

TRADITIONAL LOGIC

Introduction to Formal Logic

BOOK I



By Martin Cothran

CLASSICAL TRIVIUM CORE SERIES

TRADITIONAL LOGIC: BOOK I
Introduction to Formal Logic
© 2000 by Martin Cothran
ISBN: 978-1-930953-10-9

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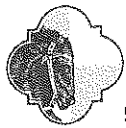
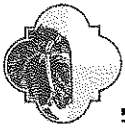


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A Note to the Teacher

This is a book on traditional formal logic, a subject which a student might have studied in the Middle Ages. For the most part, the methodology of traditional logic was laid down by the ancient Greek philosopher Aristotle. It was taken up again, however, in the Middle Ages by the great doctors of the Church, and the formulations in this and the succeeding book, *Traditional Logic, Book II: Advanced Formal Logic*, are largely a result of their work.

The largest influence on this book comes from two other books: *Basic Logic*, by Raymond McCall, and *Introduction to Logic*, by Jacques Maritain. The examples are mostly mine.

The title of this book, *Traditional Logic: An Introduction to Formal Logic*, betrays a particular approach to the subject that I should say something about. First, this book discusses traditional logic rather than modern logic. Traditional logic is the study of the classical syllogism; modern logic is the study, primarily, of the calculus of propositions. You will not find truth tables in this book, nor will you find much of the mathematical formulations that are the common currency of modern logic. Despite a number of assumptions that traditional logicians find questionable, there is much in modern logic worthy of study. Traditional logic, however, seems to me to have a much more solid metaphysical foundation, as well as a closer relationship to ordinary human language. It is also a system unto itself which warrants separate study.

Second, this book studies formal rather than informal logic. This can be seen most easily by the absence of a discussion of informal fallacies (although we do treat formal fallacies). The study of fallacies is often attempted because it seems to offer the teacher the best way to make the subject directly relevant, since they are easily understood and newspapers and magazines are filled with easily identifiable examples. But just because something has more immediate practical application does not mean that it is the best subject of study, or that it is the best to attempt first. Because a nice roof has more immediate appeal than a foundation does not mean that the foundation is less important, or that we should start on the roof first when building a house.

This book discusses traditional logic rather than modern logic. Traditional logic is the study of the classical syllogism; modern logic is the study, primarily, of the calculus of propositions.



Note to the Teacher

Because informal logic lacks a systematic structure, some of the benefits of rigorous logic instruction (such as an orderly habit of mind) are absent from its study. Like a house, a logical mind is best built upon a solid structure. A beginning study of formal logic provides this.

Traditional logic trains the mind to respect truth, and indeed assumes a Christian view of truth throughout, which is one of the reasons it appealed to the Medieval schoolmen. In fact, one of the reasons for including Chapters 1-3, abstract as they are, is precisely because they teach that there is such a thing as truth and that it can be comprehended (something you would think would be self-evident, but which we find ourselves defending against detractors much too often today).

This book has been prepared with homeschoolers in mind, although it is equally appropriate for private schools. It is the product of three years of logic instruction at Mars Hill, Lexington, a cooperative school for homeschooled children. Children met one day a week for classroom instruction (essentially the content presented in the following chapters), after which they completed the assignments in four-day installments at home.

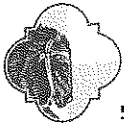
This book is best used with high school students, although I have used this material with 7th and 8th graders without any significant problems. Although Chapters 1-3 are the most abstract chapters of the book, I have found that they are among the most enjoyable to teach, and to learn—even for younger students. My own experience teaching students continues to indicate that these chapters are among my students' favorites. I don't pretend to know why this is. It might have something to do with the novelty of abstract thinking to students who have spent most of their academic lives dealing with matters more concrete; or it might be that students at this age simply appreciate dealing with deep philosophical ideas more than we give them credit for. These chapters can, however, be omitted or postponed if they are found to be too difficult.

This book is designed as a one-semester course, to be completed in approximately 15 weeks. However, my own experience, as well as feedback from several teachers, tells me that this book can be—and in most classroom situations should be—completed in less than a semester. This will allow extra time to spend on the more difficult material in *Book II*. Therefore, in such cases, I would recommend combining several pairs of chapters in *Book I*. The chapters I would recommend combining into a one-week lesson are as follows: Chapters 4 and 5; Chapters 6 and 7; and Chapters 12 and 13.

If there are suggestions about the text, I would be only too happy to hear them and would love to receive any comments you have. Simply write to Memoria Press.

