

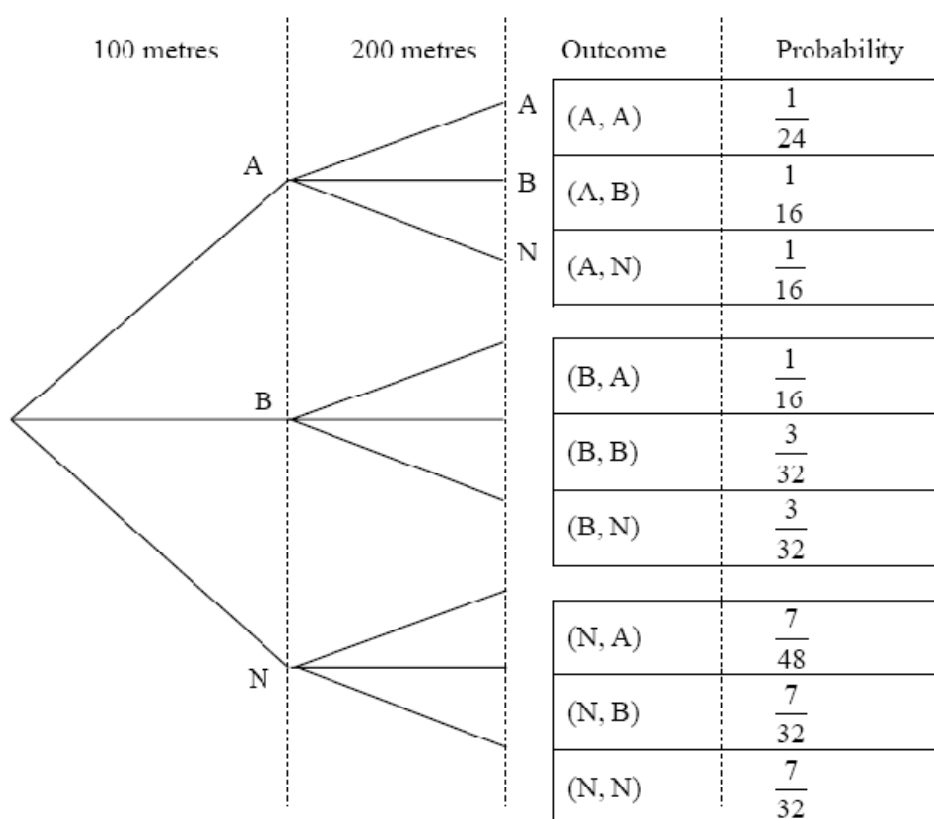
# Module 3 – Solutions

## 3.1 Tree Diagrams

(i)

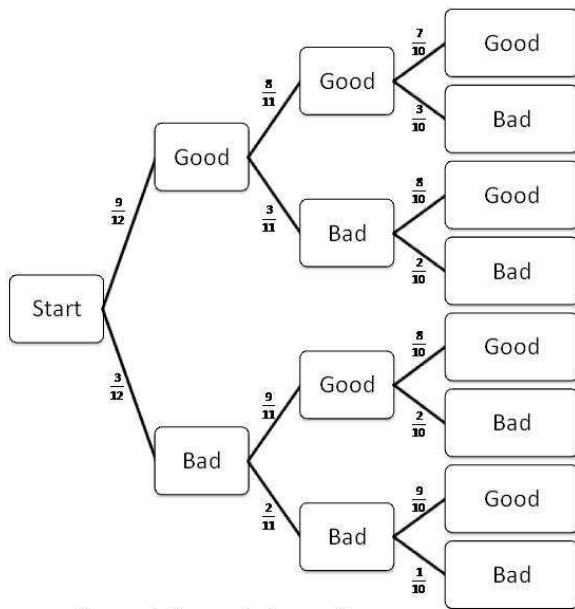
	Alex	Bobby	Neither
100 metre race	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{7}{12}$
200 metre race	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$

(ii)



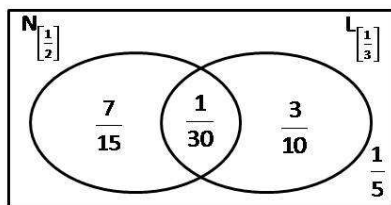
(iii)  $\frac{1}{16} + \frac{1}{16} = \frac{1}{8}$

3.2



$$\left(\frac{9}{12} \times \frac{3}{11} \times \frac{2}{10}\right) + \left(\frac{3}{12} \times \frac{9}{11} \times \frac{2}{10}\right) + \left(\frac{3}{12} \times \frac{2}{11} \times \frac{9}{10}\right) = \frac{27}{220}$$

3.3



$$\left(\frac{1}{2} - x\right) + x + \left(\frac{1}{3} - x\right) = \frac{4}{5}$$

