Exercise walk-through

6.3 Probability

Pearson Edexcel · International A-Level · Mathematics

Exercises 2.1·2.3

2.1 $P(A) = 0.6$, $P(B) = 0.5$, $P(A \cup B) = 0.85$. Find $P(A \cap B)$ and state whether A and B are independent. [3]

2.2 A bag has 5 red and 4 blue counters; two are drawn without replacement. Find the probability that both are the same colour. [3]

2.3 $P(X \cap Y) = 0.21$ and $P(X) = 0.35$. Find $P(Y \mid X)$ and $P(X' \cap Y)$ if Y and X are independent. [4]

Exercises 2.1·2.3

2.1 $P(A) = 0.6$, $P(B) = 0.5$, $P(A \cup B) = 0.85$. Find $P(A \cap B)$ and state whether A and B are independent. [3]

2.1 $P(A \cap B) = 0.6 + 0.5 - 0.85 = 0.25$. Independent would need $P(A \cap B) = 0.6 \times 0.5 = 0.3 \neq 0.25$: NOT independent.

2.2 A bag has 5 red and 4 blue counters; two are drawn without replacement. Find the probability that both are the same colour. [3]

2.2 $P(\mathrm{RR}) + P(\mathrm{BB}) = \frac{5}{9}\frac{4}{8} + \frac{4}{9}\frac{3}{8} = \frac{20+12}{72} = \frac{32}{72} = \frac{4}{9}$.

2.3 $P(X \cap Y) = 0.21$ and $P(X) = 0.35$. Find $P(Y \mid X)$ and $P(X' \cap Y)$ if Y and X are independent. [4]

2.3 $P(Y \mid X) = \frac{0.21}{0.35} = 0.6$. Independence $\Longrightarrow P(Y) = 0.6$; then $P(X' \cap Y) = 0.4 \times 0.6 = 0.24$.

Exercises 3.1·3.2

3.1 *(Edexcel IAL WST01 June 2025 Q4.)* Two events C and D are such that $P(C \cup D) = 0.59$, $P(D) = 0.45$ and $P(C \mid D) = 0.2$. (a) Find $P(C \cap D)$. (b) Find $P(C)$. [4]

3.2 *(Edexcel IAL WST01 June 2025 Q7, condensed.)* Riley's bag contains 3 white beads and 6 yellow beads. Two beads are selected at random, one at a time, without replacement. (a) Complete a tree diagram for the selection. (b) Find the probability that exactly one bead is yellow. (c) Find the probability that at least one bead is white. (d) Given that at least one bead is white, find the probability that both beads are white. [9]

Exercises 3.1·3.2

3.1 *(Edexcel IAL WST01 June 2025 Q4.)* Two events C and D are such that $P(C \cup D) = 0.59$, $P(D) = 0.45$ and $P(C \mid D) = 0.2$. (a) Find $P(C \cap D)$. (b) Find $P(C)$. [4]

3.1 (a) $P(C \mid D) = \frac{P(C \cap D)}{P(D)}$ gives $P(C \cap D) = 0.2 \times 0.45 = 0.09$. (b) $P(C) = P(C \cup D) + P(C \cap D) - P(D) = 0.59 + 0.09 - 0.45 = 0.23$.

3.2 *(Edexcel IAL WST01 June 2025 Q7, condensed.)* Riley's bag contains 3 white beads and 6 yellow beads. Two beads are selected at random, one at a time, without replacement. (a) Complete a tree diagram for the selection. (b) Find the probability that exactly one bead is yellow. (c) Find the probability that at least one bead is white. (d) Given that at least one bead is white, find the probability that both beads are white. [9]

3.2 (a) First layer: yellow $\frac{6}{9}$, white $\frac{3}{9}$; after yellow: yellow $\frac{5}{8}$, white $\frac{3}{8}$; after white: yellow $\frac{6}{8}$, white $\frac{2}{8}$. (b) $\frac{6}{9} \cdot \frac{3}{8} + \frac{3}{9} \cdot \frac{6}{8} = \frac{18+18}{72} = \frac{1}{2}$. (c) $1 - P(\text{no white}) = 1 - \frac{6}{9} \cdot \frac{5}{8} = 1 - \frac{5}{12} = \frac{7}{12}$. (d) $P(\text{both white} \mid \text{at least one white}) = \dfrac{\frac{3}{9} \cdot \frac{2}{8}}{\frac{7}{12}} = \dfrac{1/12}{7/12} = \dfrac{1}{7}$.

Local review guidance: multiplication along tree branches with consistent labels; "at least one" via the complement; conditional reversal dividing by the CONDITIONING event's probability. This is authored classroom guidance.