6.1 Standard Form, Mood, and Figure

Definition: A *syllogism* is an argument with two premises and a conclusion.

Definition: A *categorical syllogism* is a syllogism whose premises and conclusion are all categorical statements and which contains exactly three terms.

Comment: Because each categorical statement contains exactly two (distinct) terms, it follows from this definition that each term in a categorical syllogism must occur exactly twice in the argument.

Definition: The *major term* in a categorical syllogism is the predicate term of the conclusion. The *minor term* is the subject term of the conclusion. The *middle term* is the term that occurs in each premise.

Example 1: A Categorical Syllogism

1. All good logicians are beer lovers.
2. No politicians are good logicians.
3. Some politicians are not beer lovers.

Major term: "beer lovers"

Minor term: "politicians"

Middle term: "good logicans"

Comment: The syllogism above is invalid. See if you can figure out why.

Definition : A categorical syllogism is in *standard form* iff

1. Its component statements are all in standard form (i.e., not stylistic variants)

2. Its first premise contains the major term,

3. Its second premise contains the minor term, and

4. The conclusion is stated last.

Example 2

1. No birds are mammals.
2. All dogs are mammals.
3. Therefore, no dogs are birds.

Definition: The *major premise* of a categorical syllogism (in standard form) is the premise containing the major term.

Definition: The *minor premise* of a categorical syllogism (in standard form) is the premise containing the minor term.

Comment: It follows that, in a standard form categorical syllogism, the first premise is the major premise and the second premise is the minor premise.

Mood and Figure

The *mood* of a categorical syllogism in standard form is a string of three letters indicating, respectively, the forms of the major premise, minor premise, and conclusion of the syllogism. Thus, the mood of the syllogism in Example 2 above is **EAE**.

Note, however, that syllogisms can have the same mood but still differ in logical form. Consider the following example:

Example 3

1. No mammals are birds.
2. All mammals are animals.
3. Therefore, no animals are birds.

Example 3 also has the form **EAE**. But, unlike Example 2, it is invalid. What's the difference?

The syllogisms in Examples 2 and 3 have the following forms, respectively:

> No P are M.   No M are P.
> All S are M.   All M are S.
> No S are P.   No S are P.

These two syllogisms differ in *figure*.

The *figure* of a categorical syllogism is determined by the position of the middle term. There are four possible figures:

First Figure	Second Figure	Third Figure	Fourth figure
M-P	P-M	M-P	P-M
S-M	S-M	M-S	M-S
S-P	S-P	S-P	S-P

The syllogism in Example 2 exhibits second figure. The one in Example 3 exhibits third figure.

Now for the central fact about syllogistic validity:

The form of a categorical syllogism is completely determined by its mood and figure.

Aristotle worked out exhaustively which combinations of mood and figurec result in valid forms and which result in invalid forms. Thus, the form of Example 2 (**"EAE-2"**) is valid; that of Example 3 (**"EAE-3"**) is invalid.

There are 256 combinations of mood and figure (64 (4 $\times$ 4 $\times$ 4) moods $\times$ 4 figures). Only fifteen are valid.

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The valid syllogistic forms

First figure:	**AAA**, **EAE**, **AII**, **EIO**
Second figure:	**EAE**, **AEE**, **EIO**, **AOO**
Third figure:	**IAI**, **AII**, **OAO**, **EIO**
Fourth figure:	**AEE**, **IAI**, **EIO**

In working out the valid forms, Aristotle made an assumption that is rejected by most modern logicians, namely, that all terms denote nonempty classes. On this assumption, nine more forms turn out valid in addition to the fifteen above.

Forms valid in Aristotelian logic only

First figure:	**AAI**, **EAO**
Second figure:	**AEO**, **EAO**
Third figure:	**AAI**, **EAO**
Fourth figure:	**AEO**, **EAO**, **AAI**

Comment: You will not need to know the valid Aristotelian forms for the exam.