Introductory Logic

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Introductory Logic

For Christian and Home Schools

Fourth Edition
Revised and Expanded

James B. Nance
&
Douglas J. Wilson

Canon Press  *Moscow, Idaho*

Contents

Unit Three: Syllogisms and Validity

Unit Four: Arguments in Normal English

Unit Five: Informal Fallacies

Introduction

LOGIC: ITS NATURE AND PURPOSE

God created man with the ability to reason: "Come now, and let us reason together, saith the Lord" (Is. 1:18). He did this so that we could communicate with Him and with one another. This enables us to love and obey Him. Reasoning means drawing proper conclusions from other information. A proper use of reason allows us to form rational statements, and to understand the statements that are made by others. It allows us, for example, to take universal statements such as "God has commanded all men everywhere to repent" and to apply them, first to ourselves and then to our neighbor: "We are men, therefore we must repent." Without the ability to reason, we would be unable to discuss, preach, read, hear the gospel, or follow God's commands. In other words, proper reasoning opens the mind so that it can close upon truth.

Key Point

Reason opens our minds so that they can close upon truth. Reason is a gift from God; it is *not* the single, essential aspect of bearing God's image.

Some have assumed that this ability to reason is what constitutes man being created in the image of God. But there are several problems with this assumption. First, there are other creatures (like angels and cherubim) who have an ability to reason, but who do not bear the image of God the same way that man does. Another problem is that it implies that humans who are very young (e.g., a fertilized human ovum) or who are severely retarded cannot bear God's image, or that they do so imperfectly. Rather than treating reason as the image of God in man, it would be far better to treat reason as a gift that God gives (out of His own nature and character) to all intelligent creatures. The more He gives, the greater our responsibility to love Him, as Scripture says, "with all our minds."

Definition

Logic **is the science and art of reasoning well.**

Formal logic is the science and the art of reasoning well. As a science, logic includes discovering and identifying the patterns or rules by which we reason. As an art, logic teaches how to follow those rules, without abusing them in a wooden (and unreasonable) way. About sixteen centuries ago, Augustine said this about the science of logic:

> And yet the validity of logical sequences is not a thing devised by men, but is observed and noted by them that they may be able to learn and teach it; for it

> exists eternally in the reason of things, and has its origin with God. For as the man who narrates the order of events does not himself create that order; and as he who describes the situations of places, or the natures of animals, or roots, or minerals, does not describe arrangements of man; and as he who points out the stars and their movements does not point out anything that he himself or any other man has ordained; in the same way, he who says, "When the consequent is false, the antecedent must also be false," says what is most true; but he does not himself make it so, he only points out that it is so (*On Christian Doctrine,* book II, chapter 32).

Logic is not devised by man, but neither is it created by God, like maple trees and dwarf stars are. Rather, it is an "attribute" of God which is reflected in creation. We need to be careful here, because it is not an attribute of God that is stated directly in Scripture, as His holiness, love, and righteousness are. But it is a characteristic of God that we see assumed everywhere in Scripture. We do not believe that logic is independent of God and *over* Him, which would mean that the triune God is not the sovereign God of the Bible. But neither do we believe that God could have created a nonsensical world where He was both the creator of it and not the creator of it. This leaves us with the assumption that all things are ultimately defined by God Himself, rather than by "rules." Since we want to learn how to reason as faithful Christians, we begin by assuming that all faithful thinking and reasoning is somehow sharing in this characteristic of God. So when we study logic faithfully, we are studying some of the divine reflection in the world around us.

Key Point

Logic is not created by God or man; rather, it is an attribute of God. It is not over God or independent of Him.

The Laws of Thought

Keeping all of this in mind, we must be careful when dealing with "rules" and "laws" of logic. In order to reason well, we have to assume certain very basic things that never show up as particular items in our argument. They are simply (and quietly) assumed. For example, if you were putting together an argument about light bulbs or tricycles, it is very important that they not turn into something else (like toaster ovens or catcher's mitts) halfway through the argument. If they did, the argument would just have to lie down in the corner and sob quietly. It could never get anything done.

Traditionally, these assumptions have been called the "laws of thought." There is nothing wrong with the *contents* of these assumptions,

but there is a significant problem with *another* deeper assumption lying beneath them. That assumption is that you can have laws without a lawgiver, and that ultimately, you can have reason apart from the triune God of Scripture. All you need to do, it is thought, is postulate some laws of thought and off you go.

Because this is the case, we want to begin by showing how the laws of thought are actually grounded in the nature of the triune God, revealed in Jesus Christ. After we have done that, we will be able to discuss the traditional terminology. The reason for doing this is that many modernists have been guilty of thinking that impersonal "laws" have authority in themselves, which of course they do not.

Let's start with the basic Christian confession that *Jesus is Lord*. When God reveals Himself in Christ, the decision that must be made is whether to believe it or not. These are the only two options: faith or unbelief. This means that the statement *Jesus is Lord* must either be true or false. A faithful person confesses that it is true. An unfaithful person denies it as false. God does not leave open the option of saying something like, "I believe that the higher reality of the lordship of Christ cannot be contained in our paltry categories of true and false, and so I cannot say whether I believe in Him or not." Such a response is simple dishonesty masquerading as humility.