Martin Cothran

Traditional logic trains the mind to respect truth, and indeed assumes a Christian view of truth throughout, which is one of the reasons it appealed to the Medieval schoolmen.



What is Logic?

_____ **Introduction.** The best way to answer the question “What is logic?” is with a definition. But that is easier said than done. Throughout history, many people have thought and written about the subject of logic and many people have offered definitions. Some of them are useful and some are not.

Josiah Royce, an American philosopher, defined logic as “the science of order,” but this definition is so general that it really could include things outside of logic, and so it really doesn’t tell us much.

Other definitions are a little too simple. The writer Oliver Wendell Holmes said, “Logic is logic. That’s all I say.” That obviously won’t help us.

The writers of a book on fallacies (we’ll explain what those are later) defined logic as “the defense against trickery.” That’s one thing logic is, but certainly not all.

Much better is the definition given by Raymond McCall: “Logic in general is the science of right thinking.” Jacques Maritain, a very famous philosopher, had a similar definition. “Logic,” he said, “is the art which enables us to proceed with order, ease, and correctness in the act of reason itself.”

Irving Copi, who wrote a book on logic still used in many colleges, gets even a little more specific. “The distinction between correct and incorrect reasoning is the central problem with which logic deals.” As you proceed in this book, you will see that this is so.

_____ **The History of Logic.** The eighteenth-century German philosopher Immanuel Kant called Aristotle, the ancient Greek philosopher, the “father of logic.” If we are thinking only of traditional, or *formal*, logic (which is the only kind of logic we study in this book), this is true. In fact, formal logic has changed hardly at all since the time of Aristotle, who lived from 384-322 B.C.

Shortly after the time of Aristotle, another Greek philosopher laid the groundwork for modern symbolic logic—his name was Chrysippus (279-206 B.C.). During the Middle Ages, the kind of logic developed by Chrysippus

Logic is the science of right thinking.

Aristotle is considered the father of logic.



Introduction

The two main branches of logic are formal logic and material logic.

did not receive much attention. But in the 17th and early 18th centuries, philosophers began to take another look at the logical system of Chrysippus. One of the first and most famous of these is Gottfried Wilhelm Leibniz (1781-1848). Since then, many advances have been made in symbolic logic.

In addition, another form of logical thought, called *induction*, has become a part of the subject that we know as logic. John Stuart Mill (1806-1873), who lived in the 19th century, pioneered the theories about induction that we study today.

At the end of the 19th century and into our own, other logical methods have been developed, many of which have as much, if not more, to do with mathematics than with philosophy. Gottlob Frege (1848-1925), Alfred North Whitehead (1861-1947), and Bertrand Russell (1872-1970) are names associated with the more modern kinds of mathematical logic.

For our purposes, we will stick to the formal logic of Aristotle, which is just as useful today as it was when it was set forth over 2,300 years ago.

The Two Main Branches of Logic. There are two main branches of logic. One is called *formal*, or “minor,” logic, the other *material*, or “major,” logic. The two branches are quite distinct and deal with different problems.

Material logic is concerned with the *content* of argumentation. It deals with the *truth* of the terms and the propositions in an argument.

Formal logic is interested in the *form* or structure of reasoning. The truth of an argument is of only secondary consideration in this branch of logic. Formal logic is concerned with the method of deriving one truth from another.

The distinction between these two branches of logic was nicely described by G. K. Chesterton:

Logic and truth ... have very little to do with each other. Logic is concerned merely with the fidelity and accuracy with which a certain process is performed, a process which can be performed with any materials, with any assumption. You can be as logical about grif-fins and basilisks as about sheep and pigs.... Logic, then, is not necessarily an instrument for finding out truth; on the contrary, truth is a necessary instrument for using logic—for using it, that is, for the discovery of further truth.... Briefly, you can only find truth with logic if you have already found truth without it.

This last remark of Chesterton’s is important. It is not the purpose of formal logic to discover truth. That is the business of everyday observation and, in certain more formal circumstances, empirical science. Logic serves only to lead us from one truth to another.

That is why, for example, you should not call a statement of fact *logical* or *illogical* (although this is commonly done in everyday argument). You should instead call it *true* or *false*. Likewise, you should not call an argument (which contains several statements of fact) true or false. You should only call it *valid* or *invalid*. Validity is the term we use when we mean to say that an argument is logical. The term *soundness*, however, can be applied to an argument to say something about both its truth and its validity.

Three important terms in logic are truth, validity, and soundness.



