

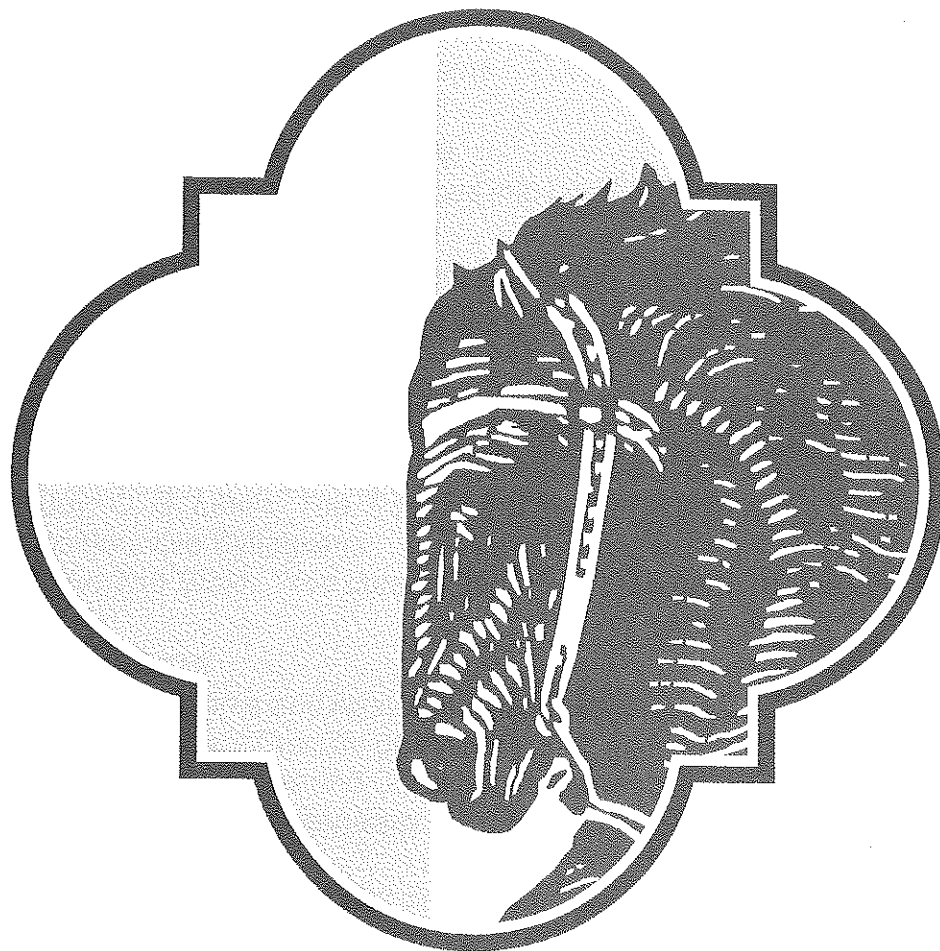
# TRADITIONAL LOGIC

Advanced Formal Logic

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BOOK II

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By Martin Cothran

CLASSICAL TRIVIUM CORE SERIES

**Traditional Logic: Book II**  
**Advanced Formal Logic**  
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## To the Teacher

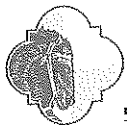
**The two books together constitute a complete course in formal logic at the junior and senior high school levels.**

\_\_\_\_\_ **What This Book Covers.** This book is a continuation of *Traditional Logic, Book I: An Introduction to Formal Logic*, and presupposes a knowledge of the material in that book. The two books together constitute a complete course in formal logic at the junior and senior high school levels.

*Book I* covers the three acts of the mind involved in logic: simple apprehension, judgement and deductive inference. In this book, we continue the study of deductive inference with the treatment of figure and mood in simple syllogisms, complex syllogisms and hypothetical reasoning. We also have one chapter on the oblique syllogism, which is a variant of the traditional categorical syllogism.

