Ex 1.6

Q1 (i) $P(R,R) = \frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$

(ii) $P(G,G) = \frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$

(iii) $P(Y,Y) = \frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$

(iv) $P(R,G) = \frac{2}{5} \times \frac{1}{5} = \frac{2}{25}$

Q2 (i) $P(6,6) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$

(ii) $P(6, \text{even}) = \frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$

(iii) $P(\text{odd, mult 3}) = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

Q3 (i) $P(H,6) = \frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

(ii) $P(H, \text{even}) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

Q4 (i) $P(Bl,Bl) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

(ii) $P(K,K) = \frac{1}{13} \times \frac{1}{13} = \frac{1}{169}$

(iii) $P(\text{Bl Ace, Diamond}) = \frac{2}{52} \times \frac{13}{52} = \frac{1}{26} \times \frac{1}{4} = \frac{1}{104}$

Q5 4 Red, 6 Blue Total = 10

(i) $P(R,R) = \frac{4}{10} \times \frac{4}{10} = \frac{16}{100} = \frac{4}{25}$

(ii) $P(B,R) = \frac{6}{10} \times \frac{4}{10} = \frac{24}{100} = \frac{6}{25}$

(iii) $P(R,B) = \frac{4}{10} \times \frac{6}{10} = \frac{6}{25}$

(iv) $P(B,B) = \frac{6}{10} \times \frac{6}{10} = \frac{36}{100} = \frac{9}{25}$

(v) $P(R,R \text{ or } B,B) = \frac{4}{10} \times \frac{4}{10} + \frac{6}{10} \times \frac{6}{10}$

$= \frac{16}{25} + \frac{9}{25} = \frac{13}{25}$

Q6 $P(\text{rain and forget umbrella}) = \frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$

Q7 (i) $P(\text{Red}_A, \text{Red}_B) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

(ii) $P(\text{Diamond}_A, \text{Clubs}_B) = \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

(iii) $P(H_A, \text{Pic}_B) = \frac{1}{13} \times \frac{3}{13} = \frac{3}{169}$

(iv) $P(10_A, 10\text{Clubs}_B) = \frac{1}{13} \times \frac{1}{52} = \frac{1}{676}$

(v) $P(\text{AHearts}_A, \text{AHearts}_B) = \frac{1}{52} \times \frac{1}{52} = \frac{1}{2704}$

Q8 $P(\text{Jackpot}) = \frac{4}{12} \times \frac{3}{12} \times \frac{2}{12} = \frac{24}{1728} = \frac{1}{72}$

Q9 (i) $P(\text{hit, hit}) = 0.2 \times 0.2 = 0.04$

(ii) $P(\text{hit, Miss or Miss, hit})$
$= 0.2 \times 0.8 + 0.8 \times 0.2$
$= 0.16 + 0.16$
$= 0.32$

Q10 Chris = 0.8 George = 0.9 Phil = 0.7

(i) $P(3 \text{ pass}) = 0.8 \times 0.9 \times 0.7 = 0.504$

(ii) $P(3 \text{ fail}) = 0.2 \times 0.1 \times 0.3 = 0.006$

(iii) $P(\text{At least 1 passes}) = 1 - P(\text{all fail})$
$= 1 - 0.006 = 0.994$

Q11 $A = \frac{1}{2}$ $S = \frac{2}{3}$

(i) $P(\text{Hit, Hit}) = \frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{1}{3}$

(ii) $P(\text{Miss, Miss}) = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$

(iii) $(P \text{ Hit, Miss or Miss Hit}) =$
$= \frac{1}{2} \times \frac{1}{3} + \frac{1}{2} \times \frac{2}{3}$
$\frac{1}{6} + \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$.

Q12 $1^{st} = 0.6$ $2^{nd} = 0.7$ $3^{rd} = 0.8$

(i) $P(\text{Stops all 3}) = 0.6 \times 0.7 \times 0.8 = 0.336$

(ii) $P(\text{stop stop Go or Stop Go Stop or Go Stop Stop or Stop Stop Stop})$

$= (0.6 \times 0.7 \times 0.2) + (0.6 \times 0.3 \times 0.8) + (0.4 \times 0.7 \times 0.8) + (0.6 \times 0.7 \times 0.8)$

$= 0.084 + 0.144 + 0.224 + 0.336$

$= 0.788.$

Q13

(i) $P(\text{No 6}) = 5/6 \times 5/6 \times 5/6 = \frac{125}{216}$

(ii) $P(1 \text{ of } 6) = 1 - P(\text{No6}) = 1 - \frac{125}{216} = \frac{91}{216}$

(iii) $P(\text{only 1 6}) = 6\,N^o\,N^o + N^o\,6\,N^o + N^o\,N^o\,6$

$\frac{1}{6} \times \frac{5}{6} \times \frac{5}{6} + \frac{5}{6} \times \frac{1}{6} \times \frac{5}{6} + \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6}$

$= 25/72$

$P(\text{Same } N^o) = \left(\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}\right) \times 6 = 1/36$

Q14

(i) $P(\text{Mon, Mon}) = \frac{1}{7} \times \frac{1}{7} = \frac{1}{49}$

(ii) $P(\text{same day}) = P(\text{1 day and same day})$

$= 1 \times \frac{1}{7} = \frac{1}{7}$

(iii) $P(\text{diff days}) = P(\text{1 day and diff day})$

$= 1 \times \frac{6}{7} = \frac{6}{7}$

(iv) $P(\text{Mon for one or both})$

$= P[(\text{Mon, Mon}) \text{ or } (\text{Mon, other}) \text{ or } (\text{other, Mon})]$

$= \left(\frac{1}{7} \times \frac{1}{7}\right) + \left(\frac{1}{7} \times \frac{6}{7}\right) + \left(\frac{6}{7} \times \frac{1}{7}\right)$

$= \frac{1}{49} + \frac{6}{49} + \frac{6}{49} = \frac{13}{49}$

Q15

(i) $P(\text{None on Sun}) = \frac{6}{7} \times \frac{6}{7} \times \frac{6}{7} = \frac{216}{343}$

(ii) $P(\text{one on S}) = P[(\text{S, other, other}) \text{ or } (\text{other, S, other}) \text{ or } (\text{other, other, Sun})]$

$= \left(\frac{1}{7} \times \frac{6}{7} \times \frac{6}{7}\right) + \left(\frac{6}{7} \times \frac{1}{7} \times \frac{6}{7}\right) + \left(\frac{6}{7} \times \frac{6}{7} \times \frac{1}{7}\right)$

$= \frac{108}{343}$

(iii) $P(\text{At least one on Sun}) = 1 - (P \text{ None on Sun})$

$= 1 - \frac{216}{343} = \frac{127}{343}$