_____ **Truth, Validity, and Soundness.** *Truth* means the correspondence of a statement to reality. An argument is valid when its conclusion follows logically from its premises. The term 'soundness' is used to indicate that all the premises in an argument are true *and* that the argument is valid.

An argument can contain true premises and still be invalid. Likewise, it can be perfectly valid (or logical, if you prefer) and contain false premises. But if an argument is sound, its premises must be true and it must be valid.

If this sounds confusing, don't worry: these concepts will become clearer as we progress through the material in this book.

_____ **The Components of an Argument.** An argument contains several components. In order to illustrate what these components are and how they work in the reasoning process, let us begin with a simple argument:

All men are mortal
Socrates is a man
Therefore, Socrates is mortal

The first two statements are premises and the last is the conclusion. All arguments must have at least two premises and one conclusion.

On the face of it, this argument contains a number of words making up three statements which fit together into what looks and sounds like an argument. But there is more here than meets the eye.

In formal logic, we recognize three kinds of logical processes. We recognize that each of these originates in a *mental act*, but that each also manifests itself as (and is known to us in the form of) a *verbal expression*.

_____ **Term.** The mental act involved in the first of these three logical processes is called *simple apprehension*. We call the verbal expression of simple apprehension the *term*. A simple apprehension occurs when we first form in our mind a concept of something. When we put this concept into words, we have put this simple apprehension in the form of a term.

At the point of simple apprehension, we do not affirm or deny anything about it. We just possess or grasp it.

If in your mind, for example, you think of this book (the one you're reading right now), you are performing this first logical process. You are having a simple apprehension. And if you speak or write anything about it, you will have to use a term, the term 'book.'

In the argument above (the one about Socrates), there are three terms representing three simple apprehensions. The first is 'men'; the second is 'Socrates'; and the third is 'mortal.' Each one of these represents in our mind a concept that we have transformed into a word. The concept we call the *simple apprehension* and the word we call the *term*.

Mental Act

Verbal Expression

Simple Apprehension

Term

The verbal expression of a simple apprehension is called the term.



Introduction

The verbal expression of a judgment is called a proposition.

_____ **Proposition.** The mental act involved in the second of these three logical processes is called *judgment*. The verbal expression of a judgment is called a *proposition*. We perform a judgment any time we think in our mind that something *is* something else (which we call affirmation), and also when we think that something *is not* something else (which we call denial). To judge is to affirm or deny.

If you think that this book is boring, then you are performing a judgment. If you verbally express this judgment, you will have to do it in the form of a proposition, the proposition "This book is boring." The judgment is the mental act you have when you think that this book is boring, and the proposition is the statement you make to express that thought.

In the argument above, there are three propositions expressed. The first is "All men are mortal"; the second is "Socrates is a man"; and the third is "Socrates is mortal." Each one of these represents in our mind a thought that something is something else: that all 'men' are 'mortal'; that 'Socrates' is a 'man'; and that 'Socrates' is 'mortal.'

We should point out that some people use the word 'statement' instead of 'proposition.' They mean the same thing, but to be consistent, we will use the word 'proposition.'

Mental Act

Verbal Expression

Judgment

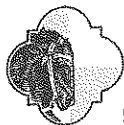
Proposition

The verbal expression of a deductive inference is called a syllogism.

_____ **Syllogism.** The mental act involved in the third of these three logical processes is called *deductive inference*. We call the verbal expression of deductive inference the *syllogism*. A deductive inference occurs when we make the logical connections in our mind between the terms in the argument in a way that shows us that the conclusion either follows or does not follow from the premises. When we verbally express this in an argument, we have put this deductive inference in the form of a syllogism.

It is at this point that we are said to make progress in knowledge. It is through the process of deductive inference, as expressed in a syllogism, that we can say, as we explained above, that we have gone from one truth or set of truths to another truth.

Let's say the reason you think this book is boring is because you think all books are boring. If this were true, you would be performing a deductive inference. You would be thinking to yourself, all books are boring, and this is a book. Therefore, this book is boring. And if you verbally expressed this deductive inference, you would do it in the form of a syllogism. The judgment expressed by "All books are boring" and "This is a book" are different than the judgment "This book is boring." Through deductive inference, however, you can go from these first two to the last one. In this way, you have gone from one set of truths to another truth (if indeed they are true, which hopefully they are not).



We would say that the argument above (the one about Socrates), in its entirety, is a syllogism. It expresses a deductive inference that logically connects certain simple apprehensions that are parts of three judgments. And this process has been expressed in the form of a syllogism.