The fact that *any statement is either true or false* is one of the three traditional laws of thought, upon which much of the science of logic is based. This law of thought is called the **Law of Excluded Middle**, because it excludes the possibility of a truth value falling somewhere in the middle between true and false. Statements are either one or the other. If a statement is not true, then it is false, and vice versa.

Definition

The *Law of the Excluded Middle:* Any statement is either true or false.

As Christians we confess that God is triune. If asked, we would say, "Yes, that is true. God is triune." Now if it is true that God is triune, *then it must be true that God is triune.* This is an application of **The Law of Identity**, which simply states that *if a statement is true then it is true.* For ordinary people in ordinary conversation, such rules are not thought to be necessary. But when people are fleeing from God, they will often take refuge in any folly, arguing that the truth of a statement can change in the middle of an argument. This law may be employed to answer the unbeliever who says, "Christianity may be true for you, but not for me." No. If the Christian faith is true, then it is true.

Definition

The *Law of Identity:* If a statement is true, then it is true.

The third law says that *a statement cannot be both true and false.* This is called the **Law of Non-contradiction.** Without this law, we could not argue for the exclusive truth of *any* statement that we hold. We could try to assert, for example, that "Jesus is Lord." But our opponents could respond, "Oh, I agree that what you say is true. But it is also false." We see that if we deny these laws, we lose the possibility of all rational discourse.

Definition
The *Law of Non-contradiction:* A statement cannot be both true and false.

Think for a moment what would happen to our faith if we were to allow someone to deny these fundamental assumptions. If we confess "God in three Persons, blessed Trinity," someone who denied the law of the excluded middle could say that this wonderful confession is not true, and it is not false. It is just wonderful, and perhaps even a little inspiring. One who denied the law of identity could say, "Yes, it is true that God is a Father for you, but it is *my* truth that She is a Mother." And one who denied the law of non-contradiction could say that God is our Father, and also, in the same way and in the same respect, He is not our Father. In other words, denial of these bedrock assumptions would make a hash out of the simplest Christian confession like the Apostles' Creed.

Having said all this, there is an important warning. The Bible does assume that the Father is the Father, and not the Son. The Spirit is the Spirit and not the Father. The Father is not "not the Father." At the same time, the Bible *also* teaches that the Father perfectly indwells the Son, the Son indwells the Father, and both with the Spirit are one God. Statements about the Father are not independent from statements about the Son. Jesus said, "Anyone who has seen me has seen the Father." These truths do not deny the laws of thought but rather support them.

Key Point
Logic must always give way to mystery. For example, we understand many things in terms of poetry, or sacraments, or the indwelling of the Trinity.

Through a wooden application of these laws, some logicians have gotten to the point where they cannot understand or appreciate poetry, metaphor, sacraments, or marriage. The world is full of "indwelling" and mutual partaking, because this is *also* what our God is like. In our study of logic, we must always leave room for mystery. We know that the Father is Father, and no one else. We know as well that the Father is not the Son. But we should also know that the Father reveals Himself perfectly in the Son.

The Scope of This Book

The subject of logic may be divided into two main branches: **formal** and **informal.** Formal logic deals directly with reasoning, by considering the

means of distinguishing between proper and improper modes of reasoning. Informal logic deals with operations of thinking that are indirectly related to reasoning, such as defining terms, relating terms to each other, and determining relationships between statements. Because informal fallacies are not formal methods of reasoning, they are also included under the branch of informal logic.

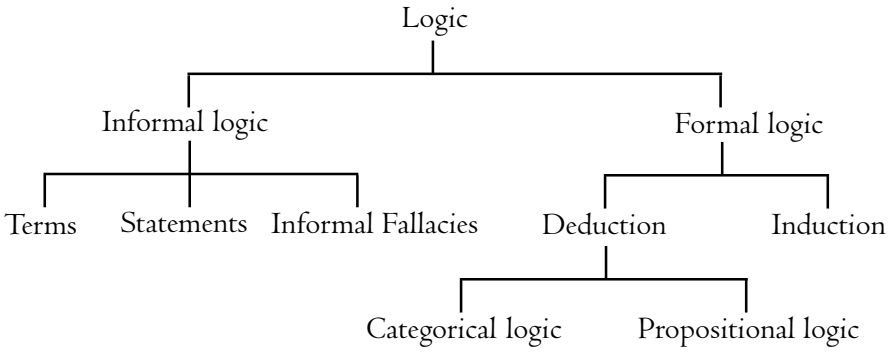
Definitions
Formal logic deals with the proper modes of reasoning. *Informal logic* deals with operations of thinking that are indirectly related to reasoning.

Formal logic itself may be divided into two main branches, **induction** and **deduction.** Induction deals with arguments of likelihood and probability. By induction we draw conclusions from facts or experience, conclusions which go beyond those facts. Inductive conclusions are never certain, but only probable. As such, they can be considered strong or weak, depending on how well experience supports the conclusion. They may also be strengthened by further experience. You can see that induction is the logic of the experimental sciences.

Definitions
Induction is reasoning with probability from examples or experience to general rules. *Deduction* is reasoning with certainty from premises to conclusions.