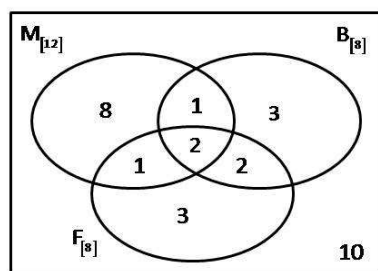
$$\frac{5}{6} - x = \frac{4}{5}$$

$$x = \frac{5}{6} - \frac{4}{5}$$

$$x = \frac{1}{30}$$

$$P(\text{both}) = \frac{1}{30}$$

3.4



(a)  $P(\text{at least one of the three subjects}) = \frac{20}{30} = \frac{2}{3}$

(b)  $P(\text{only one of the three subjects}) = \frac{8+3+3}{30} = \frac{14}{30} = \frac{7}{15}$

(c)  $P(\text{French but not boilogy}) = \frac{4}{30} = \frac{2}{15}$

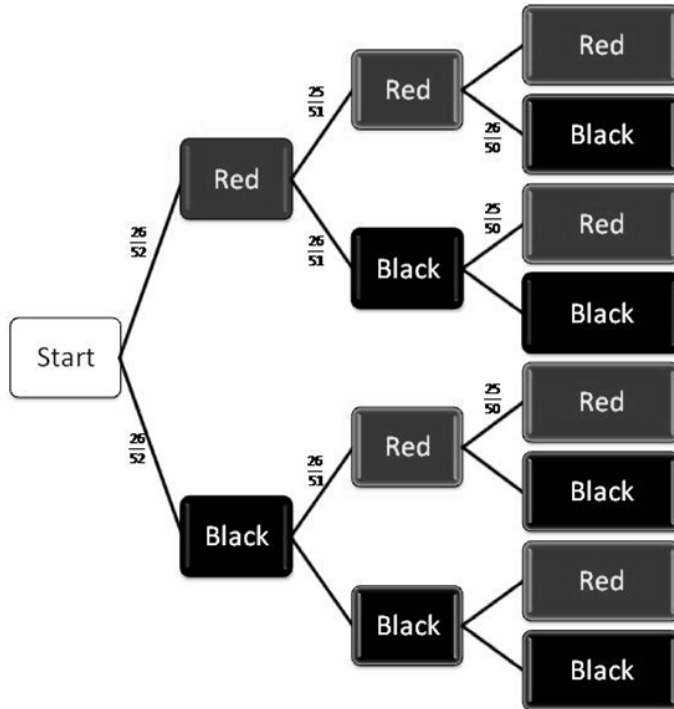
**3.5 Counting Method:**

$$P(2 \text{ red and 1 black}) = \frac{{}^{26}C_2 \times {}^{26}C_1}{{}^{52}C_3} = \frac{13}{34}$$

**Non Counting Method:**

$$P(2 \text{ red and 1 black}) = P(R).P(R).P(B) + P(R).P(B).P(R) + P(B).P(R).P(R)$$

$$P(2 \text{ red and 1 black}) = \frac{26}{52} \cdot \frac{25}{51} \cdot \frac{26}{50} + \frac{26}{52} \cdot \frac{26}{51} \cdot \frac{25}{50} + \frac{26}{52} \cdot \frac{26}{51} \cdot \frac{25}{50} = \frac{13}{34}$$



**3.6 Counting Method:**

$$P(4 \text{ Kings and 1 Queen}) = \frac{{}^4C_4 \times {}^4C_1}{{}^{52}C_5} = \frac{1}{659740}$$

**Non Counting Method:**

$$P(4 \text{ Kings and 1 Queen}) = P(K).P(K).P(K).P(K).P(Q) + P(K).P(K).P(K).P(Q).P(K) + P(K).P(K).P(Q).P(K).P(K) + P(K).P(Q).P(K).P(K).P(K) + P(Q).P(K).P(K).P(K).P(K)$$

$$P(4 \text{ Kings and 1 Queen}) = \frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} \cdot \frac{1}{49} \cdot \frac{4}{48} + \frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} \cdot \frac{4}{49} \cdot \frac{1}{48} + \frac{4}{52} \cdot \frac{3}{51} \cdot \frac{4}{50} \cdot \frac{2}{49} \cdot \frac{1}{48} + \frac{4}{52} \cdot \frac{4}{51} \cdot \frac{3}{50} \cdot \frac{2}{49} \cdot \frac{1}{48} + \frac{4}{52} \cdot \frac{4}{51} \cdot \frac{3}{50} \cdot \frac{2}{49} \cdot \frac{1}{48} = \frac{1}{649740}$$

**3.7**

$$\text{Probability} = \frac{\text{No. of favourable outcomes}}{\text{Total number of outcomes}} = \frac{{}^6C_4 \times {}^1C_1 \times {}^{38}C_1}{{}^{45}C_6} = \frac{19}{271502}$$