Like the first book, daily exercise sets are given at the end of each chapter to ensure comprehension and mastery of the material at every level. It has always seemed to me that logic instruction books are plagued by one or both of two problems: they are either too difficult for use at the high school level, or they are so simplified and cursory in their treatment that they do not constitute a truly comprehensive and rigorous course in the subject. The structure of the exercises in this book is meant to remedy both problems by guiding the student through sometimes difficult material in such a way as to make the learning of it as simple and straightforward as the subject itself allows. If I have done my job right, then whatever difficulties encountered will not be because of poor presentation, but because of the inherent complexity of the material.

One marked difference between this and the first book is the inclusion of more "real life" contemporary examples of arguments in the exercises. I intentionally avoided them in *Book I* because I wanted the student to concentrate on the form of arguments to the exclusion of all else. We continue the study of form in this book, of course, but the student should be more prepared at this point in his understanding of logic to accommodate a wide variety and complexity of content. The examples in the chapters themselves continue to



concentrate on simple examples, most of them theological or philosophical in content. But, beginning in chapter 6, the student is introduced to examples that have political and social relevance.

Several additional features differentiate this from the earlier book, including writing assignments at the end of each chapter and case studies in the later chapters of the book. The writing assignments are optional, of course, but they provide an excellent way to integrate logic, history, philosophy, religion and writing. The case studies show the relevance and importance of logic in history, literature, religion and philosophy. These are some of the notable examples of how the argument forms covered in this book have been used by the great thinkers of the Western world to deal with issues that many times transcend the time and circumstance in which they were uttered. They are meant to inspire the individual teacher to find such examples himself. In fact, the good teacher will collect many more as his years of experience in teaching logic grows.

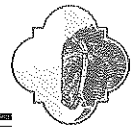
\_\_\_\_\_ **Whom This Book is For.** Both this and the previous book were written with junior high and senior high students in mind. The first book is meant to easily accommodate 7th and 8th graders. These students, however, will find this book more difficult going than the first. It is not, however, out of the reach of exceptional 7th and 8th graders, although it is probably best suited for use at about the 9th grade. Students with training in classical subjects such as Latin will be the best prepared for this logic program.

\_\_\_\_\_ **Some Suggestions on Using This Book.** I would like to make several suggestions to both the home schooling parents and the classroom teachers who use this book. The first has to do with challenges posed by the presentation of more difficult material.

Because of the level of difficulty *Book II* will take relatively longer than *Book I*. Families and schools using the book over the course of one year will probably want to finish *Book I* before the end of the first semester to allow several extra weeks to cover the material in *Book II*. Those that have used a semester to cover *Book I* might consider skipping one or two chapters in the books (Chapter 4 in *Book II*, for example, is not essential to the subsequent material.) Either book, of course, could be used as the basis for year-long rather than a one-semester course.

\_\_\_\_\_ **Suggestions on Classroom Discussion.** My own classroom experience has convinced me that nothing gets a student's attention more than the discussion of thorny religious, philosophical and social issues. I never plan for these in my own classroom presentation, partly because I teach in a cottage school environment where I only have one hour a week with the students, and partly because of my own teaching style. These issues do seem to come up on a regular basis—either from a student who has seen or heard something relevant that interests him, or from me, when I have heard something on the radio or read something in the newspaper that exemplifies some form of argument we have studied.

**The case studies show the relevance and importance of logic in history, literature, religion and philosophy.**



**It will always be the teacher and the student who will find the most relevant topics for discussion.**

Although the case studies are meant, in part, to engender some of this kind of discussion, the most relevant topics cannot be included in this book, since the shelf life of most relevant issues, particularly political and social issues, is very short. That is, of course, the problem with trying to be relevant: One becomes irrelevant rather quickly.

While we have included many examples in this book that are standard topics in many Christian and home schools, it will always be the teacher and the students who will find the most relevant topics for discussion. Simply reading the daily newspaper and listening to the news will yield a treasure trove of argument forms (valid and invalid) for profitable classroom discussion. In this age of symbolic media such as television, which dulls the rational faculties, the teacher will have done the student a favor if, during the course of the class, he (the student) acquires the habit of analyzing everything he sees, hears and reads.