Whereas induction deals with arguments that are strong or weak, deduction deals with arguments that are valid or invalid. If valid, the conclusion follows from the premises, and it does so with certainty. A valid conclusion is one which is contained within the premises: if the premises of a valid argument are true, then the conclusion must be true. There are many branches of deductive reasoning. Two main branches are **categorical logic** and **propositional logic.** To the best of our knowledge, categorical logic was first developed as a science by the Greek philosopher Aristotle (384–322 B.C.). Categorical logic deals with the **syllogism,** which is a type of deductive argument in which the conclusion connects one category (or term) with another, hence the name *categorical* logic. Propositional logic connects entire *propositions* together in arguments.

These branches of logic can be arranged as seen in the chart below:



This book is an introduction to the informal and categorical branches of logic. The next book in this series, *Intermediate Logic,* deals with the propositional branch of deduction. The point of all of this is to encourage students to begin the process of carefully "thinking God's thoughts after Him." The point of this book is *not* to teach us how to be quarrelsome with one another, nor to bring students to the false idea that the world is governed by some impersonal deity named Rules of Inference.

UNIT ONE

TERMS AND DEFINITION

CONTENTS

LESSON I

THE PURPOSES AND TYPES OF DEFINITIONS

A **term** is a concept with a precise meaning expressed by one or more words. A single term can be expressed by many different words. Words which are exact synonyms represent the same term. The English word *girl* and the Latin word *puella* represent the same term. Similarly, a single word can represent different terms. For example, the word *mad* can mean either "angry" or "insane."

A **definition** is a statement that gives the meaning of a term. The ability to define terms accurately is a valuable skill. Lawyers must continually define their terms, and may use precise, technical language to do so. The same is true for teachers, scientists, philosophers, theologians, and most other professionals. To demonstrate the value of this skill, let us consider some of the purposes which definitions serve.

Definitions

A *term* is a concept that can be expressed precisely. A *definition* is a statement that gives the meaning of a term.

1. Definitions show relationships. When a term is defined properly, the definition often gives some idea of the relationships which that term has with other terms. For example, if you were to define *man* as "a rational animal," your definition implies both that man has some relationship to other rational beings, such as angels and demons, and to other animals—bears, whales, and lizards. Or if *bald* is defined as "having no hair," its contradictory relationship with the term *hairy* is immediately apparent.

Key Point

Note the difference between a term and a word: one word can carry the meaning of many terms; the same term can be expressed with different words.

2. Definitions remove ambiguity. Words are **ambiguous** when they have more than one possible meaning. Commonly, in a discussion or a debate, ambiguous words are used without the participants being aware of the ambiguity. The result is a verbal disagreement which may be cleared up by defining terms. For instance, some people believe that Jesus' command to love your enemies is an absurd requirement because they are defining *love* to mean "believe the other to be a nice person," when in fact they know their enemies to be quite wicked and depraved. But biblically, *love*

Caution

It is extremely important to define your terms at the beginning of any debate. You want to argue about substance, not words.

means 'to treat the other person lawfully from the heart,' which is to be our behavior toward all men. If this definition is made clear, the people may still think that the command is impossible, but at least they no longer should see it as absurd.

Definitions

An *ambiguous* word has more than one definition. A *vague* word is one whose extent is unclear.

A definition which shows relationships or reduces ambiguity by providing a single, established meaning of a term is called a **lexical definition**. This is the sort of definition one would find in a dictionary.

3. Definitions reduce vagueness. A problem similar to ambiguity is vagueness. A term is **vague** when its extent is unclear. The term itself may have a single, understood meaning, but there are 'gray areas' where it is uncertain if the given term applies. This is a common problem in descriptive terms, such as *old, dark, tall, mature.* If a father tells his children it must be warm outside before they can swim in the lake, the children often immediately want vagueness reduced: *"How* warm?" If the father responds, "At least eighty degrees Fahrenheit," the issue is made clear. Or if you are asked to give a small donation for a gift for the secretary, you may want a definition to reduce the vagueness of the term *small,* like, "By small I mean five dollars." This type of definition is a **precising definition**, because it seeks to make more precise what was previously vague or fuzzy. Note that precising definitions would not be found in a dictionary; they apply only to the situation in which they are used.

Caution

A precising definition is very dependent on the situation in which it is used.

4. Definitions increase vocabulary. One of the most important elements of education is learning the meaning of unfamiliar terms. An increase in vocabulary means an increase in knowledge, which is why in English class students are taught "vocabulary words" and their definitions. In this very lesson you may have learned the definitions of terms like *ambiguity* and *vagueness.* Knowing these definitions helps us to make subtle distinctions and otherwise use language properly.

Key Point

Defining terms is a key way of communicating knowledge.

When a new word is invented, or an existing word is applied in a new way, it is given a **stipulative definition**. Such definitions, if widely accepted, increase the vocabulary of the language to which they are added. New words are continually adopted into English, such as words resulting from new inventions (*laptop*, added in 1985), from sports (*screwball*, 1928), from other languages (*macho* from Spanish, also 1928), or coined out of someone's imagination (*boondoggle*, from an American scoutmaster, 1957).

5. Definitions can explain concepts theoretically. Sometimes definitions are given for terms, not because the word itself is unfamiliar, but because the term is not understood. Such concepts require **theoretical definitions**, which are often scientific or philosophical in nature. For example, when your chemistry teacher defines water by its chemical formula H_2O, he is not trying to increase your vocabulary (you already knew the term *water*), but to explain its atomic structure.

