Set Terminology

A **set** is a collection of distinct objects called **elements**

Set Language:

Listing Set: all elements of the set are listed e.g. $A = \{1, 3, 5\}$

Describing Set: a description of the elements is used
e.g. $A = \{\text{first three odd numbers}\}$

Equal Sets: contain exactly the same elements e.g. $B = \{5, 3, 1\}$,
A and B are equal sets

Empty Set: set with no elements, also known as the **null** set

Universal Set: set that contains every possible element

Subset: set that is contained within another set e.g. $C = \{5\}$ would be a subset of both A and B

Intersection: elements that sets have in common e.g. $D = \{2, 3, 4\}$ the intersection of A and D would be $\{3\}$, 3 is in A **and** B

Union: elements contained in all of the sets e.g. the union of A and D would be $\{1,2,3,4,5\}$, these elements are in A **or** B

Complement: elements of a universal set that are **not** in the set
e.g. if the universal set is the first six integers, then the complement of A would be $\{2,4,6\}$

Set Notation:

$\varnothing$ or $\{\ \}$: the empty set

$\in$: is an element of e.g. $3 \in A$

$|\ |$ or $n(\ )$: the number of elements in a set e.g. $|A| = 3$

$\subset$: is a subset of e.g. $C \subset A$, $C \subset B$, $B \subseteq A$, $\varnothing \subset A$

$\cap$: intersection e.g. $A \cap D = \{3\}$, $C \cap D = \varnothing$

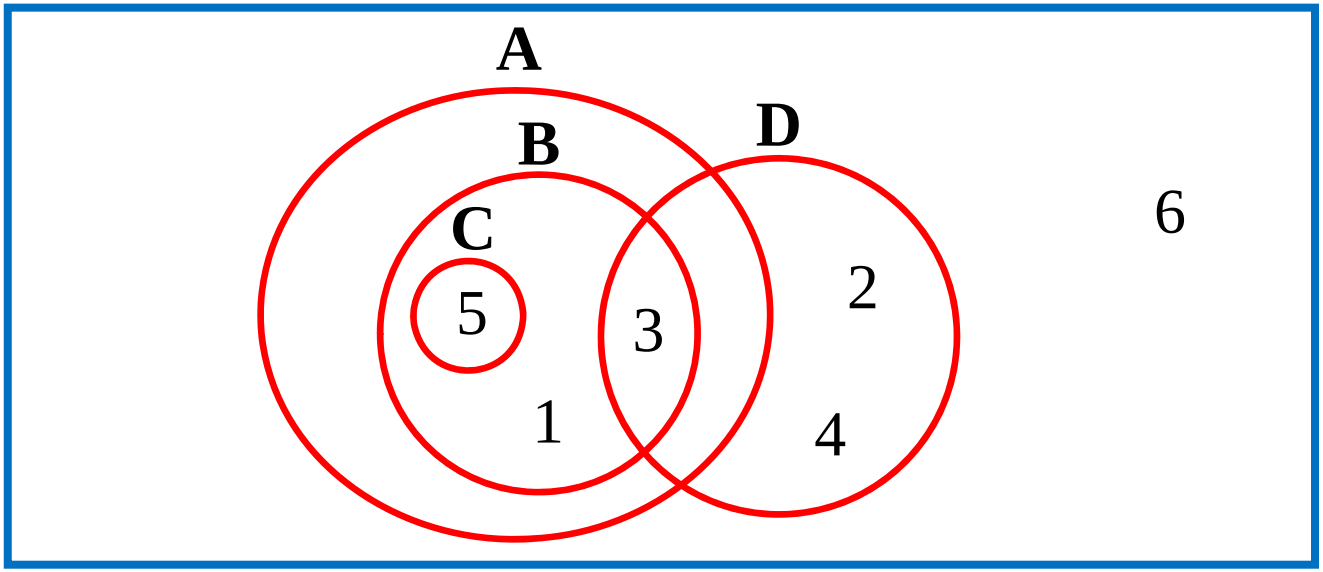
$\cup$: union e.g. $A \cup D = \{1,2,3,4,5\}$