One excellent way to foster interest in the subject of logic is to arrange to have the students all read the same material outside of class. Having them all read a particular columnist in the local newspaper or in a magazine (Christian families and schools might consider sources such as *World* magazine) would be an excellent way to provide a common fund of material to facilitate discussion and to engender competition in identifying arguments.

When a classroom discussion builds a head of steam, and students begin to address one another, I have found that the teacher can calmly retreat to the board and begin writing down the arguments being expressed by the most vigorous proponents of each position. It doesn't take the students long to realize that the logical skeleton of their arguments has been set down in very clear terms. Sometimes they like what they see, but more often they are forced to qualify their statements and sometimes take them back. In either case, they have been forced to logically analyze what they have said. These situations make for very teachable moments.

The teacher will notice that there are many exercises in this book that require the student to construct arguments of the form being studied. These exercises are extremely important, since they force the student to analyze the structure of the argument form he is studying. These exercises are also useful in the classroom. Teachers might, for example, with a few minutes left in class, ask students to create a syllogism in whatever argument form they are studying. As soon as they have done it correctly (and no sooner), they can be dismissed. I have used this technique to great benefit.

\_\_\_\_\_ **Traditional Logic vs. Modern Logic.** I would also like to say something about the relationship between traditional and modern symbolic logic, since I anticipate questions from some about material covered in other programs that is not covered here. Truth tables, for example, and other features of the calculus of modern logic are things I have chosen not to cover in this program in favor of a more tradi-



tional approach to the subject. There are several reasons for this.

Traditional logic is based on metaphysical realism; in its emphasis on terms and their relationships, it assumes that terms stand for concepts and concepts for real essences. In other words, in the perennial debate over how we can know anything, traditional logic very plainly assumes that things are and that we can know them as they are. Modern logic, on the other hand, assumes a sort of metaphysical nominalism; that is, the idea that terms are merely labels, invented for our convenience, but not necessarily signifying anything real.

This creates problems too technical to delve into here. Suffice it to say that this book is based on the older and more philosophically sound approach which is, in my opinion, much more closely in accord with the Christian worldview. That is not to say that I think a study of modern logic is not profitable. I do believe, however, that a student will profit more from it if he already has a solid grounding in a system with correct assumptions.

\_\_\_\_\_ **Acknowledgments.** The material for this book was based on a number of important sources. Among the most important are: *Formal Logic*, by Jacques Maritain; *Basic Logic*, by Raymond McCall; and perhaps the most helpful book I have come across on the subject of logic, *Introduction to Logic*, by Andrew H. Bachhuber, S. J. I have tried not to directly lift anything from these books, although a few examples will seem extremely familiar to anyone who has read these books. I have also used the same breakdown for translating ordinary language arguments that is used in *Philosophy Made Simple*, by Richard H. Popkin and Avrum Stroll, a book that contains one of the best short presentations of traditional logic available.

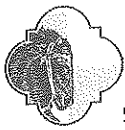
I would also like to thank the students in my logic classes over the past years for their help in pointing out mistakes in the class notes which formed the basis for this book. I would like particularly to thank Ruth John, one of my veteran students who helped proof the book. But it is Cheryl Lowe of Memoria Press who, with the exception of myself, has spent more time than anyone else on the book.

But despite the many hours Cheryl has spent finding my errors, there are undoubtedly a few we missed. Anyone finding mistakes in the book is welcome (and encouraged) to bring them to our attention. I would also urge parents and teachers using this book to share their suggestions for teaching the material. Both of these things can be done by visiting our website at: [www.memoriapress.com](http://www.memoriapress.com). We will try to incorporate all of your suggestions in some way, either in a future revision of the book or through online helps.

Training in logic will provide a student with a lifelong habit of mind which he will take with him into every activity in his life that involves thought—which is to say, every activity. Not everyone becomes a scientist, or accountant, or teacher, but everyone has to think. And there is no better way to prepare for this universal occupation than the study of logic.

Martin Cothran

**T**his book is based on the older and more philosophically sound approach which is, in my opinion, much more closely in accord with the Christian worldview.



“Logic is the anatomy of thought.”