Mental Act

Deductive Inference

Verbal Expression

Syllogism

If we now put this all together, keeping our distinction between mental acts and verbal expressions, it would look like this:

Mental Act

Simple Apprehension
Judgment
Deductive Inference

Verbal Expression

Term
Proposition
Syllogism

In order to give ourselves a mental picture of these three logical processes, let us think of a man walking. In order to get from, say, one room to another, he has to pick up his foot and take several steps in order to get to the room that is his destination. The initial act—picking up his foot—is like the initial logical act of simple apprehension. Taking a full step is like making a judgment. And stringing all the steps together into one movement is like deductive inference—we move from one place to another.

_____ **Summary.** We started out by defining logic as “the science of right thinking.” We said there are two main branches of logic. One is called *formal*, or *minor*, logic, the other *material*, or *major*, logic. Material logic is concerned with the *content* of argumentation. Formal logic is interested in the *form* or structure of reasoning. We defined *truth* as correspondence with reality. We said an argument is *valid* when its conclusion follows logically from its premises. And we said that *soundness* indicates that all the premises in an argument are true *and* that the argument is valid.

We said also that all arguments must contain two premises and a conclusion. And we said, finally, that there are three mental acts that make up the logical process: *simple apprehension*, *judgment*, and *deductive inference*. These three mental acts correspond to three verbal expressions: *term*, *proposition*, and *syllogism*.

The initial act—picking up his foot—is like the initial logical act of simple apprehension. Taking a full step is like making a judgment. And stringing all the steps together into one movement is like deductive inference.



Exercises for Day 1. Read the entire chapter. You may read it fairly quickly on this first reading. Don't expect to understand everything you read. Try only to get a general idea of what the chapter is about. Next, read the beginning sections of the introduction: "The History of Logic" and "The Two Main Branches of Logic." Read these sections carefully and try to fully understand them.

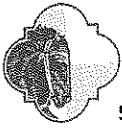
1. Based on what you have read in this chapter, what is the definition of logic?
2. Who was called the "father of logic"?
3. Who laid the groundwork for modern symbolic logic?
4. Give the name of one philosopher who made advances in symbolic logic.
5. Who pioneered the theories about induction that we study today?
6. Give the names of three people whose names are associated with modern kinds of mathematical logic.
7. Give the names of the two main branches of logic.
8. Explain the first of the main branches of logic (in Question 7) and describe it in your own words.
9. Explain the second of the main branches of logic (in Question 7) and describe it in your own words.
10. Indicate whether the following statements are true or false:

- | | | |
|---|---|---|
| T | F | The purpose of formal logic is to discover truth. |
| T | F | It is necessary to have logic in order to discover truth. |
| T | F | Logic leads us from one truth to another. |
| T | F | A statement can be true or false. |
| T | F | A statement can be valid or invalid. |
| T | F | An argument can be true or false. |
| T | F | An argument can be valid or invalid. |
| T | F | Truth is only of secondary consideration in formal logic. |

Exercises for Day 2. Read "Truth, Validity, and Soundness" and "The Components of an Argument." Read them carefully.

11. On the basis of today's reading, define 'truth.'
12. On the basis of today's reading, explain what it means to say an argument is valid.
13. On the basis of today's reading, define 'soundness.'
14. Indicate whether the following statements are true or false:

- | | | |
|---|---|---|
| T | F | An argument can contain true premises and be invalid. |
| T | F | An argument can be sound and contain false premises. |
| T | F | A sound argument must be valid. |
| T | F | A valid argument must be sound. |
| T | F | An argument with true premises can be unsound. |
| T | F | An argument can contain only one premise. |



15. In the following argument, identify the premises and the conclusion by writing the words 'premise' or 'conclusion' in the space next to the statement.

All men are mortal
Socrates is a man
Therefore, Socrates is mortal

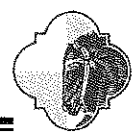
16. Name the three types of logical processes (or acts of the mind) involved in logic.

Exercises for Day 3. Read "Term" and "Proposition."

17. Each of these logical processes or mental acts (in Question 16 above) originates in a _____ and manifests itself in the form of a _____.
18. What is the mental act involved in the first of the three kinds of logical processes?
19. What is the verbal expression connected to this mental act (in Question 18)?
20. What occurs in our minds when we have a simple apprehension?
21. If you think of this book and have the concept in your mind, you are having a simple apprehension. What is the term you use to verbally express this particular simple apprehension?
22. Name the terms included in the argument in Question 15 above.
23. What does each one of these terms (in Question 22) represent?
24. What is the mental act involved in the second of the three kinds of logical processes?
25. What is the verbal expression connected to this mental act (in Question 24)?
26. What occurs in our minds when we perform a judgment?
27. If you think that this book is boring by affirming in your mind that this is so, your mind is performing a judgment. What is the term you use to verbally express this judgment?
28. Indicate the propositions included in the argument in Question 15 above.
29. What does each one of these propositions (in Question 28) represent?

