Mastering Syllogism

Comprehensive Guide, Venn Diagrams, and Shortcut Rules for Competitive Exams

1. Introduction to Syllogism

A Syllogism is a logical argument where a conclusion is drawn from two or more given propositions (premises). In competitive exams, statements are assumed to be true even if they contradict general facts.

- **Premise:** Statements provided in the question.
- **Conclusion:** Derived claims to be tested (True/False/Possibility).
- **Key Terms:** Subject, Predicate, and Middle Term.

2. Categorical Propositions

Standard categorical statements are classified into four main types:

A-Type: Universal Affirmative

- *Form:* All A are B.
- *Venn Representation:* A is completely inside B.
- *Distribution:* Subject (A) is distributed; Predicate (B) is not.

E-Type: Universal Negative

- *Form:* No A are B.
- *Venn Representation:* A and B are completely disjoint.
- *Distribution:* Both Subject (A) and Predicate (B) are distributed.

I-Type: Particular Affirmative

- *Form:* Some A are B.
- *Venn Representation:* A and B intersect partially.
- *Distribution:* Neither Subject nor Predicate is distributed.

O-Type: Particular Negative

- *Form:* Some A are not B.
- *Venn Representation:* At least some part of A is outside B.
- *Distribution:* Predicate (B) is distributed; Subject (A) is not.

3. Golden Rules of Distribution

A term is distributed if the statement refers to **all** members of that class.

1. **Universal statements (A, E)** distribute their **Subjects**.
2. **Negative statements (E, O)** distribute their **Predicates**.

4. Standard Syllogism Shortcuts

- **A + A → A**: All A are B + All B are C $\implies$ All A are C.
- **A + E → E**: All A are B + No B are C $\implies$ No A are C.
- **I + A → I**: Some A are B + All B are C $\implies$ Some A are C.
- **I + E → O**: Some A are B + No B are C $\implies$ Some A are not C.

5. Either-Or (˜) Cases

An 'Either-Or' condition arises when neither conclusion is definitely true individually, but together they form a complementary pair.

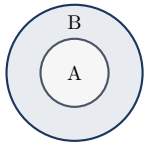
Conditions for Either-Or:

1. Both conclusions must be individually **wrong/uncertain**.
2. The subjects and predicates in both conclusions must be the **same**.
3. The pair of statements must be complementary:
   - **A + O** (All + Some Not)
   - **E + I** (No + Some)
   - **A + E** (All + No) – *Note: Only works if subject-predicate are interchangeable (e.g., All A are B No A are B with equivalent terms).*

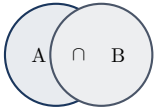
6. Possibility Cases

- If a conclusion is definitely true or definitely false, its **possibility** is **False**.
- If a conclusion is uncertain (can be drawn or can be avoided), its **possibility** is **True**.
- **Rule of Thumb:** "May", "Can", "Possible" mean the diagram can be redrawn without violating the primary premises.

7. Quick Visualization (TikZ Example)



All A are B



Some A are B