—John Locke

# Figure in Syllogisms

\_\_\_\_\_ **Introduction.** Now that we have mastered the rules of validity for categorical syllogisms, we turn to figures and moods. Categorizing syllogisms according to figure and mood will deepen our understanding of the syllogism and give us a short cut in determining validity.

The *figure* of the syllogism can be defined as follows:

*The figure of a syllogism is the disposition (or location) of terms in the premises.*

The figure of a syllogism is determined by the position of the middle term. There are four figures in all.

\_\_\_\_\_ **Review of Terms.** In order to properly understand syllogistic figures, we must remember the terms in a syllogism and the letters that designate them. We must remember that the letter *P* designates the major term (which is the predicate of the conclusion). The letter *S* designates the minor term (which is the subject of the conclusion); and the letter *M* designates the middle term (which is the term that appears in both premises, but not in the conclusion).

We must also remember that the premise that contains the major term (which we call the major premise) always comes first. Thus, a typical syllogism might look like this:

All M is P  
All S is M  
Therefore, all S is P

The location of *M* (the middle term) in each premise will tell us what figure the syllogism is in.

\_\_\_\_\_ **The First Figure.** In a syllogism of the First Figure, the middle term is the subject in the major premise and the predicate in the minor premise. We call this figure *sub-prae*, which is short for

**T**he figure of a syllogism is the disposition (or location) of terms in the premises.





*subjectum-praedicatum*, which is Latin for *subject-predicate*—the subject being the place of the middle term in the major premise and predicate being the place of the middle term in the minor premise.

An example of a *sub-prae* or *First Figure* syllogism would be:

All human beings<sup>M</sup> are mortal<sup>P</sup>  
 All boys<sup>S</sup> are human beings<sup>M</sup>  
 Therefore, all boys<sup>S</sup> are mortal<sup>P</sup>

**Sub-prae**



You can see that the middle term is the subject in the major premise and the predicate in the minor premise. Therefore, it is *sub-prae*.

**We** must also remember that the major premise is always put first in a syllogism.

\_\_\_\_\_ **The Second Figure.** In a syllogism of the *Second Figure*, the middle term is the predicate in the major premise and the predicate in the minor premise.

We term this figure *prae-prae*, which is short for *praedicatum-praedicatum*, which is Latin for *predicate-predicate*, the predicate being the place of the middle term in both premises.

An example of a *prae-prae* or *Second Figure* syllogism would be:

All men<sup>P</sup> are mortal<sup>M</sup>  
 No angels<sup>S</sup> are mortal<sup>M</sup>

Therefore, no angels<sup>S</sup> are men<sup>P</sup>

**Prae-prae**



You can see that the middle term is the predicate in both the major and minor premises of this argument. Therefore, this syllogism is *prae-prae*.

\_\_\_\_\_ **The Third Figure.** In a syllogism of the *Third Figure*, the middle term is the subject in the major premise and also the subject in the minor premise:

We term this figure *sub-sub*, which is short for *subjectum-subjectum*, the subject being the place of the middle term in both premises.

An example of a *sub-sub* or *Third Figure* syllogism would be:

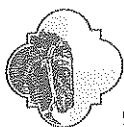
All human beings<sup>M</sup> are mortal<sup>P</sup>  
 Some human beings<sup>M</sup> are boys<sup>S</sup>

Therefore, some boys<sup>S</sup> are mortal<sup>P</sup>

**Sub-sub**



Here the middle term is the subject in both the major and minor premises of the argument. Therefore, this syllogism is *sub-sub*.



\_\_\_\_\_ **The Fourth Figure (Indirect First).** There is also what some have called a *Fourth Figure*. However, *Fourth Figure* syllogisms are actually just another form of the First. They are what we will call the *Indirect First*.

In a *Fourth Figure* syllogism, the middle term is the predicate in the major premise and the subject in the minor premise. In other words, a *prae-sub*. We say it is not a figure in and of itself but only a form of the First because the only difference between it and the First is in the grammar of the syllogism; the arrangement of the words only makes it look different, but logically it is the same.