Accepting a theoretical definition is like accepting a theory about the term being defined. If you define *spirit* as "the life-giving principle of physical organisms," you are inviting others to accept the idea that life is somehow a spiritual product.

6. Definitions can influence attitudes. Often terms are defined, not necessarily for the purpose of clarifying their meaning, but in order to influence the attitudes and emotions of an audience. *Abortion* has been defined as "the slaughter of innocent children" on the one hand, "the right of a woman to control her own body" on the other, or even the non-emotional "termination of a pregnancy." All these definitions aim at persuading the listener one way or another toward the term being defined, and as such are called **persuasive definitions**. Examples abound. Is democracy "mob rule" or "government by the people"? Is marriage "the institutionalized slavery of women by men" or "the blessed union of man and wife"? You can see the capacity of persuasive definitions for good or ill.

Key Point

Definitions may seem dry and logical, but they can be used persuasively. Knowing how to define terms well is a great advantage in debate.

SUMMARY

Definitions give meanings for terms. Definitions can show relationships between terms, remove ambiguity, reduce vagueness, increase vocabulary, explain theoretically, and influence attitudes. Along with these purposes are the five types of definitions: lexical, precising, stipulative, theoretical, and persuasive.

EXERCISE 1

1. Write lexical definitions of the words *child* and *adult* which show the relationship between them.

_____

_____

2. The word *grace* is an ambiguous word. Write two lexical definitions for the word *grace,* giving two of its different meanings.

_____

_____

3. Write a precising definition of the word *soon* to clarify the vagueness in the sentence "I will be home soon."

_____

4. Invent a stipulative definition for the word *ploff*.

_____

5. Write a persuasive definition of the word *television* from the point of view of a mother who thinks her children watch too much of it.

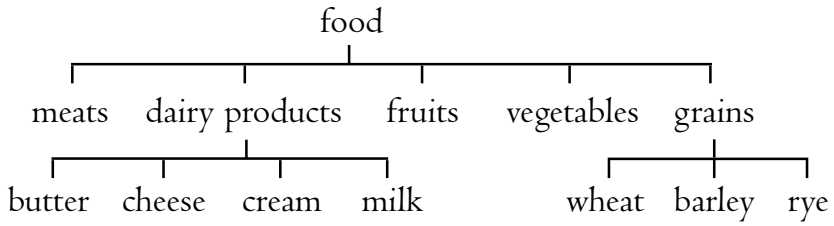
_____

6. Write a short, imaginary dialogue between two people having a verbal dispute about the word *believe*. Then introduce a third person who settles the dispute by presenting lexical definitions for the word which eliminates the ambiguity. (Use the back of this sheet if needed.)

LESSON 2

GENUS AND SPECIES

Terms are often defined by being placed among a higher category, or **genus**. The genus of a term is more general, broad, or abstract than the term itself. The term under a genus is called the **species**, which is a type, kind, or example of the term. The species is more specific, narrow, or concrete than the genus. Terms can be placed in a **genus and species hierarchy**, thus clearly showing the relationships between them. For example, consider the hierarchy below:



Here we see the genus *food*, and under it some of the species of the term food: meats, dairy products, fruits, vegetables, and grains. Of these, the terms *dairy products* and *grains* are shown to be genera (the plural of genus) for the species under them. The genus *dairy products* is broader than any of its species, such as butter, because dairy products includes not only butter but cheese, cream, milk, and any other species which could be placed under it. The chart also shows that the term *grains* is the genus of wheat, barley, and rye. Of course, many other terms could be included as species of grains. Can you think of any?

The words *genus* and *species* are relative terms. Each term can be both a genus and a species—a genus of the terms below it, and a species of the term above it. Thus *grains* is both a species of food and a genus of wheat. This process can continue (although not indefinitely) both downward and upward. *Cheese* could be the genus for different varieties of cheese, such as Swiss, Parmesan, and Cheddar. *Food* can be considered a species of *material* (if it is defined as "edible material"), and so on.

Definitions

A *genus* of a term is a term that is more general, broad, or abstract than the original term and includes it. A *species* of a term is a term that is more specific, narrow, or concrete than the original term and is included by it.

Key Point

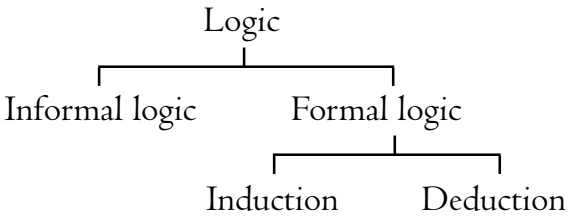
Genus and *species* are relative terms. Each term can be both a genus and a species.

One caution: do not confuse the genus and species hierarchies of logic with the similar hierarchy you may have learned in biology. In logic, there are no levels other than genus and species—no family, order, class, phylum, or kingdom.

Now look at the genus and species hierarchy for the term *logic.*

Caution

Even though *genus* and *species* are biological terms, logical heirarchies are very different from biological ones.