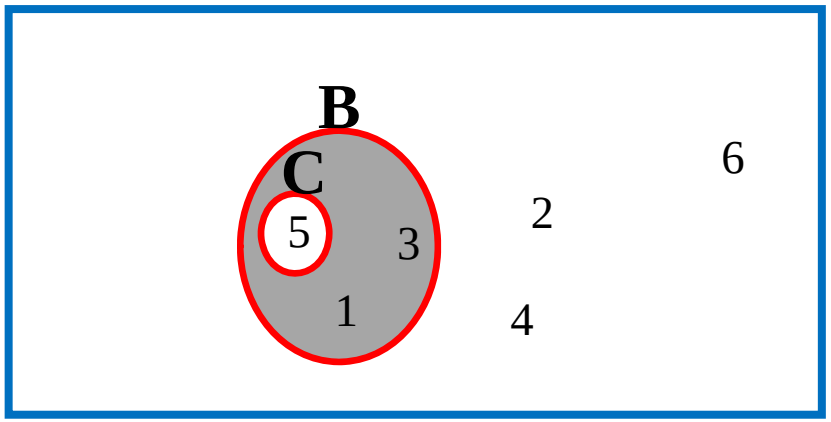
$\overline{A}$ $\left(\text{or } A' \text{ or } A^c\right)$: complement of e.g. $\overline{A} = \{2,4,6\}$

Venn Diagrams

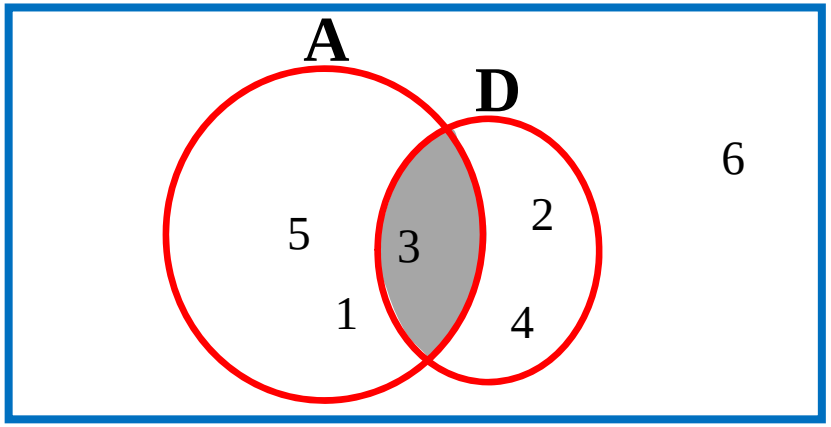
A visual (or geometrical) representation of sets

The universal set is represented by a rectangle, and all other sets are contained within the rectangle

