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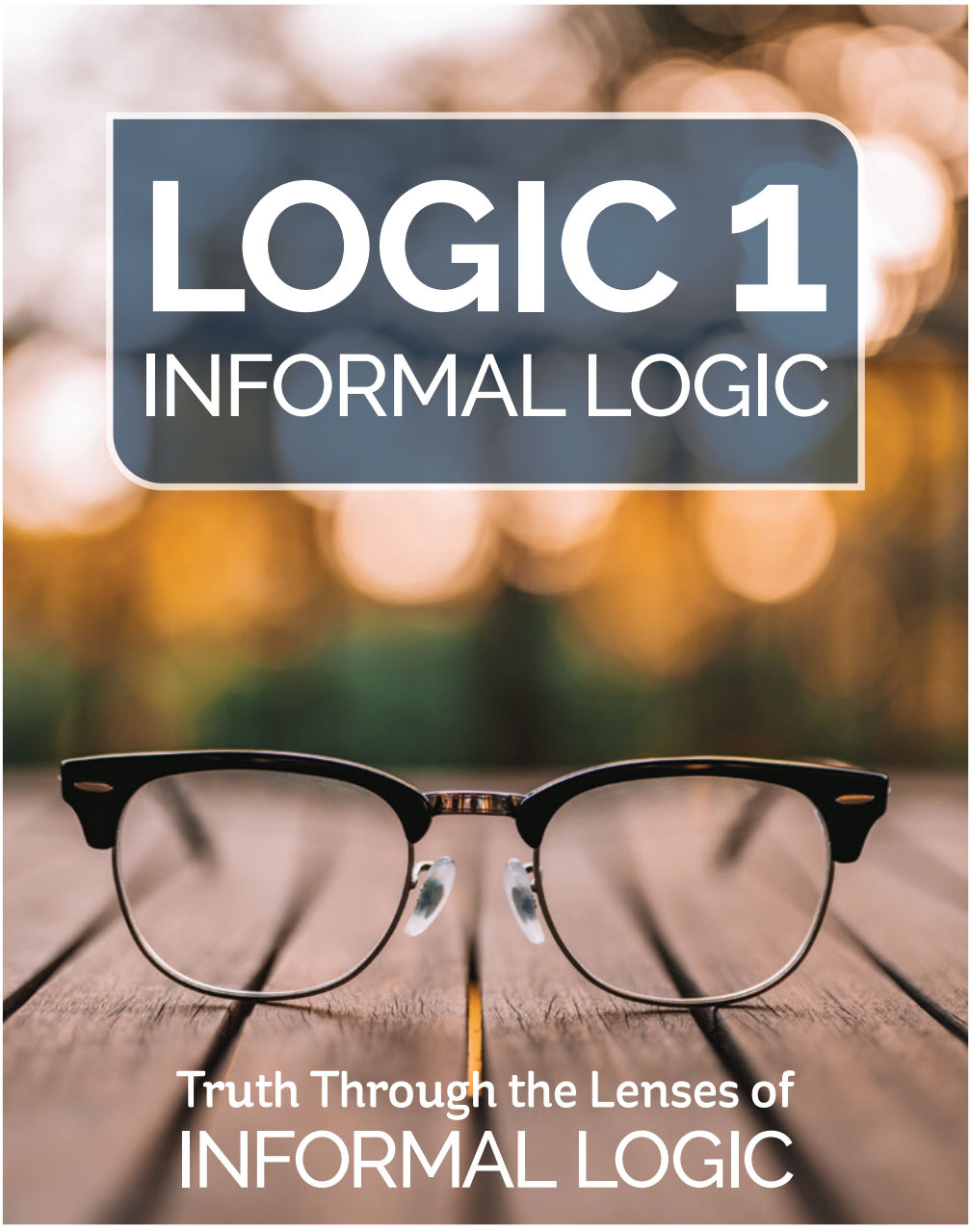
LOGIC 1
INFORMAL LOGIC



MICHAEL G. EATMON

TEACHER'S EDITION

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Truth Through the Lenses of
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How to Use the Teacher's Edition

Logic 1 aims to teach young adults how to think in better ways so that they may think better things. It offers them basic tools for cogent reasoning and clear communication. This course aims to teach students how to argue, as well, but to do so with equal parts honesty and humility. Conversations today too often lack both thoughtful care and careful thought. *Logic 1* strives to set a better course, both through its instruction and by its example.