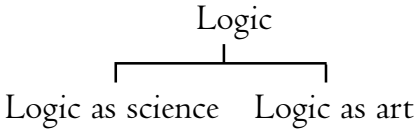


Two types of logic are identified as species: informal and formal. These species are **mutually exclusive**—they do not overlap. No branch of logic is both formal and informal. They are also **exhaustive**—no other types of logic exist. Theoretically, every genus can be divided into species which are both mutually exclusive and exhaustive. And while the species must be mutually exclusive, in practice they are rarely exhaustive. Are induction and deduction an exhaustive list of the types of formal logic?

In the chart above, logic is divided into *formal* and *informal* logic. The dividing principle there is, "How directly related to reasoning is the term?" Logic which deals directly with reasoning is formal, while logic which is more indirectly related to reasoning is informal. Other dividing principles could have been used which would result in a different chart, such as "What is the product or goal of the term?" In one case, for logic, the goal might be to discover and classify the rules of reasoning. In this case we would be considering the *science* of logic. In another case, the goal might be to produce persuasive arguments, which would mean we are considering the *art* of logic. Thus the chart would be:

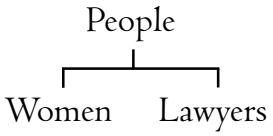
Key Point

Genus and species charts can be drawn very differently depending on the principle used to divide and categorize terms.



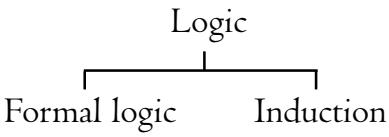
There are several types of errors which we need to avoid while constructing genus and species charts. The first error was already mentioned:

species which overlap, meaning that they are not mutually exclusive. Such an error exists in this chart:



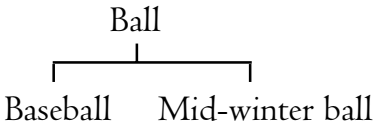
This is an error because the species overlap: some women are lawyers. The error was caused by using two different dividing principles for the term *people:* division by gender and division by profession.

A similar error would occur when a term appears at the wrong level in the chart, such as in this example:

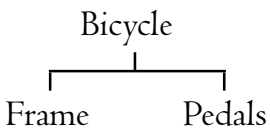


Here the species overlap because induction itself is a species of formal logic, and thus should appear beneath it.

Another error can occur if a chart is being produced for an ambiguous word, with two different definitions in mind for the same word. For example, consider the word *ball*. This word could be taken in two senses: as a round toy, or as a kind of formal dance. This ambiguity could result in the following faulty chart:



Finally, remember that a species is not a part of the genus, but rather a type or kind of that genus. The species of the genus *bicycle* may include *mountain bike*, but not *handlebars*. So when asked to make a genus and species chart, do not make a "whole to parts" chart like this:



Thinking Deeper

If the process of finding a further genus for any genus cannot continue indefinitely, it is reasonable to ask, What is the highest possible genus? If the genus of *food* is *material*, what is the genus of *material?* Possibilities include *matter, substance, being*, and so on. All of these are *things created*. But anything not created is God, since God alone is uncreated. Thus we are led to what theologians call the "Creator/creature distinction": all things are either Creator, or something created by the Creator. These are the highest genera of *things*. More could be said about the highest genus of abstractions (like *logic*), verbs (like *to run*), and so on.

Caution

Watch out for these basic errors when drawing genus/species charts: overlapping species, ambiguous terms, and confusing genus/species with part/whole.

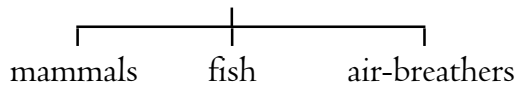
SUMMARY

Terms can be organized into genus and species charts. A genus is a category into which a given term fits. A species is a type, kind, or example of a given term. Species should be mutually exclusive, and may be an exhaustive list.

EXERCISE 2

Explain the error or problem with each genus and species hierarchy shown.

1.



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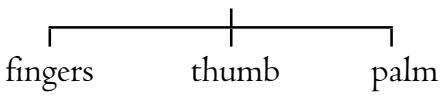

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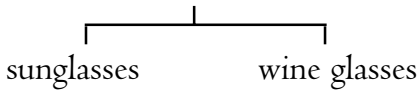

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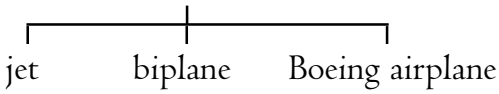


Fill in the genus and species hierarchy for each term given, identifying (a) a genus for the term, (b) another species under that genus, and (c) a species of the term.

5. (a) _____

angel (b) _____

(c) _____

6. (a) _____

chair (b) _____

(c) _____

7. On the next page, draw a genus and species hierarchy which includes the following terms:
ALGEBRA, BIOLOGY, CHEMISTRY, GEOMETRY, MATH, PHYSICS, SCIENCE, SUBJECT

Unit 1 Review Questions

Answers to the review questions can be found in the lesson under which the questions are listed.

Introduction

What is reasoning? Why has God given men the ability to reason? What is formal logic? In what way is logic an "attribute" of God? What is the Law of Excluded Middle? What is the Law of Identity? What is the Law of Non-contradiction? How does formal logic differ from informal logic? What are some of the topics dealt with under informal logic? What are the two branches of formal logic? What are some differences between *induction* and *deduction*? What are two branches of deduction? Who first developed categorical logic, and when did he live? What is one difference between *categorical logic* and *propositional logic*? What are the branches of logic dealt with in this book?