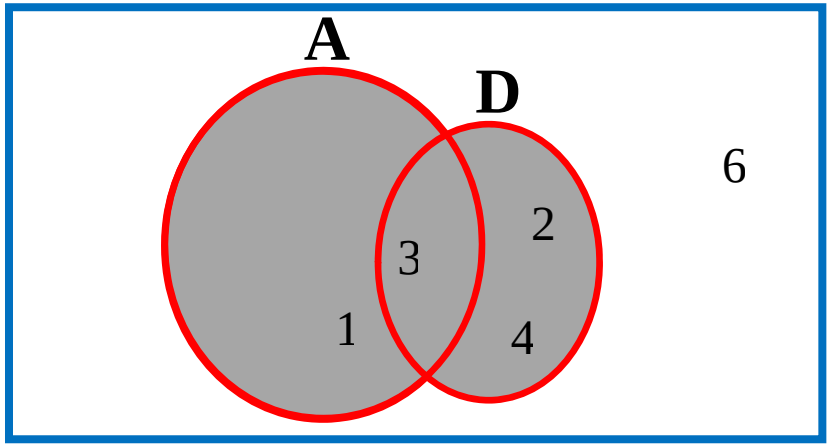




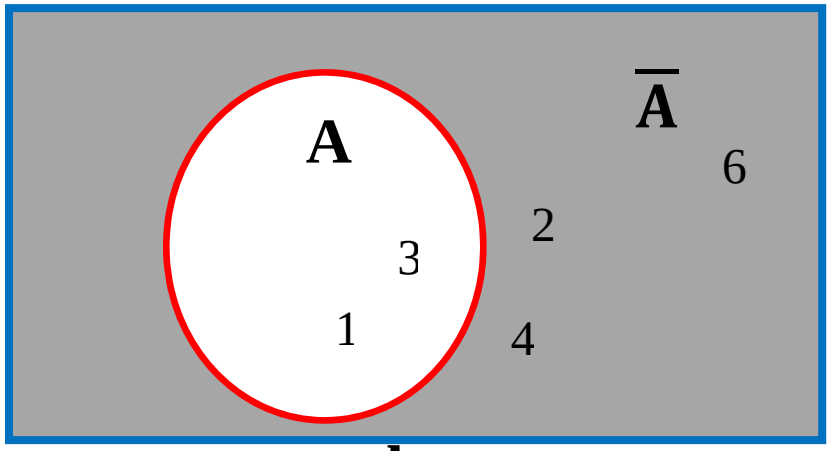
subset $C \subset B$



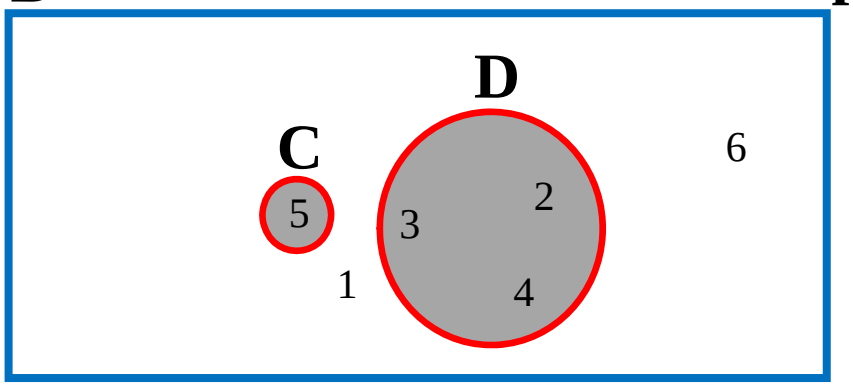
intersection $A \cap D$



union $A \cup D$



complement



disjoint sets (mutually exclusive)

Venn Diagrams & Counting

When using Venn diagrams to solve probability problems, we are more interested in counting the number of elements in a set, rather than the actual elements themselves

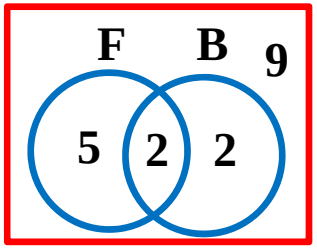
counting rule for sets

$$|A \cup B| = |A| + |B| - |A \cap B|$$

e.g. In Sam's class at school many of the students are on the swim team. There are 18 students in the class. Seven swim freestyle, four swim backstroke and two swim both strokes.

calculate missing info

$$|F \cup B| = |F| + |B| - |F \cap B|$$
$$= 7 + 4 - 2$$
$$= 9$$



$\therefore 18 - 9 = 9$ students not in swim team

Find the probability that a random student selected is not on the swimming team

$$\mathrm{P}(\text{not on team}) = \frac{9}{18}$$
$$= \frac{1}{2}$$

Exercise 12C; 3, 4acfh, 5, 7c, 8, 9bdf, 10aceg, 14, 16ac, 17, 18

Exercise 12D; 2, 4, 6ac, 8, 9, 11, 12, 13