Union $\bigcup$ and intersection $\bigcap$

- $\{2, 4, 6\} \cup \{4, 6, 8\} = \{2, 4, 6, 8\}$
- $\{2, 4, 6\} \cap \{4, 6, 8\} = \{4, 6\}$
- $A \cup B$ means the disjunction $\{x \mid (x \in A) \vee (x \in B)\}$
- $A \cap B$ means the conjunction $\{x \mid (x \in A) \wedge (x \in B)\}$

If the intersection $A \cap B$ is the empty set, then A and B are called *disjoint* sets.

Commutative, associative, and distributive laws

Union and intersection satisfy these properties.
For example, $A \cup B = B \cup A$ (commutative law),
$(A \cap B) \cap C = A \cap (B \cap C)$ (associative law),
$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

De Morgan's laws for complements

Augustus De Morgan (1806–1871)

- Complement of $A \cup B$ is the intersection of the complement of A and the complement of B.
- Similarly, the complement of $A \cap B$ is the union of the complement of A and the complement of B.

Spelling lesson

- Complement of a set: all the elements not in the set.
- Compliment of a set: "You are an intelligent set!"