Lesson 1: The Purposes and Types of Definitions

What is a term? What is the connection between a *term* and a *word*? What does it mean to define a term? What are six purposes for defining terms? What are the five types of definitions? Which types would you likely find in a dictionary? What is an ambiguous word? What is a vague word? What is a lexical definition? What is a precising definition? What is a stipulative definition? What is a theoretical definition? What is a persuasive definition?

Lesson 2: Genus and Species

What is a genus? What is a species? Can a term be both the *genus* of one term and the *species* of another? What are some of the common errors made in constructing genus and species charts?

Lesson 3: Extension and Intension

What is the extension of a term? What is the intension of a term? How are *extension* and *intension* related in any given genus and species chart?

Lesson 4: Methods of Defining

What are three methods of defining terms? Do other methods exist? What are some limitations of defining by synonym? What are some rules for defining by example? How is a term defined by genus and difference?

Lesson 5: Rules for Defining by Genus and Difference

What are the six rules for defining by genus and difference? Can you restate these rules in your own words? What is the difference between an *essential* and an *accidental* attribute? What are three ways that a definition can be unclear?

UNIT TWO

STATEMENTS AND THEIR RELATIONSHIPS

CONTENTS

Unit 2 Review Questions

Answers to the review questions can be found in the lesson under which the questions are listed.

Lesson 6 – Statements

What is a statement? What are the possible truth values of a statement? What are the types of sentences which are not statements?

Lesson 7 – Self-supporting Statements

What is a self-supporting statement? What are the three types of self-supporting statements? Give an example of a self-report. What is the difference between a *tautology* and a *self-contradiction*? Give an example of a statement which is false by definition.

Lesson 8 – Supported Statements

What is the difference between a *supported* statement and a *self-supporting* statement? What are three methods of determining the truth value of supported statements? Do any other methods exist?

Lesson 9 – Relationships between Statements

What does it mean that two statements are consistent? What does it mean that one statement implies another? What are logically equivalent statements? What does it mean that two statements are independent? Can two statements be consistent yet *not* be related by implication or independence?

Lesson 10 – Consistency and Disagreement

What is another term for a real disagreement? What is the difference between an *apparent* disagreement and a *verbal* disagreement?

Lesson 11 – The One Basic Verb

What are the different verbs of being? What is the procedure for rewriting statements into statements which only use verbs of being?

Lesson 12 – Standard Categorical Statements

What are the two main parts of a categorical statement? What is the quantity of a statement? What is the quality of a statement? What are the four types of categorical statements expressed in terms of their quantity and quality? In terms of *S* and *P*?

Lesson 13 – The Square of Opposition

What are the four types of categorical statements abbreviated by one letter? Draw the square of opposition using these abbreviations.

Lesson 14 – Contradiction

What two pairs of statement types contradict each other? What does contradiction mean in terms of the truth value of the pair of statements? How is contradiction diagramed on the square of opposition?

Lesson 15 – Contrariety

What pair of statement types are contraries? What does contrariety mean in terms of truth value? How is contrariety diagrammed on the square of opposition? What do *contradiction* and *contrariety* have in common? How do they differ?

Lesson 16 – Subcontrariety

What pair of statement types are subcontraries? What does subcontrariety mean in terms of truth value? How is subcontrariety diagrammed on the square of opposition? How do *contrariety* and *subcontrariety* differ?

Lesson 17 – Subimplication

What two pairs of statement types are related by subimplication? What does subimplication mean in terms of truth value? How is subimplication diagrammed on the square of opposition?

Lesson 18 – Superimplication

What two pairs of statement types are related by superimplication? What does superimplication mean in terms of truth value? How is superimplication diagrammed on the square of opposition? What do *subimplication* and *superimplication* have in common? How do they differ? Draw the complete square of opposition, including all the relationships.

UNIT THREE

SYLLOGISMS AND VALIDITY

CONTENTS

Unit 3 Review Questions

Answers to the review questions can be found in the lesson under which the questions are listed.

Lesson 19: Arguments

What is a logical argument? What is a premise? What are some words which introduce a premise in an argument? What is a conclusion? What are some words which introduce a conclusion in an argument? How else might a conclusion be identified in an argument?

Lesson 20: The Syllogism

Define *syllogism* by genus and difference. What are the three terms in a syllogism? Where is the major term found in a conclusion? Where is the minor term found in a conclusion? Where is the middle term found? What is the standard order for the statements in a syllogism? What is the procedure for arranging a syllogism into standard categorical form?

Lesson 21: Mood of Syllogisms

What is the schema of a syllogism? What is the mood of a syllogism?

Lesson 22: Figure of Syllogisms

What does the figure of a syllogism identify? How many different figures can a syllogism have? What is the form of a syllogism? How many different forms of syllogisms exist?

Lesson 23: Truth and Validity

What does it mean that a syllogism is valid? Can the statements in a valid syllogism be false? Can the statements in an invalid syllogism be true? What is a sound syllogism?

Lesson 24: Testing Syllogisms by Counterexample

Does validity depend solely on the form of a syllogism? What is a counterexample of a syllogism? How does a counterexample show a syllogism to be invalid? How many forms of syllogism are valid, and how many are invalid?