We hope, though, that *Logic 1*'s high aspirations don't frighten students—or teachers—away! This course aims for lofty heights, but it hopes to get its readers there gently. It treats its topics with a plain approach and its readers with a playful tone. When possible, it simplifies complexity, and when helpful, it scaffolds the learning process. This incremental approach is vital when covering epistemology, cognitive biases, and logical fallacies. It's crucial when covering them in middle school.

The volume before you is a teacher companion to *Logic 1: Informal Logic*. (Most often, we'll refer to the current volume simply as the "TE.") The TE gives guidance and suggestions for how to use the student text and workbook. (Throughout the TE, we'll refer to the student edition as the "SE" and the workbook as the "WB.") The TE's plans, notes, sample responses, and assessments inform and advise.

This teacher edition should be viewed as a teaching companion, though, not as a cookbook. It's not a collection of recipes that need nothing more than water and a whisk. Instead, you'll need to give of yourself, too. You'll need to invest attention, preparation, and reflection.

Some who teach logic have studied the subject before. Many haven't. This teacher edition assumes no prior knowledge of the subject. It does assume, however, that the teacher will read the student text long before the student does.

We enjoyed putting this teacher edition together for you. We hope you'll find it useful. We hope you'll find ways to build upon it, too. Be encouraged to adapt it to your and your students' needs.

Lessons' basic pattern

Logic 1 aims to connect today's middle-school audience to a rewarding but complex topic. It aims to do so with the least frustration, too. To achieve that goal, the TE's lessons and helps follow a basic design.

1. Each lesson in this volume pairs with the same-numbered chapter in the student text. For example, lesson 17 in the teacher edition pairs with chapter 17 in the student edition.
2. Each lesson represents a week's worth of instruction. Further, each lesson's instruction is divided into five sessions. Some teachers will cover a lesson—five sessions' worth of material—in five days. Some will compress the same material into fewer days. What's

most important is to cover all content in each lesson.

- For classes that follow a five-day schedule, a lesson's five sessions will fit like hand in glove. Not all classes will follow a five-day schedule, though. Appendix A shows how to plan lessons for a five-day schedule and a two-day schedule.

3. Each lesson shows when content should be completed: before, during, or after a session. Teachers shouldn't view these as mere suggestions, but as strong recommendations. Completing content when called for is essential to a lesson's integrity and flow.
4. Most lessons' sessions follow a pattern.
    - Session 1 ("S1" below)
        - S1 assumes that students have read the current chapter beforehand. It assumes, as well, that they've completed session 1 in the corresponding WB chapter. Veritas recommends that teachers collect and grade students' WB responses each week. We recommend that they be collected late in the week, though. What students submit needn't be their first and only passes at the WB questions. Their responses may, instead, reflect what they've learned during the week.
        - S1 calls you to review each section of the chapter, ask for summaries, and review unusual or special terms. Invite and answer questions about basic comprehension. Be encouraged to discuss the character narrative, too. Then, discuss students' responses to WB session 1.
        - S1 (like sessions 2–4) contains teacher notes you may find useful for this or another session.
        - S1 directs students to complete WB session 2 for homework.
    - Session 2 ("S2" below)
        - S2 calls you to finish any helpful discussions from the previous day. Then, discuss students' responses to WB session 2.
        - S2 (like sessions 1, 3, and 4) contains teacher notes you may find useful for this or another session.
        - S2 directs students to complete WB session 3 for homework.
    - Session 3 ("S3" below)
        - S3 calls you to finish any helpful discussions from the previous day. Then, discuss students' responses to WB session 3.
        - S3 (like sessions 1, 2, and 4) contains teacher notes you may find useful for this or another session.
        - S3 directs students to complete WB session 4 for homework. This includes both the quiz and the discussion questions.
    - Session 4 ("S4" below)
        - S4 calls you to collect students' quiz answers at the beginning of class. (Sample responses at the end of each lesson show correct quiz answers.) Finish any helpful discussions from the previous day. Then, discuss students' responses to WB session 4's Discussion questions.