An example of the *Fourth Figure* would be:

All Romans<sup>P</sup> are men<sup>M</sup>  
All men<sup>M</sup> are mortal<sup>S</sup>  
Therefore, some mortals<sup>S</sup> are Romans<sup>P</sup>

As you can see, the middle term (*men*) is the predicate in the major premise and the subject in the minor premise.

*Prae-sub* \_\_\_\_\_



This Fourth Figure is sometimes called the *Galenic* figure because it was Claudius Galen, who lived from 131 A. D. to about 200 A. D., who first considered

that it was a separate figure. Galen was considered the chief authority on medicine for over a thousand years. But while Galen and many modern logicians think the Fourth Figure is distinct from the First, Aristotle and all the rest of the ancient logicians thought it was only another form of the First.

We will side with the ancients and concentrate primarily on the first three figures. However, we do encounter syllogisms in this form, so we need to be prepared to handle them.

\_\_\_\_\_ **How to Remember the Figures.** There are many Latin sayings that logicians in the Middle Ages invented to help us to remember certain things in logic. The Latin saying that helps us to remember figures goes like this:

*Sub-prae prima, bis prae secunda, tertia sub bis.*

It means, *Sub-prae first, prae twice second, sub twice third*. In other words, *sub-prae* is the First Figure, *prae-prae* (*prae twice*) is the Second, and *sub-sub* (*sub twice*) is the Third. By memorizing this saying, you will be able to remember where the middle term is in each of the three figures.

\_\_\_\_\_ **Summary.** This chapter concerns the *figure* of syllogisms. The figure of a syllogism is defined as *the disposition of terms in the premises*. The terms in a syllogism can be arranged in one of three (some would say four) different ways. We identify the figures

**While Galen and many modern logicians think the Fourth Figure is distinct from the First, Aristotle and all the rest of the ancient logicians thought it was only another form of the First.**

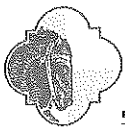


**We identify the figures according to the location of the middle term.**

according to the location of the middle term.

A syllogism in which the middle term is the subject in the major premise and the predicate in the minor premise is called a *sub-prae* or *First Figure* syllogism. A syllogism in which the middle term is the predicate in the major premise and the predicate in the minor premise is called a *prae-prae* or *Second Figure* syllogism. A syllogism in which the middle term is the subject in the major premise and the subject in the minor premise is called a *sub-sub* or *Third Figure* syllogism.

There is also an *Indirect First Figure*, which some logicians have considered to be another figure altogether—a *Fourth Figure* syllogism. Its middle term appears in the predicate of the major premise and in the subject of the minor premise, making it a *prae-sub*. But it only looks like a different figure and is really just a form of the First.



\_\_\_\_\_ Exercises for Day 1. Peruse entire chapter. Then read the introductory section at the very beginning of chapter 1. Read this section carefully and try to understand it as best you can.

1. What are we discussing in this chapter?
2. Explain what the word *figure* means as used in this chapter.
3. How many figures are there?
4. What is *disposition*?

Read section titled, "The First Figure." Read it carefully.

5. What is the Latin term for a syllogism in the First Figure?
6. How do we know a syllogism is in the First Figure?
7. Fill in the following chart:

**First Figure (*sub-prae*)**

M is the \_\_\_\_\_ (subject or predicate) in the *major* premise

M is the \_\_\_\_\_ (subject or predicate) in the *minor* premise

8. Show, using the symbols S, P and M, how a *sub-prae* syllogism is constructed.
9. Construct a *sub-prae* syllogism using different terms than the ones in the text.

\_\_\_\_\_ Exercises for Day 2. Read section titled, "The Second Figure." Read the entire section carefully.

10. What is the Latin term for a syllogism in the Second Figure?
11. How do we know a syllogism is in the Second Figure?
12. Fill in the following chart:

**Second Figure (*prae-prae*)**

M is the \_\_\_\_\_ in the *major* premise

M is the \_\_\_\_\_ in the *minor* premise

13. Show, using the symbols S, P and M, how a *prae-prae* syllogism is constructed.
14. Construct a *prae-prae* syllogism using different terms than the ones in the text.

Read section titled, "The Third Figure." Read it carefully.