Exercises for Day 4. Read "Syllogism" and "Summary." Read them carefully.

30. What is the mental act involved in the third of the three kinds of logical processes?
31. What is the verbal expression connected to this mental act (in Question 30)?
32. Describe in no less than one and no more than three sentences what occurs in our minds when we engage in deductive inference.



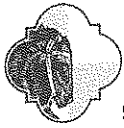
Introduction

33. If you think that because all books are boring and that this is a book, and that therefore this book is boring, your mind engaged in deductive inference. What is the term you use to verbally express this deductive inference?
34. Fill out the chart below, listing the mental acts and their corresponding verbal expressions in the order in which we have covered them:

<u>Mental Act</u>	<u>Verbal Expression</u>
■ _____	■ _____
■ _____	■ _____
■ _____	■ _____

35. Draw a line to indicate which action best describes what each mental act is like:

Taking a step	Simple Apprehension
Picking up your foot	Deductive Inference
Walking from one place to another	Judgment



What is Simple Apprehension?

_____ **Introduction.** In this chapter, we will discuss the first of the three parts of logic, simple apprehension. We will do this by defining what simple apprehension is. Let us try to explain simple apprehension by an illustration. Let's say we have a simple apprehension of a chair. What happens in our minds when we have a simple apprehension of a chair?

Generally speaking, three things happen. First, we perceive it with our senses; second, we form an image of it in our minds; and, thirdly, we conceive its meaning. Although all three of these things occur when we have a sense perception, it is this final act, the conception of meaning, that we properly speak of as simple apprehension.

_____ **What is Sense Perception?** Let's use an illustration to try to understand sense perception. When you look at a chair, when your senses (in this case your sight) present a chair to your mind, you have a sense perception. In other words, your senses perceive the chair. This sense perception is present when you are looking at the chair, but goes away when you stop looking at the chair. You will continue to have a sense perception of the chair as long as you look at it. But when you stop looking at the chair, your sense perception ceases.

The sense perception of the chair is different from the chair itself, since the sense perception occurs in your mind, while the chair exists outside of your mind. The sense perception lasts as long as you see or hear or smell or taste or touch an object and stops when you stop doing these things.

Sense perception is the act of seeing or hearing or smelling or tasting or touching.

_____ **What is a Mental Image?** When you have a sense perception of something—when you see or hear or smell or taste or touch an object—an image forms in your mind. When you see a chair, for example, an image—which has color and shape—forms as a result of the sense perception you have of the chair. When the sense perception ceases, however—when, for example, you stop looking at the chair—the image can continue. And this image will

Three things generally occur during simple apprehension: we perceive it with our senses, we have a mental image of it, and we conceive the meaning of it.



occur again in your mind whenever you think about the chair—even if you are not looking at the chair.

This happens, for example, every time you remember something you have seen before.

Like the sense perception you had when you looked at the chair, this mental image of the chair is different from the chair itself, since the chair exists outside the mind, while the mental image exists inside the mind only. Furthermore, this mental image of the chair is different from the sense perception because, while the sense perception lasts only as long as you are looking at the chair, the mental image can be present even when you are not perceiving the chair through your senses.

In short, the mental image is different from the chair, and the mental image is also different from the sense perception.

A mental image is the image of an object formed in the mind as a result of a sense perception of that object.

_____ **What is a Concept?** The third aspect of simple apprehension is idea or *concept*. When you look at a chair, there is something else that happens in your mind other than a sense perception and a mental image. It is the idea or concept of the chair. When you grasp the concept of something, like a chair, you understand what a chair is. That is all we mean by 'concept.'

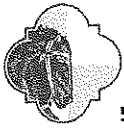
Although the idea of a chair in your mind may be accompanied by the sense perception of a chair or by the mental image of a chair, it does not have to be. You can have the concept without the sense perception and without the mental image.

For example, you may be reading this book right now but not have a chair around to look at, and yet you can still understand what is meant by the word 'chair.' In other words, you don't have to look at a chair to understand what a chair is. Similarly, you may be reading this book right now and not even have a mental image of chair and still understand what the word 'chair' means. You may understand what a chair is without having a picture of a chair in your mind.

