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**Question 1**

(a)  $(190 \div 300) \times 50$   
 $= 32$

(b)  $P(10B) \times P(11B)$   
 $= \frac{100}{190} \times \frac{50}{110}$   
 $= \frac{50}{209}$  (oe)

(c) i)  $\frac{150}{300} \times \frac{149}{299}$  (oe)  
 $= \frac{149}{598}$  (oe)

ii)  $\frac{190}{300} \times \frac{100}{299}$  (oe)  
 $2 \times \frac{190}{300} \times \frac{110}{299}$

$\left[ 1 - \left( \frac{190}{300} \times \frac{189}{299} + \frac{110}{300} \times \frac{109}{299} \right) \right]$  M2

$= \frac{418}{897}$  (oe)

Notes:

(a) M1 for correct process, condone 1 slip (31.6/31.7 seen M1)  
A1 cao

(b) M1  
A1 cao (accept 0.239 or better) allow percentages.

(c) i) M1 for correct process, (condone arithmetical slip but must be conditional)  
A1 cao (accept 0.249  
or better)

ii) M1 for correct process (condone arithmetical slip but must be conditional)  
A1 cao (accept 0.466  
or better)

[If  $n = 50$  used see

alternative solutions on extra sheets].

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**Question 2**

(a)  $1000 \times 0.7 = 700$  (C)

(b)  $0.6 \times 0.7 = 0.42$  (B)

(c)  $0.6 \times 0.3 = 0.18$  (B)

(d)  $P(\text{pass}) + P(\text{fail}) \times P(\text{pass})$   
 $0.7 + 0.3 \times 0.7 = 0.91$  (A\*)

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**Question 3**

- (a) 300  
(b) {3,H}; {1,H}; {2,H}; {4,H}; {5,H}; {1,T}; {2,T}; {3,T}; {4,T}; {5,T}  
(c) i)  $1 - (0.36 + 0.1 + 0.25 + 0.15) = 0.14$  oe  
ii) 0  
iii) 1

Notes:

- (a) B1  
(b) B2 for all 10 [condone {3,H} absent]  
B1 if 6 correct  
(c) i) M1  
A1 cao  
ii) B1 cao Accept 0, 0, 0.0, zero, nought. Do not accept 1 5  
"no possibility", "no chance"  
iii) B1 cao

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**Question 4**

- i)  $0.2 \times 0.3 = 0.06$   
ii)  $1 - 0.3$  or  $1 - 0.2$  (oe)  
 $0.2 \times "0.7" + "0.8" \times 0.3 = 0.38$

Notes:

- i) M1 for  $0.2 \times 0.3$  seen on its own  
A1 cao  
ii) M1  
M1 (dep on previous M1)  
A1 cao

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**Question 5**

- i)  $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$   
ii)  $2 \times \frac{1}{4} \times \frac{1}{3} = \frac{1}{6}$

Notes:

- i) M1  $\frac{1}{4} \times \frac{1}{4}$   
A1 cao [0.06 or better]  
ii) M1  $\frac{1}{4} \times \frac{1}{3}$   
M1 x #2 (dep)  
A1 cao [0.17, 0.16 or better]

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**Question 6**

(a)  $3p + p = 1$  or  $1:3$

$$p = 0.25$$

$$"0.25" \times 232$$

$$= 58$$

(b)  $PC \text{ "a"} \times \frac{48}{8} = 348 \text{ pkts}$

$$COC (232 - \text{"a"}) \times \frac{48}{8}$$

16

$$= 522 \text{ pkts}$$

$$\frac{(PC + COC)}{232 \times 48} = \frac{870}{11136} = \frac{5}{64}$$

$$= 0.07812$$

Alternative

$$p \times \frac{1}{8} + (1 - p) \times \frac{1}{8}$$

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Notes:

(a) M1 (oe method to find probs)

A1 cao for  $p = 0.25$

A1 cao

(b) M1  $PC \text{ "a"} \times 48 \div 8$  or  $\text{"a"} \times 6$  (oe for *COC*)

M1 dep

A1 cao anything rounding up to 0.08

Alternative

M1 for  $p \times \frac{1}{8}$

M1 dep full expression

A1 cao

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**Question 7**

(a)  $0.27 \times 0.17$   
 $= 0.0459$

(b)  $0.27 \times 0.17$  (0.0459)  
 $0.27 \times 0.83$  (0.2241)  
 $0.73 \times 0.17$  (0.1241)  
 $= 0.3941$

**or**

$1 - 0.73 \times 0.83$   
 $= 1 - 0.6059$   
 $= 0.3941$

Notes:

(a) M1 for  $0.27 \times 0.17$   
A1 cao

(b) M1 at least 2 or 3 cases identified correctly  
M1  $\times$  , M1 + 2 or 3 correct cases (dep) to get a final answer  
A1 cao  
M2 for  $1 - \text{Prob}$  (no breakdown)  
M1 (dep) for  $0.73 \times 0.83$   
A1 cao

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**Question 8**

$$\frac{4}{20} \times \frac{3}{19} \left( = \frac{12}{380} \right)$$

$$\frac{10}{20} \times \frac{9}{19} \left( = \frac{90}{380} \right)$$

$$\frac{6}{20} \times \frac{5}{19} \left( = \frac{30}{380} \right)$$

$$\frac{(12 + 90 + 30)}{380} = \frac{132}{380} = \frac{33}{95} = 0.347$$

Notes:

B1 for any of the 3 products seen

M1 for adding 3 correct products

A1 for  $\frac{132}{380}$  or  $\frac{33}{95}$  or 0.347

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**Question 9**

$$(0.8)^n < \frac{1}{4}$$

$$(0.8)^6 = 0.262144 \quad (0.8)^8 = 0.16777216$$

$$(0.8)^7 = 0.2097152$$

$$n = 7$$

Notes:

M1 for  $(0.8)^n$  used for  $n \geq 2$  (possibly implied)

M1 for final trial with  $6 \leq n \leq 8$

A1 for  $n = 7$

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**Question 10**

**i)**  $0.0625 \times 0.032 \times 0.044 = 0.0000915$

**ii)**  $0.065 \times 0.968 \times 0.954 = 0.06$

**iii)**  $0.935 \times 0.968 \times 0.954 = 0.863$

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**Question 11**

**i)**  $0.65 \times 0.8 = 0.52$

**ii)**  $1 - 0.65 (= 0.35)$

$$1 - 0.8 (= 0.2)$$

$$0.35 \times 0.2 = 0.07$$

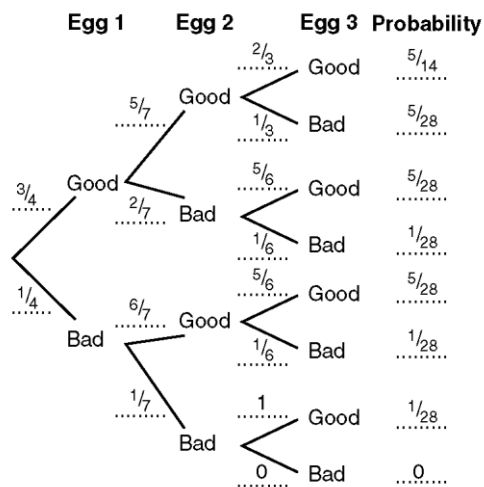
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**Question 12**

- i)  $0.0625 \times 0.032 \times 0.044 = 0.0000915$
  - ii)  $0.065 \times 0.968 \times 0.954 = 0.06$
  - iii)  $0.935 \times 0.968 \times 0.954 = 0.863$
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**Question 13**

(a)



(A)

(b)  $\frac{3}{4} \times \frac{5}{7} \times \frac{2}{3} = \frac{5}{14}$  (A\*)

(c)  $1 - \text{(b)} = \frac{9}{14}$  (A\*)



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**Question 14**

(a) [AW]

(b) i)  $\frac{5}{12} \times \frac{5}{12} = \frac{25}{144}$

ii)  $\left(\frac{5}{12} \times \frac{7}{12}\right) + \left(\frac{7}{12} \times \frac{5}{12}\right) = \frac{35}{72}$

Notes:

(a) B1 LHS (oe)

B1 RHS (oe) ft on probability values used on LHS

In each case (oe) is a % or a decimal to a minimum of 2 dp on LHS.

NB: Probabilities must add to 1 on each pair of branches.

$$\frac{5}{12} = 0.416, \frac{7}{12} = 0.583$$

(b) i) M1  $\frac{5}{12} \times \frac{5}{12}$

A1 cao (oe) 0.17(3611...)

ii) M1  $\left(\frac{5}{12} \times \frac{7}{12}\right)$

M1 ( ) + ( ) (dep); OR  $2 \times ( )$

A1 cao (oe) 0.48(611...) or 0.49

SC: if without replacement, then allow B1 on (a), M1  $\times 3$  for (b),

B1 for both  $\frac{5}{33}, \frac{35}{66}$  (0.15..., 0.53030...)

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**Question 15**

(a) 0.05; 0.2; 0.2

(b) 0.76

(c) 0.23