Rules for transforming words into math

1. **Not** event $A$: $A^c$.

2. Events $A$ and $B$ both occur: $A \cap B$, the intersection of $A$ and $B$.

3. Event $A$ or $B$ occurs: $A \cup B$, the union of $A$ and $B$.

4. $A \cap B \subseteq A \cup B$. This means that $A \cap B$ is generally a smaller set than $A \cup B$ (though they can be equal). This is because membership in $A \cap B$ is more restrictive than membership in $A \cup B$.

5. **Exactly one** of the events $A$ or $B$ occurs.
   This is the exclusive or. It means that $A$ or $B$ occurs, but not both. In other words, the event that $A$ and $B$ occur is not allowed. In terms of sets,
   \[
   \text{Exactly one event:} \quad (A \cup B) - (A \cap B) = (A - B) \cup (B - A)
   \]
   
   **Note:** If you see the word and connected with two events, think intersection. If you see the word or in connection with two events, think union.

6. **Neither** event $A$ nor event $B$ occurs: this is the same as “$A$ does not occur and $B$ does not occur” = $A^c \cap B^c$.

7. When solving probability word problems:
   - **Step 1:** Write down the events of interest in the problem.
   - **Step 2:** Write down the given information in terms of the events.
   - **Step 3:** Write down what you’re looking for.

**Definition:** The set of all possible outcomes of an experiment is called the **sample space** for the experiment. The outcomes in the sample space are called the sample points.

**Definition:** An **event** is a subset of the sample space of an experiment. An event $E$ is said to occur if the outcome of the experiment is an element of $E$.

**Definition:** Two events $E$ and $F$ are **mutually exclusive** (disjoint) if $E \cap F = \emptyset$.

**Definition:** The events $E_1, \ldots, E_n$ are mutually exclusive if no two of the events can occur at the same time.