Understanding what we mean when we talk about a concept is important in understanding what we mean when we talk about simple apprehension, since simple apprehension is the grasping of a concept. Remember also that simply apprehending, or understanding, something is different from making a judgment about it. Simple apprehension takes place prior to making a judgment. (We will talk about judgment in later chapters.)

Simple apprehension is an act by which the mind grasps the concept or general meaning of an object without affirming or denying anything about it.

Simple apprehension is an act by which the mind grasps the concept or general meaning of an object without affirming or denying anything about it.



_____ **Concept vs. Image.** While a mental image is representative of something tangible and material (for example, it has shape and color), the simple apprehension is the grasp of something intangible and immaterial. A simple apprehension itself does not have shape or color; it is the act of understanding a universal meaning.

When we have a simple apprehension of something—when, in other words, we understand it—we do not just get a glimpse of the sensible qualities of it, like its color and shape; we grasp the *essence* (or meaning) of the thing.

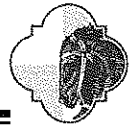
This becomes clearer when we consider terms like ‘man’ (meaning ‘human being’). When we think of the concept ‘man,’ we may have some kind of image in our minds, such as an actual man, tall, with blond hair, blue eyes, and light skin. But when someone else thinks of the concept ‘man,’ he may have a completely different image in his mind. He may think of an actual man who is short, with dark hair, brown eyes, and dark skin. Although the mental images we have when we think of the concept ‘man’ are completely different, that doesn’t mean that we do not both understand the same concept ‘man.’ We may have exactly the same understanding of what ‘man’ is, yet have very different mental images that we associate with it.

_____ **Abstraction.** The process by which a simple apprehension is derived from a sense perception and mental image is called *abstraction*. Through abstraction, an object such as a chair is lifted from the level of the senses to the level of the intellect.

_____ **Simple Apprehension vs. Judgment.** If we affirm or deny anything about a simple apprehension of the chair, we are going beyond simple apprehension—the first aspect of logic—and engaging in judgment—the second aspect of logic. If, in other words, we think, “The chair is brown,” then we are going beyond simple apprehension to affirm something about the chair and engaging in judgment. If, however, we think simply ‘chair,’ merely have an idea of a chair, then we are engaging in simple apprehension.

_____ **Summary.** In this chapter, we have discussed the meaning of simple apprehension. We said three things generally occur during the process of simple apprehension: we perceive it with our senses, we have a mental image of it, and we conceive the meaning of it. Note that the term ‘simple apprehension’ is used both to refer to the act of conceptualizing something as well as the entire process leading up to that act. We said, finally, that the process by which a simple apprehension is derived from a sense perception and a mental image is called *abstraction*.

The process by which a simple apprehension is derived from a sense perception and a mental image is called abstraction.



_____ **Exercises for Day 1.** Read the entire chapter. You may read it fairly quickly on this first reading. Try only to get a general idea of what the chapter is about. Read the beginning sections of Chapter 1: "What is Simple Apprehension?" and "What is Sense Perception?" Read these sections carefully and try to understand them as best you can.

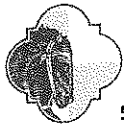
1. What are the three things associated with simple apprehension?
2. Which one of the three parts of the answer to Question 1 is the simple apprehension itself?
3. Which two of the three answers in Question 1 are connected with simple apprehension, but are not simple apprehension itself?
4. Which one of the three things associated with simple apprehension (in Question 1) is present when we are looking at something with our eyes, but ceases once we are no longer looking at it?
5. Why is the sense perception of a chair different from the chair itself?
6. What is the definition of 'sense perception'?

_____ **Exercises for Day 2.** Read "What is a Mental Image?" Read it carefully.

7. What happens in your mind when you have a sense perception?
8. When you remember something you have seen, say, a chair, are you having a sense perception or a mental image?
9. Give one reason why a mental image of a chair must be different from the sense perception of the chair.
10. What is the definition of 'mental image'?

Read "What is a Concept?"

11. What are you having when you understand the meaning of the concept 'chair'?
12. Is the simple apprehension you experience when you understand the meaning of an object, such as a chair, the same as or different from the sense perception you experience when looking at a chair or the mental image in your mind that results from the sense perception?
13. Give one reason why a mental image must be different from simple apprehension itself.
14. What is the definition of 'simple apprehension'?
15. What is another term used for simple apprehension?



