Syllogism

Syllogism is a noun which means form of reasoning in which a conclusion is drawn from two statements, i.e., deductive reasoning. In more clear terms, Syllogism is a mediate deductive inference in which two propositions are given in such an order that they jointly or collectively imply the third. Thus, Syllogism can be defined as 'a form of reasoning in which the conclusion establishes a relation between two terms on the basis of both terms being related to the same third term as derived in the premises'.

For example

Statements: All human beings are mortal. [A]

Socrates is a human being. [A]

Conclusions: Socrates is mortal.

The conclusion is reached through the medium of a middle term, i.e., 'human being'. with both subject Socrates and the predicate (mortal). Therefore, in a Syllogism two premises are necessary to arrive at a conclusion.

Points to Remember

Proposition: A proposition is a sentence which comprises a subject, a predicate and a copula. Subject is that about which something is said. Predicate is a term which states something about a subject and copula is that part of proposition which denotes the relation between the subject and the predicate.

A proposition also known as a premises.

Examples:

1. All cows(subject) are(copula) white(predicate)
2. Some flowers(subject) are(copula) red(predicate)

Categorical Proposition: A categorical proposition makes a direct assertion. It has no conditions attached with it.

For examples, 'All S are P', 'Some S are P', 'No S is P' etc.

But 'Either S or P', 'If S, then P' are not categorical proposition.

Immediate Inference and Mediate Inference: Immediate inference is drawn from a single statement whereas the mediate inference is drawn from two statements.

- **Major term:** The predicate of the conclusion is called major term.
- **Minor term:** The subject of the conclusion is called minor term.
- **Middle term:** The common term in the premises is called the middle term.

Types of Categorical Proposition

Categorical proposition has been classified on the basis of quality and quantity of proposition. Quantity represents whether the proposition is universal or particular and quality denotes whether the proposition is affirmative or negative.

Hence there are four types of categorical propositions:

1. Universal affirmative (A)
2. Universal negative (E)
3. Particular affirmative (I)
4. Particular negative (O)

Universal Affirmative Proposition (denoted by A):

A proposition of the form 'All S are P' is called a Universal Affirmative Proposition i.e., Universal Affirmative Proposition fully include the subject. Universal affirmative propositions begin with All, Every etc.

Universal Negative Proposition (denoted by E):

Universal Negative Proposition fully exclude the subject. Therefore, a proposition of the form 'No S is P' is called a Universal Negative Proposition. It begins with 'No', 'None of the', 'Not a single' etc.

Particular Affirmative Proposition (denoted by I):

Particular affirmative proposition partly include the subject. Hence, a proposition of the form 'some S are P' is called a Particular affirmative proposition. It begins with 'Some'

Particular Negative Proposition (denoted by O):

Syllogisms

A proposition of the form 'some S are not P' is called Particular Negative Proposition. Particular Negative Proposition partly exclude the subject.

Methods for Immediate Inference

Implication: In implication, the quantity of a given proposition are changed. The subject, predicate and the quality of proposition remain unchanged. Thus, A will be changed to I and E will be changed to O.

Example 1:

- **Statement:** All tables are trees. (A)
- **Conclusion:** Some tables are trees. (I)

Example 2:

- **Statement:** No table is tree. (E)
- **Conclusion:** Some tables are not tree. (O)

Conversion: In conversion, the subject becomes the predicate and the predicate becomes the subject. The quantity of the proposition remains unchanged.

Thus,

- A-type proposition can be converted into I-type.
- E-type proposition can be converted into E-type.
- I-type proposition can be converted into I-type.
- But O-type proposition cannot be converted.

Example 1:

- **Statement:** All tables are trees. (A)
- **Conclusion:** Some trees are tables. (I)

Example 2:

- **Statement:** No table is tree. (E)
- **Conclusion:** No tree is table. (E)

Example 3:

- **Statement:** Some tables are trees. (I)
- **Conclusion:** Some trees are tables. (I)

Methods for Mediate Inference

Format of the Conclusion: The conclusion is itself a proposition whose subject is the subject of the first statement and whose predicate is the predicate of the second statement and the common term disappears.

