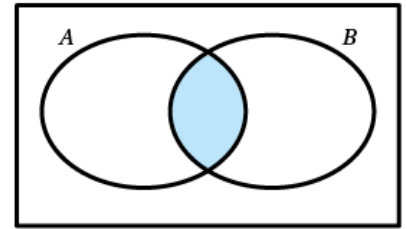


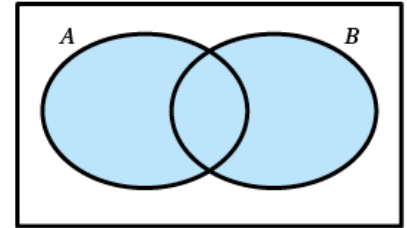


SET NOTATION AND VENN DIAGRAMS | KEY POINTS

- A **sample space** is the **set of all possible outcomes**.
- $A \cap B$ is the **intersection** of A and B (often referred to as ' A **and** B ').
 - This means when **both** A and B occur.
- $A \cup B$ is the **union** of A and B (often referred to as ' A **or** B ').
 - This means either ' A occurs' or ' B occurs' or 'both A and B occur'.
- A' is the **complement** of A (often read as '**not** A ').
 - This means **everything** that could happen **other than** A .
 - $P(A') = 1 - P(A)$.
- Events A and B are **mutually exclusive** if it is impossible for both of them to occur at the same time.
 - $P(A \cap B) = 0$
 - e.g. When a coin is flipped, both heads and tails cannot occur simultaneously.
- Events A and B are **independent** if knowing the outcome of A does not affect the outcome of B .
 - $P(A \cap B) = P(A) \times P(B)$



$A \cap B$



$A \cup B$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

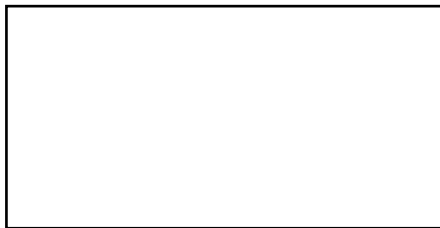
SET NOTATION AND VENN DIAGRAMS | EXAMPLE PROBLEM PAIRS

1A. $P(A) = \frac{2}{3}$, $P(B) = \frac{1}{8}$, $P(A \cup B) = \frac{5}{8}$. Let $P(A \cap B) = x$

(a) Draw a Venn Diagram to represent the information given.

(b) Find the value of x .

(c) Find $P(A \cap B')$.

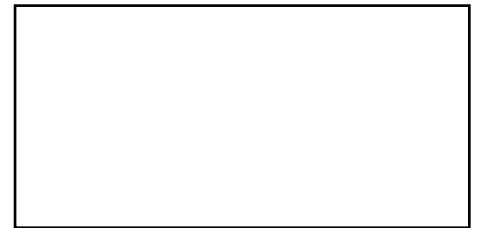


1B. $P(A \cap B) = 20\%$, $P(A \cup B) = 0.4$, $P(A) = \frac{1}{3}$.

(a) Draw a Venn Diagram to represent the information given.

(b) Find $P(B')$.

(c) Find $P(A \cap B')$.



2E. $P(A) = 0.3$, $P(B) = 0.4$, $P(A \cap B) = 0.25$.

(a) Show that A and B are not independent.

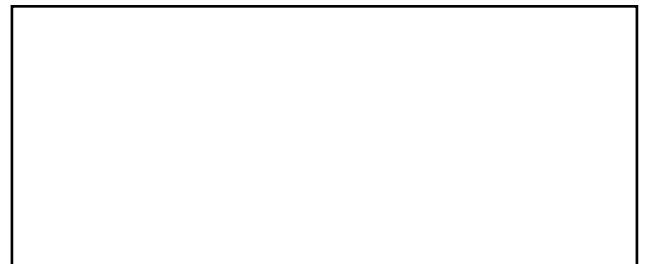
(b) Given also that

➤ $P(C) = 0.2$

➤ A and C are mutually exclusive, and B and C are independent.

Draw a Venn diagram to illustrate the events.

(c) Find $P((A \cap B') \cup C)$

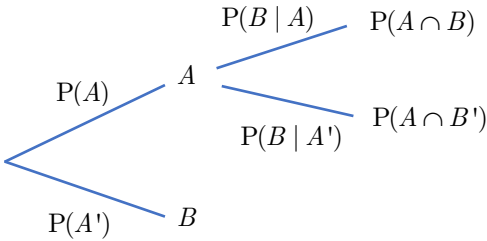
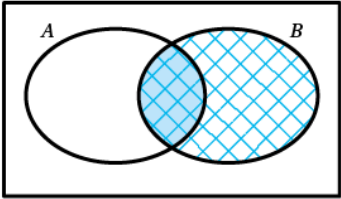


2P. $P(A \cap B') = 0.3$ and $P(B) = 0.4$. A and B are independent.
Find $P(A \cap B)$.

CONDITIONAL PROBABILITY | KEY POINTS

➤ The probability of A given B has happened is $P(A | B)$.

$$P(A | B) = \frac{P(A \cap B)}{P(B)}$$



CONDITIONAL PROBABILITY | EXAMPLE PROBLEM PAIRS

3E. $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{4}$ and $P((A \cup B)') = \frac{5}{12}$.

- (a) Find $P(A \cap B)$.
- (b) Find $P(A | B)$.

3P. $P(A) = 0.25$, $P(B | A) = 0.8$ and $P(A' \cap B) = 0.4$

- (a) Find $P(A \cap B)$.
- (b) Find $P(A | B)$.

4E. In a small sixth form of 50 students, Maths and English are the two most popular subjects.

- 30 students are studying Maths.
- 25 students are studying English.
- 10 students are studying Maths and English.

- (a) Find the probability that a student chosen at random is studying Maths or English.
- (b) Find the probability that a student studies Maths given that they study English.

4P. In a group of 11 footballers, five are over 6 feet tall.

Two of the three players who can play in goal are over 6 feet tall. One of the players is selected at random.

- (a) If the player is over 6 feet tall, what is the probability that they can play in goal?
- (b) If the player can play in goal, what is the probability that they are over 6 feet tall?