Exercises for Day 3. Read "Concept vs. Image." Read it carefully.

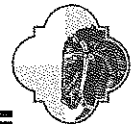
16. What do we grasp when we have a simple apprehension of a thing?
17. If you have a mental image in your mind when you think of the concept 'man' and someone else has a different mental image, does that mean you are each thinking of a different concept? Explain, using the concept 'man.'
18. Offer an explanation for your answer in Question 17 above, only this time use an example other than that of 'man.'

Read "Abstraction."

19. What is the definition of the term 'abstraction'?

Exercises for Day 4. Read "Simple Apprehension vs. Judgment."

20. Explain at what point you go from simple apprehension to judgment.
21. Indicate whether the following statements are true or false:
 - T F Mental image is the simple apprehension itself.
 - T F A sense perception of something we see disappears when we are no longer looking at it.
 - T F A sense perception of a chair is different from the chair itself because the chair exists in the mind while the sense perception exists outside the mind.
 - T F Sense perception is the act of seeing or hearing or smelling or tasting or touching.
 - T F When we see something, an image forms in our mind, which we call a 'mental image.'
 - T F A sense perception lasts only as long as we are perceiving the object through our senses.
 - T F A mental image is the image of an object formed in our mind as a result of a sense perception of that object.
 - T F The idea of a chair in your mind must be accompanied by the sense perception of a chair or by the mental image of a chair.
 - T F Simple apprehension is an act by which the mind grasps the concept or general meaning of an object and affirms or denies something about it.
 - T F The terms 'concept' and 'simple apprehension' mean the same thing.
 - T F A simple apprehension (or concept) has shape and color.
 - T F When we have a simple apprehension of a thing, we grasp the thing's essence.
 - T F If you have a different mental image of a concept than another person has, then you both cannot be thinking of the same concept.
 - T F The process by which a simple apprehension is derived from a sense perception and mental image is called 'abstraction.'
 - T F If we were to affirm or deny something about a concept, we would be going beyond simple apprehension to judgment.



_____ **Review Exercises.**

- 22. What is the definition of 'logic'?
- 23. On the basis of last week's reading, define 'truth.'
- 24. Name the three types of logical processes (or acts of the mind) involved in logic.
- 25. Fill out the chart below, listing the mental acts and their corresponding verbal expressions in the order in which we have covered them:

Mental Act

Verbal Expression

- _____
- _____
- _____

- _____
- _____
- _____

TRADITIONAL LOGIC

Introduction to Formal Logic

BOOK I



Answer Key

By Martin Cothran

CLASSICAL TRIVIUM CORE SERIES

TRADITIONAL LOGIC: BOOK I ANSWER KEY

Introduction to Formal Logic

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ISBN: 978-1-930953-11-6

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INTRODUCTION

Exercises for Day 1

1. Logic is the science of right thinking.
2. Aristotle
3. Chrysippus
4. Gottfreid Wilhelm Leibniz
5. John Stuart Mill
6. Gottlob Frege, Alfred North Whitehead and Bertrand Russell
7. One is called *formal* or "minor" logic, the other *material* or "major" logic.
8. Formal logic is interested in the form or structure of reasoning.
9. Material logic is concerned with the content of argumentation. It deals with the truth of the terms and the propositions in an argument.
10. F (The purpose of formal logic is to lead us from one truth to another.)
 F (Formal logic is useful only if we already have truths to use logic with.)
 T
 T
 F (Statements can only be true or false.)
 F (Arguments can only be valid or invalid.)
 T
 T

Exercises for Day 2

11. Truth is correspondence to reality.
12. We say an argument is valid when its conclusion follows logically from its premises.
13. The term *soundness* is used to indicate that all the premises in an argument are true **and** that the argument is valid.
14. T
 F (A sound argument must both be valid and have true premises.)
 T
 F (A valid argument need not be sound, since an argument can be valid but have false premises, disallowing it from being sound.)
 T
 F (An argument must contain two premises in traditional logic.)
15.

All men are mortal	premise
Socrates is a man	premise
Therefore, Socrates is mortal	conclusion
16. Simple apprehension, judgment, and deductive inference.

Exercises for Day 3

17. Mental act; verbal expression.
18. Simple apprehension.
19. Term.
20. We form in our minds a concept of something.
21. Book. (*Term* would also be acceptable.)
22. Men; mortal; and Socrates.
23. A concept.
24. Judgment.
25. Proposition.
26. We perform a judgment any time we think in our minds that something is something else (which we call affirmation), and also when we think that something is *not* something else (which we call denial).
27. Proposition.



