Solutions to Past Paper Questions – Probability

1) (a) $0.3 + 0.1 = 0.4$
(b) $0.3 	imes 0.3 = 0.09$

9) (a) $0.08 	imes 0.08 = 0.0064$
(b) $p[(\text{Snow in 2002, No snow in 2003}) \text{ OR } (\text{No Snow in 2002, Snow in 2003})]$
   \[ = (0.08 \times 0.92) + (0.92 \times 0.08) \]
   \[ = 0.1472 \]

8) (a) See diagram
(b) $p(\text{Black, Black}) = \frac{6}{10} \times \frac{5}{9} = \frac{30}{90} = \frac{1}{3}$
(c) $p(\text{Red, Red}) = \frac{4}{10} \times \frac{3}{9} = \frac{12}{90}$
So $p(\text{two of same colour}) = \frac{12}{90} + \frac{30}{90} = \frac{42}{90}$

12) (a) Spanish 0.3; on second branches reading down 0.6, 0.4, 0.6, 0.4
(b) (i) $0.7 \times 0.6 = 0.42$
   (ii) $(0.7 \times 0.6) + (0.3 \times 0.4) = 0.42 + 0.12 = 0.54$
(c) $0.42 \times 200 = 84$ will choose French and Geography, so $200 - 84 = 116$ will not

11) (a) Fill in gaps: 0.05, 0.2 and 0.2
(b) $0.95 \times 0.8 = 0.76$
(c) $(0.95 \times 0.2) + (0.05 \times 0.8) = 0.23$
For Ann: \( p( (\text{Red, Red}) \text{ OR } (\text{Blue, Blue}) ) = \frac{4}{10} \times \frac{3}{9} + \frac{6}{10} \times \frac{5}{9} = \frac{12}{90} + \frac{30}{90} = \frac{42}{90} \) or \( \frac{7}{15} \)

(b) \( p(\text{match is a draw}) = \frac{4}{10} \times \frac{6}{9} \times \frac{5}{8} + \frac{6}{10} \times \frac{4}{9} \times \frac{5}{8} = \frac{120}{720} + \frac{120}{720} = \frac{240}{720} \) or \( \frac{1}{3} = \)

19) It is simpler to first work out \( p(\text{they ARE the same}) \) and then use the fact that \( p(\text{not the same}) = 1 - p(\text{they are the same}) \)

\[
p(\text{they are the same}) = \left( \frac{6}{15} \times \frac{4}{12} \right) + \left( \frac{4}{15} \times \frac{3}{12} \right) + \left( \frac{5}{15} \times \frac{5}{12} \right) = \frac{61}{180}
\]

So \( p(\text{not the same}) = \frac{119}{180} \)

20) On the first draw there are \( n \) beads, \( n-6 \) of which are white. On the second draw, there are \( n-1 \) beads, \( (n-6)-1 \) of which are white.

So \( p(\text{White bead on first draw AND white bead on second draw}) = \frac{n-6}{n} \times \frac{n-7}{n-1} \)

So \[
\frac{n-6}{n} \times \frac{n-7}{n-1} = \frac{1}{2}
\]

\[
\frac{n^2 - 13n + 42}{n^2 - n} = \frac{1}{2}
\]

\[
n^2 - 13n + 42 = \frac{1}{2}(n^2 - n)
\]

\[
2|n^2 - 13n + 42| = n^2 - n
\]

\[
2n^2 - 26n + 84 = n^2 - n
\]

\[
n^2 - 25n + 84 = 0
\]