REG-PROB-2324-ASM-SET 4-MATH
Suggested solutions

Conventional Questions

1. (a) Required probability $= \dfrac{C_2^3}{C_2^5}$ 1M

$= \dfrac{3}{10}$ 1A

(b) Required probability $= \dfrac{C_1^3 \times C_1^2}{C_2^5}$ 1M

$= \dfrac{3}{5}$ 1A

(c) Required probability $= \dfrac{3}{10} \times \dfrac{2}{4} + \dfrac{3}{5} \times \dfrac{1}{4} + \left(1 - \dfrac{3}{10} - \dfrac{3}{5}\right) \times 0$ 1M+1A

$= \dfrac{3}{10}$ 1A

2. (a) Required probability $= \dfrac{C_3^{20} C_2^{15}}{C_5^{35}}$ 1M

$= \dfrac{4275}{11\,594}$ 1A

(b) Required probability $= \dfrac{C_3^{20} C_2^{10}}{C_3^{20} C_2^{15} + C_4^{20} C_1^{15} + C_5^{20}}$ 1M

$= \dfrac{900}{3647}$ 1A

3. (a) Required probability $= \dfrac{C_4^8 C_2^6 + C_5^8 C_1^6 + C_6^8}{C_6^{8+6}}$ 1M

$= \dfrac{202}{429}$ 1A

(b) Required probability $= \dfrac{C_3^7 C_2^5 + C_4^7 C_1^5}{C_4^8 C_2^6}$ 1M

$= \dfrac{1}{2}$ 1A

4. (a) Required probability $= 1 - \dfrac{C_2^5}{C_2^9}$ 1M

$= \dfrac{13}{18}$ 1A

(b) Required probability $= \dfrac{\left(\frac{C_2^4}{C_2^9}\right)}{\left(\frac{13}{18}\right)}$ 1M

$= \dfrac{3}{13}$ 1A

5. (a) Required probability $= \frac{1}{2} \cdot \frac{C_1^4 C_2^8}{C_3^{12}} + \frac{1}{2} \cdot \frac{C_1^2 C_2^8}{C_3^{10}}$ 1M+1A

$= \frac{161}{330}$ 1A

(b) Required probability $= \frac{\frac{1}{2} \cdot \frac{C_1^4 C_2^8}{C_3^{12}}}{\frac{161}{330}}$ 1M

$= \frac{12}{23}$ 1A

6. (a) Number of ways $= C_{10}^{8+7} = 3003$ 1A

(b) Required probability $= \frac{C_5^7 C_5^8 + C_6^7 C_4^8 + C_7^7 C_3^8}{C_{10}^{15}}$ 1M

$= \frac{82}{143}$ 1A

(c) Required probability $= \frac{\frac{C_6^7 C_4^8}{C_{10}^{15}}}{\frac{82}{143}}$ 1M

$= \frac{35}{123}$ 1A

7. (a) Number of combinations $= C_4^{10}$ 1M

$= 210$ 1A

(b) Required probability $= \frac{C_4^8}{C_4^8 + C_2^8}$ 1M+1A

$= \frac{5}{7}$ 1A

8. (a) Required probability $= 1 - \frac{C_6^{14} + C_6^{16}}{C_6^{30}}$ 1M+1A

$= \frac{6404}{6525}$ 1A

(b) Required probability $= \frac{\frac{C_2^{14} C_4^{16} + C_1^{14} C_5^{16}}{C_6^{30}}}{\frac{6404}{6525}}$ 1M+1M

$= \frac{623}{1601}$ 1A

9. (a) Required probability $= 1 - \frac{C_3^{10} C_3^6}{C_6^{16}}$ 1M

$= \frac{701}{1001}$ 1A

(b) Required probability $= 1 - \dfrac{C_6^{10} + C_5^{10} C_1^6}{C_6^{16}}$ 1M

$= \dfrac{449}{572}$ 1A

(c) Required probability $= \dfrac{C_3^{10} C_3^6 + C_4^{10} C_2^6}{C_6^{16}} \div \dfrac{449}{572}$ 1M+1A

$= \dfrac{2775}{3143}$ 1A

10. (a) Number of male teachers = 30; number of female teachers = 20.

Required probability $= \dfrac{C_2^{30} + C_2^{20}}{C_2^{50}}$ 1M

$= \dfrac{25}{49}$ 1A

(b) Number of male teachers that have received professional training = 24.

Number of female teachers that have received professional training = 14.

Required probability $= \dfrac{24 \times 14}{C_2^{50}}$ 1M

$= \dfrac{48}{175}$ 1A

(c) Required probability $= \dfrac{\left(\frac{6 \times 6}{C_2^{50}}\right)}{\left(\frac{C_2^{12}}{C_2^{50}}\right)}$ 1M+1A

$= \dfrac{6}{11}$ 1A

11. (a) Required probability $= 0.2 \times 0.35 + 0.5 \times 0.55 + 0.3 \times 0.25$ 1M

$= 0.42$ 1A

(b) (i) Required probability $= 0.2^3 + 0.5^3 + 0.3^3$ 1M

$= 0.16$ 1A

(ii) Required probability $= \dfrac{(0.2 \times 0.35)^3 + (0.5 \times 0.55)^3 + (0.3 \times 0.25)^3}{0.16}$ 1M+1A

≈ 0.135 1A

(iii) Required probability $= \dfrac{(0.2 \times 0.35)^3}{0.42^3}$ 1M

≈ 0.00463 1A

 END OF PAPER