15. What is the Latin term for a syllogism in the Third Figure?



## Daily Exercises for Chapter 1

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16. How do we know a syllogism is in the Third Figure?

17. Fill in the following chart:

**Third Figure (sub-sub)**

M is the \_\_\_\_\_ in the *major* premise

M is the \_\_\_\_\_ in the *minor* premise

18. Show, using the symbols S, P and M, how a *sub-sub* syllogism is constructed.

19. Construct a *sub-sub* syllogism using different terms than the ones in the text.

\_\_\_\_\_ **Exercises for Day 3.** Read section titled "The Fourth Figure (Indirect First)." Read the entire section carefully.

20. What is the Latin term for a syllogism in the Fourth Figure?

21. How do we know a syllogism is in the Fourth Figure?

22. Fill in the following chart:

**Fourth Figure-Indirect First (prae-sub)**

M is: \_\_\_\_\_ in the *major* premise

M is: \_\_\_\_\_ in the *minor* premise

23. Show, using the symbols S, P and M, how a *prae-sub* syllogism is constructed.

24. Construct a *prae-sub* syllogism using different terms than the ones in the text.

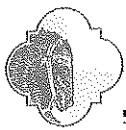
25. Fourth Figure syllogisms are just another form of what?

26. What is the Fourth Figure sometimes called?

**Read section titled, "How to Remember the Figures."**

27. What is the Latin saying invented to help remember the figures?

28. What does this saying mean?



Exercises for Day 4.

29. Identify the terms, identify the position of the middle term and determine the figure of each syllogism:

No liberals are conservatives  
Allen is a conservative  
Therefore, Allen is not a liberal

M= \_\_\_\_\_ (*sub* or *prae*)  
M= \_\_\_\_\_ (*sub* or *prae*)

S: \_\_\_\_\_  
P: \_\_\_\_\_  
M: \_\_\_\_\_

■ First ■ Second ■ Third ■ Fourth

All Democrats are big spenders  
President Clinton is a Democrat  
Therefore, President Clinton is a big spender

M= \_\_\_\_\_  
M= \_\_\_\_\_

S: \_\_\_\_\_  
P: \_\_\_\_\_  
M: \_\_\_\_\_

■ First ■ Second ■ Third ■ Fourth

Some men are physicists  
All physicists are brilliant  
Therefore, some brilliant things are men

M= \_\_\_\_\_  
M= \_\_\_\_\_

S: \_\_\_\_\_  
P: \_\_\_\_\_  
M: \_\_\_\_\_

■ First ■ Second ■ Third ■ Fourth

No beggars can be choosers  
That man is a beggar  
Therefore, that man cannot be a chooser