    - S4 (like sessions 1–3) contains teacher notes you may find useful for this or another session.
    - S4 directs students to read and think about WB session 5 for homework. They'll write their response to it during session 5's class period.
- Session 5 ("S5" below)
    - S5 is a class period for students to work on their own. They should use the time to complete WB session 5's Puzzles & Perspectives. They may use some of the time to review the current or past chapters, as well.
    - S5 calls you to collect students' homework for the chapter, sessions 1–5, at the end of the day. (Define "day" as best suits your purposes.)
    - S5 directs students to read the next chapter in the SE and complete that WB chapter's session 1.

WB discussion questions

The discussion questions in sessions 2–4 may present too heavy a workload for some students. No worries. Feel free to omit a question here and there as helpful. Another approach is to designate some questions as "QPs." These are questions students are expected to ponder and to be prepared to discuss in class. They needn't respond to QPs in writing, though.

Student notebooks

The reference material in the back of the SE contains helpful overviews of some of the book's main ideas. What students won't find there, though, is a glossary of important terms. Important terms appear in blue typeface throughout the SE, and each is defined in context. Still, it may be helpful for students to maintain a notebook for special terms and concepts. It can be a handy reference that includes definitions, notes, questions, and comments. It can catalog cognitive biases and logical fallacies, too, providing definitions and examples. A notebook can also function as an overflow location for students' WB responses.

Midterm & final exams

Appendix B provides a midterm exam for use after chapter 16 and a final. Both follow the same pattern of questions. The first 15 questions ask for definitions/descriptions of important terms and concepts. Following them are five discussion questions and 15 items of straightforward matching. Each exam's final question, The Bigger Picture, explores a key topic in greater depth. Each section of the exams shows questions' suggested point values. We see some benefit to showing students the first 15 questions in advance of the exam. The aim of these questions is to confirm students' comprehension of core content. Assessing memory of chapter content is important. Assessing comprehension of it is more so.

Lesson 1 Plan

1

THE PROBLEM OF INVISIBLE CATS

In this and all future lessons, we'll use abbreviations for Logic I's three components. We'll refer to the student edition as "SE," the workbook as "WB," and the teacher edition as "TE."

Session 1

Before class

Although unused on day 1 of the course, "Before class" is a regular Session 1 section.

During class

Because this is the first day of class, read together SE (student edition) chapter 1 and its footnotes. (An important part of each *Logic I* chapter, footnotes should be read, not skipped over.) We won't be reading later chapters during class.

Read each section of the chapter as a chunk. Pause after each to have students interact

with what was read. Ask for summaries. Review any unusual or special terms, especially those in **blue**. Invite and answer any questions about basic comprehension. Use this paragraph's pattern for *anything* assigned to be read in class.

Before discussing a chapter in class, be sure to have read it thoroughly. Be sure to have read through the corresponding exercises in the WB (workbook), too. Try to avoid introducing the WB's exercises in class before they've been done for homework. We'd like for students to tackle the chapter's Discussion questions on their own first.

You and the students may find something unexpected at the very start of chapter 1. Like all other chapters, chapter 1 contains a conversation between fictitious characters. In chapter 1, those characters are siblings Renny and Jen. In chapter 2, we'll meet Renny's best friend, José. Together, Renny, Jen, and José are the book's main characters. Later chapters introduce Mrs. Sagewright the younger, Professor Mentchurn, and Chris LeClair. We'll also meet a few supporting characters: Renny and Jen's dad, Mrs. Sagewright the elder, and Li Mei.

The chapters' narratives are an important feature of the text. They illustrate good thinking and bad, strong character and character that needs work. Be encouraged to discuss the narratives, even before students do the workbook exercises. When class makeup permits, students may enjoy acting out the narratives.

In each "During class" section of Sessions 1–4, you'll find teacher notes that pair with the SE and WB. (Incidentally, you're currently reading the "During class" section of Lesson 1 Session 1.) Sometimes, notes clarify core content or call attention to something needing added emphasis. Other times, notes invite further in-class discussion of an important topic. Whatever their focus, the notes offer added insight for teaching the material.

Notes

A. Chapter titles in the text tend to be playful. Be encouraged to ask students about them. What do the titles call to mind? Where might the chapter be going? Answers to those questions might be challenging to see before reading the chapter. Feel free, then, to ask these connecting questions after the chapter has been read and discussed.