Example:

- **Statement:** All dogs are cats.
- **Statement:** All cats are bats.
- **Conclusion:** All dogs are bats.

Steps to find the Conclusion

Step I: Aligning: Two propositions are said to be aligned if the common term is the predicate of the first proposition and the subject of the second one.

If the sentences are not already aligned then they can be aligned by changing the order of the sentences or converting the sentences.

Example:

All flowers are birds.
    Subject   predicate

All birds are red.
    Subject   predicate

Here, common term is 'birds' and it is the predicate of the first proposition and the subject of second proposition.

Step II: After aligning the two sentences properly, use the following table to draw

Type of I prop.		Type of II prop.		Type of conclusion
A	+	A	=	A
A	+	E	=	E
I	+	A	=	I
I	+	E	=	O
E	+	A	=	O*
E	+	I	=	O*

Here, O* mean that the conclusion or inference is of type O but the subject of inference is the predicate of the second statement and the predicate of the inference is the subject of the first statement i.e. its format is opposite to the normal format of the conclusion

Points to Remember

There are only 6 cases where a conclusion can be drawn. In other cases, no conclusion can be drawn.

A + I → No conclusion;	E + O → No conclusion.
A + O → No conclusion;	I + I → No conclusion.
E + E → No conclusion;	I + O → No conclusion.

- If two propositions have no common term then no conclusion could be drawn.
- In 'Syllogism' a conclusion has to be drawn from two propositions.

Solved Examples

- **Statement: I.** Some cars are roads.
- **Statement: II.** Some roads are buses.

Solution: Since, both statements are I-type, therefore, no mediate conclusion follows. But immediate conclusions can be followed from conversion of statements (I) and (II).

- Conversion of statement I: Some roads are cars.
- Conversion of statement II: Some buses are roads.

- Statement: I. Some men are lions.
- Statement: II. All lions are foxes.

Solution: Here, some men are lions. … I-type

Syllogisms

All lions are foxes. … A-type.

Conclusion:I + A = I-type

∴ Some men are foxes.

Also, conversion of statement I : Some lions are men.

Conversion of statement II : Some foxes are lions.

and Implication of statement II : Some lions are foxes.

- **Statement:** I. All birds are books.
- **Statement:** II. All books are cars.

Solution: Here, both statements are of A-type.

and A + A =A-type conclusion.

All birds are books.

All books are cars.

Conclusions: All birds are cars.

Some birds are books. (Implication of statement I)

Some books are cars. (Implication of statement II)

Some books are birds. (Conversion)

Some cars are books. (Conversion)

- **Statement:** I. Some dogs are cats.
- **Statement:** II. No cat is cow.

Solution: Since I + E = O-type conclusion.

Conclusions:Some dogs are not cow.

Some cats are dogs. (conversion of I)

Some cats are not cow.(Implication of II)

No cow is cat. (conversion of II)

- **Statement:** I. All fathers are sons.
- **Statement:** II. No son is educated.

Solution: Here, A + E = E-type conclusion.

Conclusions:No father is educated.

Some fathers are sons.(Implication of I)

Some sons are fathers. (conversion)

Some sons are not educated.(Implication of II)

- **Statement**: I. No magazine is cap.
- **Statement:** II. All caps are cameras.

Solution: Since E + A = O*-type conclusion.

Conclusions:Some cameras are not magazine.

Some caps are cameras. (Implication of II)

Some magazines are not cap. (Implication of I)

Some cameras are caps. (conversion of II)

No cap is magazine. (conversion of I)

- **Statement:** I. No table is water.
- **Statement:** II. Some water are clothes.

Solution: Here, E + I = O*-type conclusion.

Conclusions:Some clothes are not tables.

Some tables are not water. (Implication of I)

No water is table. (conversion of I)

Some clothes are water. (conversion of II)