Answer Key: Chapter I

28. "All men are mortal"; "Socrates is a man"; and "Socrates is mortal." (You do not have to include the word 'therefore' in the last proposition.)
29. A judgment.

Exercises for Day 4

30. Deductive inference.
31. Syllogism.
32. A deductive inference occurs when we make the logical connections in our minds between the terms in the argument in a way that shows us that the conclusion either follows or does not follow from the premises. (or something similar)
33. Syllogism.

- | | | |
|-----|--|--|
| 34. | <u>Mental Act</u> | <u>Verbal Expression</u> |
| | <ul style="list-style-type: none"> ■ Simple Apprehension ■ Judgment ■ Deductive Inference | <ul style="list-style-type: none"> ■ Term ■ Proposition ■ Syllogism |

- 35.
- | | | |
|-----------------------------------|---|---------------------|
| Taking a step | / | Simple Apprehension |
| Picking up your foot | \ | Deductive Inference |
| Walking from one place to another | / | Judgment |

CHAPTER 1

Exercises for Day 1

1. First, we perceive something with our senses; second, we form an of image of it in our mind; and, thirdly, we conceive its meaning.
2. The third: we conceive its meaning.
3. The first and second: perceiving something with our senses and forming an image of it in our minds.
4. The first: the perception of something with our senses.
5. Because the sense perception occurs in our minds, while the chair exists outside of our minds.
6. Sense perception is the act of seeing or hearing or smelling or tasting or touching.

Exercises for Day 2

7. We form a mental image.
8. A mental image.
9. Because, while the sense perception lasts only as long as we are looking at the chair, the mental image can be present even when we are not perceiving the chair through our senses.
10. A mental image is the image of an object formed in the mind as a result of a sense perception of that object.
11. Simple apprehension.
12. Different.
13. Because, while a mental image is representative of something tangible and material (for example, it has shape and color), simple apprehension is the grasp of something intangible and immaterial.
14. *Simple apprehension* is an act by which the mind grasps the concept or general meaning of an object without affirming or denying anything about it.
15. Concept.



Exercises for Day 3

- 16. We grasp the essence (or meaning) of the thing.
- 17. When we think of the concept *man*, we may have some kind of image in our mind, such as an actual man, tall, with blond hair, blue eyes and light skin. But when someone else thinks of the concept *man*, he may have a completely different image in his mind. He may think of an actual man who is short, with dark hair, brown eyes and dark skin. Although the mental images we have when we think of the concept *man* are completely different, that doesn't mean that we do not both understand the same concept *man*. We may have exactly the same understanding of what *man* is, yet have completely different mental images that we associate with it. (or something similar)
- 18. (This answer should be similar to the one in 17, only using another concept than *man*.)
- 19. The process by which a simple apprehension is derived from a sense perception or mental image is called *abstraction*.

Exercises for Day 4

- 20. If you affirm or deny anything about a concept, you are going beyond simple apprehension and engaging in judgment.
- 21. F (Only the act of the mind grasping the essence or nature of a thing is the act itself.)
T
F (The chair exists outside the mind and the sense perception inside the mind.)
T
T
T
T
F (The idea of a chair in your mind need not be accompanied by the sense perception or the mental image.)
F (While the simple apprehension is an act by which the mind grasps the concept or general meaning of an object, it does not affirm or deny anything about it. If it did, it would be a judgment, not a simple apprehension.)
T
F (Only sense perceptions and mental images can have shape and color.)
T
F (Mental images of the same essence can differ.)
T
T

Review Exercises

- 22. Logic is the science of right thinking.
- 23. Correspondence to reality.
- 24. Simple apprehension; judgment; deductive inference.
- 25.

<u>Mental Act</u> ■ Simple Apprehension ■ Judgment ■ Deductive Inference	<u>Verbal Expression</u> ■ Term ■ Proposition ■ Syllogism
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CHAPTER 2

Exercises for Day 1

- 1. The properties of *simple apprehension*.
- 2. The two properties of simple apprehension are *comprehension* and *extension*.
- 3. Complex.
- 4. (Relatively) simple.
- 5. A featherless biped.
- 6. Yes.
- 7. It doesn't tell us many things about human beings that make up his nature or essence.
- 8. *Comprehension* can be defined as the completely articulated sum of the intelligible aspects, or elements (or notes) represented by a concept.
- 9. *Sentient*: having senses, such as sight, hearing, etc.; *material*: having a body, rather than being purely spiritual; *substance*: being something rather than nothing.