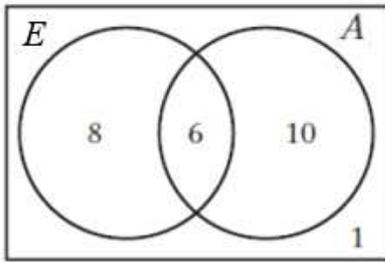


Exercise 4B

1 a



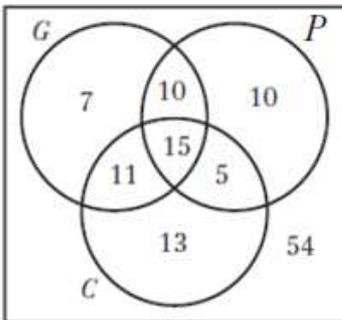
b i $P(E) = \frac{14}{25}$

ii $P(E \cap A) = \frac{6}{25}$

iii $P(\text{English but not Arabic}) = \frac{8}{25}$

iv $P(\text{Neither English nor Arabic}) = \frac{1}{25}$

2 a



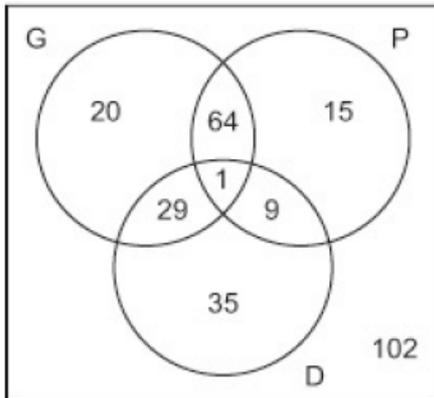
b i $P(\text{All three}) = \frac{15}{125} = \frac{3}{25}$

ii $P(\text{Pasta but not cheesecake and not garlic bread}) = \frac{10}{125} = \frac{2}{25}$

iii $P(\text{Garlic bread and pasta but not cheesecake}) = \frac{10}{125} = \frac{2}{25}$

iv $P(\text{None}) = \frac{54}{125}$

3 a



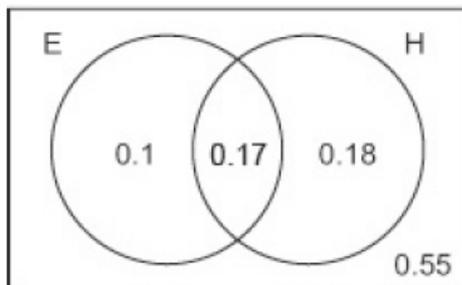
$$\text{b i } P(\text{Plays piano}) = \frac{89}{275}$$

$$\text{ii } P(\text{At least 2}) = \frac{64 + 9 + 29 + 1}{275} = \frac{103}{275}$$

$$\text{iii } P(\text{Plays exactly one}) = \frac{20 + 15 + 35}{275} = \frac{14}{55}$$

$$\text{iv } P(\text{Plays none}) = \frac{102}{275}$$

4

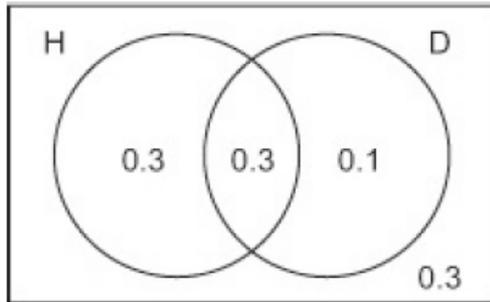


$$\begin{aligned} \text{a } P(E \cap H) &= P(E) + P(H) - P(E \cup H) \\ &= 0.27 + 0.25 - 0.45 \\ &= 0.17 \end{aligned}$$

$$\text{b } P(\text{Black hair but not Blue eyes}) = 0.35 - 0.17 = 0.18$$

$$\text{c } P(\text{Neither}) = 1 - P(E \cup H) = 1 - 0.45 = 0.55$$

5



$$\begin{aligned} \mathbf{a} \quad P(H \cap D) &= P(H) + P(D) - P(H \cup D) \\ &= 0.6 + 0.4 - 0.7 \\ &= 0.3 \end{aligned}$$

$$\mathbf{b} \quad P(\text{Hiya only}) = 0.6 - 0.3 = 0.3$$

$$\mathbf{6 a} \quad P(B) = x + 0.1 + 0.2 = 0.45$$

$$\text{So } x = 0.45 - 0.3 = 0.15.$$

$$\mathbf{b} \quad y = 1 - (0.35 + 0.15 + 0.1 + 0.2 + 0.05) = 1 - 0.85 = 0.15$$

$$\mathbf{7} \quad P(M) = 0.32 + p$$

$$P(P) = p + q + 0.07$$

$$\text{As } P(M) = P(P), 0.32 + p = p + q + 0.07.$$

$$\text{So, rearranging, } q = 0.32 - 0.07 = 0.25.$$

$$p = 1 - (0.32 + 0.25 + 0.07 + 0.13 + 0.1) = 0.13$$

$$p = 0.13, q = 0.25$$

Challenge

$$P(B) = p + q + 0.05$$

$$P(A) = 0.15 + p$$

$$\text{As } P(B) = 2P(A), p + q + 0.05 = 2(0.15 + p), \text{ or } p + q + 0.05 = 0.3 + 2p$$

$$\text{So our first equation relating } p \text{ and } q \text{ is: } q = 0.25 + p$$

$$\text{As } P(\text{not } C) = 0.83$$

$$0.15 + p + q + 0.2 = 0.83, \text{ so our second equation results: } p + q = 0.48$$

Using substitution to solve simultaneously:

$$p + (0.25 + p) = 0.48, \text{ so } 2p = 0.23 \text{ and therefore } p = 0.115$$

$$q = 0.25 + 0.115 = 0.365$$

$$P(C) = 1 - P(\text{not } C) = 1 - 0.83 = 0.17$$

$$\text{Hence } r + 0.05 = 0.17, \text{ so } r = 0.12$$

$$p = 0.115, q = 0.365, r = 0.12$$