M= \_\_\_\_\_  
M= \_\_\_\_\_

S: \_\_\_\_\_  
P: \_\_\_\_\_  
M: \_\_\_\_\_

■ First ■ Second ■ Third ■ Fourth

No men are gods  
All men are mortal  
Therefore, some mortals are not gods

M= \_\_\_\_\_  
M= \_\_\_\_\_

S: \_\_\_\_\_  
P: \_\_\_\_\_  
M: \_\_\_\_\_

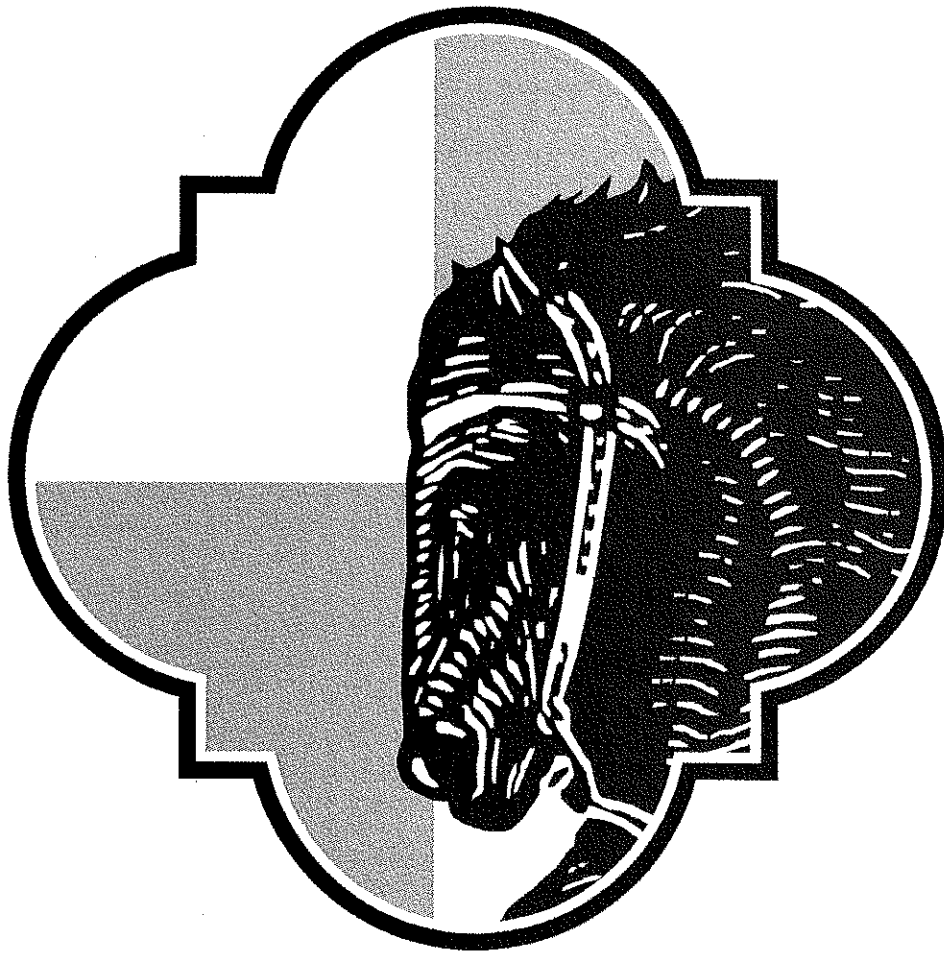
■ First ■ Second ■ Third ■ Fourth



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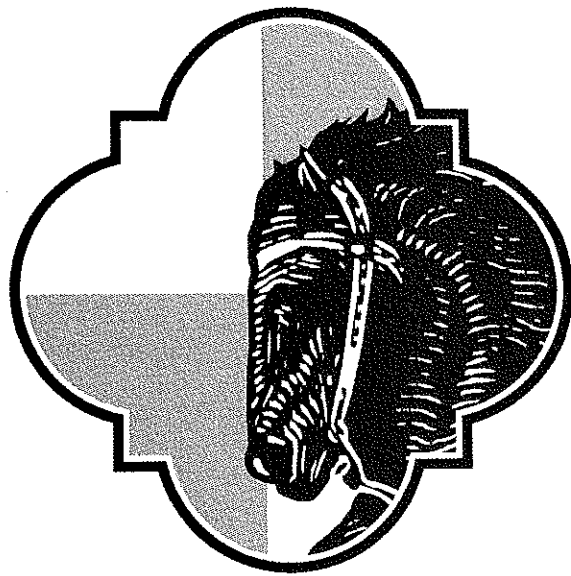
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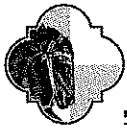
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**Answer Key: Chapter I**

**Exercises for Day 1**

1. Figure in syllogisms.
2. The figure of a syllogism is the disposition or location of terms in the premises.
3. There are three (some would say four) figures.
4. *Disposition* means *location*.
5. *sub-prae*
6. The middle term is the subject of the major premise and the predicate of the minor premise.
7. Subject; predicate.
8.       M is P  
       S is M  
       S is P
9. Make sure the syllogism is constructed as in question 7.

**Exercises for Day 2**

10. *prae-prae*
11. When the middle term is the predicate in both the major and minor premises.
12. predicate; predicate
13.       P is M  
       S is M  
       S is P
14. Make sure the syllogism is constructed as in 12.
15. *sub-sub*
16. When the middle term is the subject in both the major and minor premises.
17. subject; subject
18.       M is P  
       M is S  
       S is P
19. Make sure the syllogism is constructed as in question 17.