Lesson 25: Distributed Terms

What is a distributed term? Which types of statements distribute their subject? Which types of statements distribute their predicate?

Lesson 26: Testing Syllogisms by Rules

List the five rules of validity. Which rules depend on how terms are distributed in the statements? Which rules depend on the quality of the statements in a syllogism? Name the fallacy or fallacies associated with each rule.

UNIT FOUR

ARGUMENTS IN NORMAL ENGLISH

CONTENTS

Unit 4 Review Questions

Answers to the review questions can be found in the lesson under which the questions are listed.

Lesson 27 – Immediate Inferences

What is an immediate inference? What are the three types of immediate inference which result in equivalent statements? How is the converse of a statement produced? How is the obverse of a statement produced? How is the contrapositive of a statement produced? Which immediate inferences are valid for each of the four types of categorical statements? How can the contrapositive of a statement be derived using obverse and converse?

Lesson 28 – Translating Ordinary Statements

What is a singular statement? When translating singular statements into categorical form, what quantity should the translation probably have? What is an indefinite statement? What needs to be considered in translating indefinite statements into categorical form? What is a hypothetical statement? How are hypothetical statements translated into categorical form?

Lesson 29 – Translating Inclusive and Exclusive Statements

List several inclusives or "*ever*-words." How should the following words be translated: *whoever, whatever, wherever, whenever, however, always, never*? What are exclusives? Give examples of statements using *only, unless,* and *except* along with their translations.

Lesson 30 – Enthymemes

What is an enthymeme? When determining the missing statement in an enthymeme, what must be assumed about the enthymeme's validity?

Lesson 31 – Hypothetical Syllogisms

What is the difference between *pure* and *mixed* hypothetical syllogisms? What are the two valid forms of mixed hypothetical syllogisms? What are the two invalid forms? What does *non sequitur* mean? How does *modus ponens* differ from *affirming the consequent*? How does *modus tollens* differ from *denying the antecedent*?

Lesson 32 – Establishing Conclusions

How many valid moods exist for each of the four figures? What is the general procedure for establishing the truth of a given statement? Does that procedure need to be followed strictly?

UNIT FIVE

INFORMAL FALLACIES

CONTENTS

Unit 5 Review Questions

Answers to the review questions can be found in the lesson under which the questions are listed.

Lesson 33 – Fallacies of Distraction

What are the three types of informal fallacies? What do fallacies of distraction do? What are the eight forms of fallacies of distraction considered in this lesson? Is it ever legitimate to use arguments that follow the same form as these informal fallacies? Translate the following Latin fallacy names: *ipse dixit, ad populum, ad baculum, ad hominem, tu quoque, ad ignorantiam.*

Lesson 34 – Fallacies of Ambiguity

What is a fallacy of ambiguity? What are the five fallacies of ambiguity considered in this lesson? What is equivocation? How does equivocation differ from accent? How does it differ from amphiboly? How are composition and division related?

Lesson 35 – Fallacies of Form

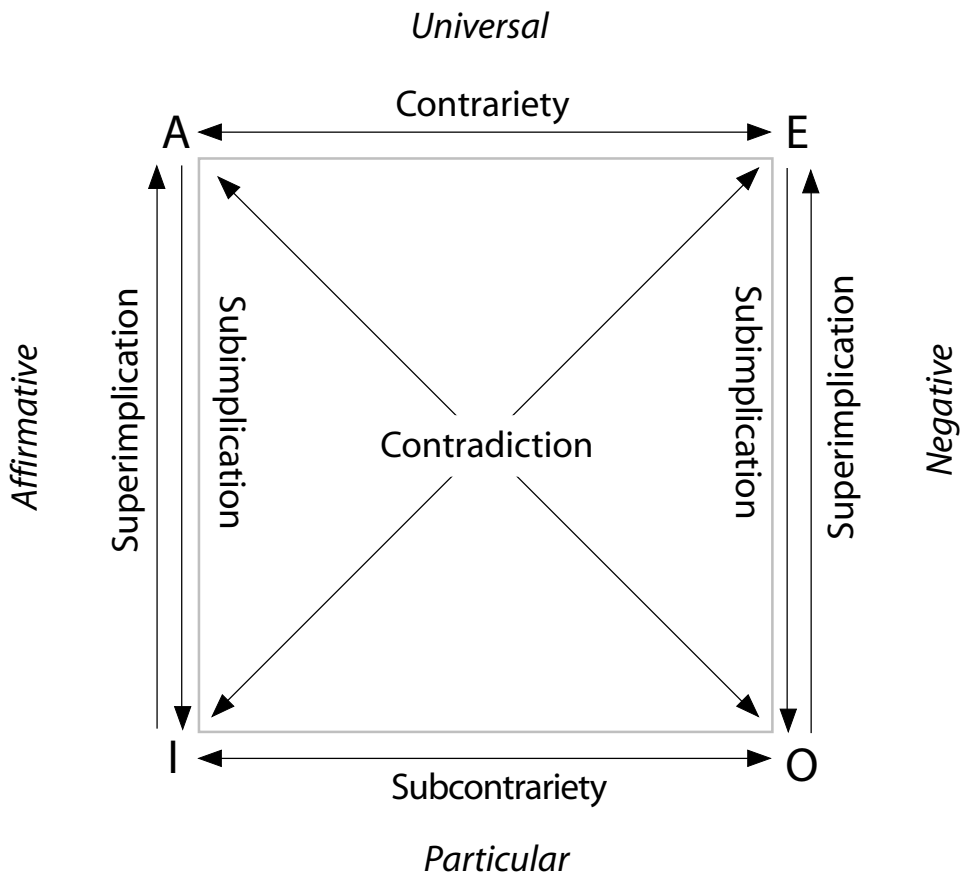
What is a fallacy of form? What are the five fallacies of form considered in this lesson? Is circular reasoning always fallacious? Translate from the Latin *post hoc ergo propter hoc*. What is another name for this fallacy? What is another name for the *either/or* fallacy? What is the fallacy of a hasty generalization? What is a legitimate generalization called?

