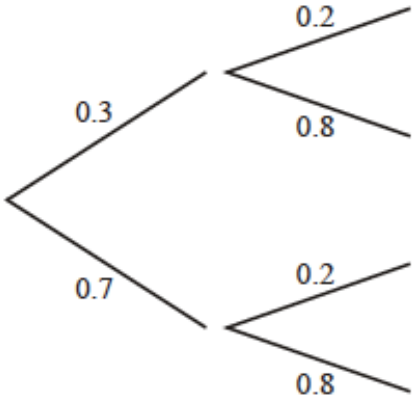
Attempt at addition of their three relevant products — M1
This could be left as
(5/10 × 4/9) + (3/10 × 2/9) + (2/10 × (1/9)

28/90 or 14/45 — A1
Note: (5/10 × 5/10) + (3/10 × 3/10) + (2/10 × 2/10)
= 38/100 or 19/50 M1 A1 (SC)

[4]

2.

(a) — B1



(b) 0.3 × 0.2 — M1
oe

0.06 — A1
or 6/100

[3]

3.

(a) 40 × 0.4 — M1

16 — A1

(b) 30 ÷ 80 — M1

Plot at (80, 0.375) — A1

Point on graph within ½ square 2 marks

(c) Yes (implied) plus reference to 20 (out of 80) or probability should be 0.25 or ¼ — B1

[5]

4.

Alternative method 1		
1800	B3	B2 a × b × c × d with at least 3 correct from 9, 10, 10 and 2 B1 a × b × c × d with at least 2 correct from 9, 10, 10 and 2 or identifies 9 possibilities for first digit or identifies 2 possibilities for final digit
Alternative method 2		
9000	M1	The number of digits between 1000 and 9999 inclusive
their 9000 ÷ 5	M1dep	
1800	A1	

5.

Sight of $(0.6)^2 \times (0.4)$ M1

*Could be part of a tree diagram...**must** multiply*

Indication of 3 possible ways (**must** show addition) ie. $3 \times (0.6)^2 \times (0.4)$ M1

Could also be part of a tree diagram ... might just indicate the 3 routes through the tree but must add
ie. $0.6 \times 0.6 \times 0.4 + 0.6 \times 0.4 \times 0.6 + 0.4 \times 0.6 \times 0.6$

$= 0.432$ A1

[3]

6.

$0.5 \times$ prob or $0.3 \times$ prob or $0.2 \times$ prob M1

Second prob use of 9 in denominator M1 dep

$\frac{5}{10} \times \frac{4}{9}$ or $\frac{3}{10} \times \frac{2}{9}$ or $\frac{2}{10} \times \frac{1}{9}$ A1

Or equivalent fractions eg $\frac{20}{90}$ etc

$\frac{5}{10} \times \frac{4}{9} + \frac{3}{10} \times \frac{2}{9} + \frac{2}{10} \times \frac{1}{9}$ M1

Adding 3 correct products

$\frac{28}{90}$ or 0.31… A1

Or equivalent

SC3 for fully correct using ratio throughout. Treat MR as A2
M1 using correct sample space diagram and M1 for denominator 90

[5]

7.

(a)	Two of $\frac{6}{50}$ $\frac{28}{100}$ $\frac{34}{150}$	B2	oe fraction, decimal, percentage B1 One of $\frac{6}{50}$ $\frac{28}{100}$ $\frac{34}{150}$ with at most one incorrect answer
(b)	Chooses their probability from the larger number of trials and reason given that more trials are involved	B1ft	Must have two probabilities in (a)

8.

(a) Any one correct probability seen — M1

Seen anywhere in (a)

$\frac{1}{4}$ and $\frac{3}{4}$ correctly placed — A1

Or 0.25, 0.75

$\frac{4}{10}$ and $\frac{6}{10}$ correctly placed twice — A1

Or 0.4, 0.6 (twice)

(b) $\frac{3}{4} \times \frac{6}{10}$ — M1

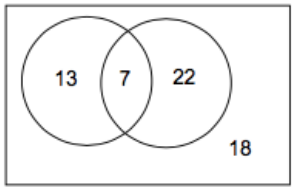
ft their tree if possible (unambiguous)

$= \frac{9}{20}$ (or 0.45) — A1

oe

[5]

9.

(a)			**3** 1 AO2.1a 2 AO2.3b	**B1** for 18 correctly placed AND **B2** for 13, 7 and 22 correctly placed Or **M1** for 60 – (18 + *their* '13' + *their* '22') in overlap	*Their* 7 must be ≥ 1
(b)		$\frac{20}{42}$ **oe**	**2FT** 1 AO2.1b 1 AO2.3a	**M1** for denominator 42 seen, **FT** from *their* '13' + *their* '7' + *their* '22'	**FT** from *their* Venn diagram Look for $\frac{10}{21}$ or 0.476[190] Condone 0.47 to 0.48

10.

(a)		Insufficient trials	**1** 1 AO2.5a		Any acceptable reason
(b)		11 8 1	**3** 1 AO1.3b 2 AO2.1b	**B2** for two correct or for one correct with total balls = 20 Or **M1** for $\frac{66}{120} \times 20$ or $\frac{47}{120} \times 20$ or $\frac{7}{120} \times 20$	

11.

(a) $\frac{4}{9}\times\frac{3}{8}$ M1

$= \frac{1}{6}$ oe A1

0.17 or better

(b) "a" $+ (\frac{3}{9}\times\frac{2}{8}) + (\frac{2}{9}\times\frac{1}{8})$ M1

Alt: at least 3 correct products seen

$1 - (\text{"a"} + (\frac{3}{9}\times\frac{2}{8}) + (\frac{2}{9}\times\frac{1}{8}))$ M1 dep

All 6 correct products added oe

eg $(\frac{4}{9}\times\frac{5}{8}) + (\frac{3}{9}\times\frac{6}{8}) + (\frac{2}{9}\times\frac{7}{8})$

$= \frac{13}{18}$ or 0.72 or better A1

Sampling with replacement perfectly correct in (b) $\Rightarrow \frac{52}{81}$ *and if done (a) must also be with replacement SC3*

[5]

12.

(a)		Sweets are replaced **oe**	**1** 1 AO3.5		
(b)		$\frac{5}{10}\times\frac{4}{9}\times\frac{3}{8}+\frac{3}{10}\times\frac{2}{9}\times\frac{1}{8}$ **oe** $\frac{66}{720}=\frac{11}{120}$ or shows correct cancelling leading to $\frac{11}{120}$	**M4** **A1** 3 AO2.4a 1 AO3.1d 1 AO3.3	**M3** for $\frac{5}{10}\times\frac{4}{9}\times\frac{3}{8}$ or $\frac{3}{10}\times\frac{2}{9}\times\frac{1}{8}$ Or **M2** for $\frac{5}{10}, \frac{4}{9}$ and $\frac{3}{8}$ OR $\frac{3}{10}, \frac{2}{9}$ and $\frac{1}{8}$ **seen** Or **M1** for RRR and BBB identified in tree diagram or elsewhere Dependent on **M4** and no errors seen	For **M4** condone $\frac{2}{10}\times\frac{1}{9}\times\frac{0}{8}$ in addition For **M3** and **M2 isw**