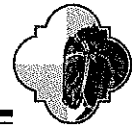
**Exercises for Day 3**

20. *prae-sub*
21. When the middle term is predicate of the major premise and subject of the minor premise.
22. predicate; subject.
23.       P is M  
       M is S  
       S is P
24. Make sure it is constructed as in 22.
25. The First Figure.
26. The Indirect First or Fourth.
27. *Sub-prae* prima, *bis prae* secunda, *tertia sub* bis.
28. *Sub-prae* first, *prae* twice second, *sub* twice third.

**Exercises for Day 4**

- |       |   |                                   |
|-------|---|-----------------------------------|
| 29.   | S: Allen<br>P: liberal<br>M: conservative             | M=prae<br>M=prae<br>Second Figure |
| <hr/> |   |                                   |
|       | S: President Clinton<br>P: big spender<br>M: Democrat | M=sub<br>M=prae<br>First Figure   |
| <hr/> |   |                                   |
|       | S: brilliant things<br>P: men<br>M: physicists        | M=prae<br>M=sub<br>Fourth Figure  |
| <hr/> |   |                                   |

## Answer Key: Chapter 2



S: that man	M=sub
P: choosers	M=prae
M: beggars	First Figure

S: mortals	M=sub
P: gods	M=sub
M: men	Third figure

30. Letter designation	Form (e.g. "All S is P")	Subject-Term	Predicate-Term
A	All S is P	<u>distributed</u>	<u>undistributed</u>
I	Some S is P	<u>undistributed</u>	<u>undistributed</u>
E	No S is P	<u>distributed</u>	<u>distributed</u>
O	Some S is not P	<u>undistributed</u>	<u>distributed</u>

31. First, First (although it would at first appear to be Fourth, since the syllogism is not in proper logical form), First, Third.

32. Make sure the middle term is in the appropriate location in each premise.

33. T; F (it is the Fourth Figure that is really just a form of the First); T; F (it is the middle, not the major term that is the subject in the major premise and the predicate in the minor premise); F (it is the disposition of terms in the *premises*, not the *conclusion*); T.

## Answer Key: Chapter 2

### Exercises for Day 1

1. Mood in syllogisms.
2. subject; predicate.
3. Figure is the disposition of terms in the premises.
4. Mood is the disposition of premises according to quantity and quality.
5. Four
6. Sixty-four (16 for each figure)
7. That the premises are both A statements.
8. That the major premise is an E statement and the minor premise is an A statement.
9. AA
10. EA
11. AA, AE, AI, AO; EA EE, EI, EO; IA, IE, II, IO; OA, OE, OI, OO

### Exercise for Day 2

12. predicate; predicate
13. Yes
14. 64
15. EE or OO
16. I9
17. **BARBARA, CELARENT, DARII, FERIO**que prioris;  
**CESARE, CAMESTRES, FESTINO, BAROCO** secundae;  
Tertia; **DARAPTI, DISAMIS, DATISI, FELAPTON, BOCARDO, FERISON** habet;  
quarta insuper addit; **BRAMANTIP, CAMENES, DIMARIS, FESAPO, FRESISON.**
18. BARBARA, CELARENT, DARII, FERIO (note that it is not FERIOque, but just FERIO, since que is a Latin form of the word and)
19. CESARE, CAMESTRES, FESTINO, BAROCO
20. DARAPTI, DISAMIS, DATISI, FELAPTON, BOCARDO, FERISON
21. BRAMANTIP, CAMENES, DIMARIS, FESAPO, FRESISON
22. The mood of the syllogism by indicating what kind of statement each premise is.

### Exercise for Day 3

23. **BARBARA, CELARENT, DARII, FERIO**que prioris;  
**CESARE, CAMESTRES, FESTINO, BAROCO** secundae;  
Tertia; **DARAPTI, DISAMIS, DATISI, FELAPTON, BOCARDO, FERISON** habet;  
quarta insuper addit; **BRAMANTIP, CAMENES, DIMARIS, FESAPO, FRESISON.**
24. subject; subject
25. Five.
26. AA (First), EA (First), EA (Second), AE (Second), AE (Fourth)