Lesson 36 – Detecting Fallacies

What two questions should be asked when evaluating any kind of reasoning? Where can examples of informal fallacies be found?

APPENDIX A

THE SQUARE OF OPPOSITION



Relationship	***Truth value between statements***
Contradiction	Opposite truth values; one must be true, the other must be false
Contrariety	Cannot both be true; can both be false
Subcontrariety	Can both be true; cannot both be false
Subimplication	If the universal is true, the particular of the same quality is true
Superimplication	If the particular is false, the universal of the same quality is false

APPENDIX B

THE 256 FORMS OF SYLLOGISMS

AAA-1	AAA-2	AAA-3	AAA-4	IAA-1	IAA-2	IAA-3	IAA-4
AAE-1	AAE-2	AAE-3	AAE-4	IAE-1	IAE-2	IAE-3	IAE-4
AAI-1	AAI-2	AAI-3	AAI-4	IAI-1	IAI-2	IAI-3	IAI-4
AAO-1	AAO-2	AAO-3	AAO-4	IAO-1	IAO-2	IAO-3	IAO-4
AEA-1	AEA-2	AEA-3	AEA-4	IEA-1	IEA-2	IEA-3	IEA-4
AEE-1	AEE-2	AEE-3	AEE-4	IEE-1	IEE-2	IEE-3	IEE-4
AEI-1	AEI-2	AEI-3	AEI-4	IEI-1	IEI-2	IEI-3	IEI-4
AEO-1	AEO-2	AEO-3	AEO-4	IEO-1	IEO-2	IEO-3	IEO-4
AIA-1	AIA-2	AIA-3	AIA-4	IIA-1	IIA-2	IIA-3	IIA-4
AIE-1	AIE-2	AIE-3	AIE-4	IIE-1	IIE-2	IIE-3	IIE-4
AII-1	AII-2	AII-3	AII-4	III-1	III-2	III-3	III-4
AIO-1	AIO-2	AIO-3	AIO-4	IIO-1	IIO-2	IIO-3	IIO-4
AOA-1	AOA-2	AOA-3	AOA-4	IOA-1	IOA-2	IOA-3	IOA-4
AOE-1	AOE-2	AOE-3	AOE-4	IOE-1	IOE-2	IOE-3	IOE-4
AOI-1	AOI-2	AOI-3	AOI-4	IOI-1	IOI-2	IOI-3	IOI-4
AOO-1	AOO-2	AOO-3	AOO-4	IOO-1	IOO-2	IOO-3	IOO-4
EAA-1	EAA-2	EAA-3	EAA-4	OAA-1	OAA-2	OAA-3	OAA-4
EAE-1	EAE-2	EAE-3	EAE-4	OAE-1	OAE-2	OAE-3	OAE-4
EAI-1	EAI-2	EAI-3	EAI-4	OAI-1	OAI-2	OAI-3	OAI-4
EAO-1	EAO-2	EAO-3	EAO-4	OAO-1	OAO-2	OAO-3	OAO-4
EEA-1	EEA-2	EEA-3	EEA-4	OEA-1	OEA-2	OEA-3	OEA-4
EEE-1	EEE-2	EEE-3	EEE-4	OEE-1	OEE-2	OEE-3	OEE-4
EEI-1	EEI-2	EEI-3	EEI-4	OEI-1	OEI-2	OEI-3	OEI-4
EEO-1	EEO-2	EEO-3	EEO-4	OEO-1	OEO-2	OEO-3	OEO-4
EIA-1	EIA-2	EIA-3	EIA-4	OIA-1	OIA-2	OIA-3	OIA-4
EIE-1	EIE-2	EIE-3	EIE-4	OIE-1	OIE-2	OIE-3	OIE-4
EII-1	EII-2	EII-3	EII-4	OII-1	OII-2	OII-3	OII-4
EIO-1	EIO-2	EIO-3	EIO-4	OIO-1	OIO-2	OIO-3	OIO-4
EOA-1	EOA-2	EOA-3	EOA-4	OOA-1	OOA-2	OOA-3	OOA-4
EOE-1	EOE-2	EOE-3	EOE-4	OOE-1	OOE-2	OOE-3	OOE-4
EOI-1	EOI-2	EOI-3	EOI-4	OOI-1	OOI-2	OOI-3	OOI-4
EOO-1	EOO-2	EOO-3	EOO-4	OOO-1	OOO-2	OOO-3	OOO-4