B. Renny likes using "$5 words," such as *proliferation*. Although not strictly "logic words," they might be useful additions to students' vocabularies.

C. In later narratives, various characters experience a Jen moment or a Ren moment. (Notes in later chapters will highlight when either happens. Sometimes, the Jen/Ren moment is striking; other times, it's more subtle.) Encourage students to look out for such moments, and plan to discuss them when they appear.

D. Some may find interesting the origin of the word *logic*. It derives from the Greek word *logos*, which can mean a lot of things. Legitimate English translations include "speech," "discourse," "story," "study," "word," and "reason."

E. Feel free to discuss how common conversations use the terms *judge* and *judgment*. What does it mean, for example, when a teen says "Stop judging me!"? What do the students mean when they use such a phrase, or how do they interpret it when they hear it?

For homework

Students complete WB Session 1 (both Terms & Concepts and Big Ideas). For Terms & Concepts, students may stick closely to the definitions given in the SE. Most important, students need to provide satisfactory answers *that they'll remember*. Session 1's Big Ideas, however, call upon students' reflection, not only their memory. Most Big Ideas questions in the WB are answerable in 3–5 sentences. Sample student responses to WB exercises appear at the end of each lesson in this TE (teacher edition).

Students may need more space to write their responses than the WB provides. If so, then they may dedicate a supplemental notebook/binder to *Logic 1*. One way to organize the overflow notebook is like this. Let's say a student needs more space to write an answer for Big Idea 1. She can start her answer in the workbook and then continue her answer in her notebook. She can label her entry "Chapter 1 Session 1 Big Idea 1." Other notebook overflows could use the same, or an abbreviated, labeling pattern. For example, an overflow response to Chapter 1 Session 2 Discussion 1 could be labeled "C1 S2 D1." Organizing overflow answers in this way helps students become better young logicians. It sharpens their attention to order and detail.

Session 2

During class

Finish any helpful discussions from the previous day. Then, discuss students' responses to WB Session 1, which they completed for homework. (As a reminder, sample student responses to WB exercises appear at the end of the lesson.) After discussing students' responses to WB Session 1, talk through WB Session 2 in class. Below are teacher notes you may find useful for this or another session.

Notes

A. "Ren moment" and "Jen moment" are terms used only in Veritas logic curricula. The terms are known more commonly among experts as *hubris* and *aporia*. The terms are ancient, but the conditions they describe are as relevant today as ever.

B. Defining the term *truth* is no easy matter. The definition provided in the chapter will serve our purposes in logic. Still, feel free to discuss what it means for a statement to be true. Consider comparing *true* to related concepts: *accurate*, *actual*, *factual*, *faithful*, *honest*, and *real*. A reputable dictionary may be helpful here.

C. Another common way to divide the subject of logic is into formal logic and material logic. Formal logic focuses on the form of arguments. Material logic focuses on the matter, or content, of arguments.

D. What sorts of things can get in the way of our knowing what's true? Our ignorance

and misinterpretation of information can, as can our poor use of reason. Pride and self-deception can keep us from knowing what's true. So can excessive skepticism and undue self-doubt.

E. The WB's Discussion questions aim to prompt deep thinking. They require students to reflect on and apply what they've learned. Definitional answers or answers that merely quote the SE won't do.

For homework

Students complete WB Session 3.

Session 3

During class

Finish any helpful discussions from the previous day. Then, discuss students' responses to WB Session 3, which they completed for homework. Below are teacher notes you may find useful for this or another session.

Notes

A. Session 3 Discussion 1 (C1 S3 D1) asks about the sorts of questions philosophers explore. (As a reminder, "C1" in this sentence refers to WB chapter 1.) A *philosopher* is someone who studies or "does" philosophy. From its Greek roots, *philosophy* means "love of wisdom." It's the study of what's really real, how we know things, and what the difference is between right and wrong. To philosophers, these areas are known as metaphysics, epistemology, and ethics. Philosophers ask questions like "Are all things that exist *physical* things?" (metaphysics). "What role does faith play, if any, in knowing some truth?" (epistemology). "Is it ever acceptable to take what isn't ours without the owner's permission?" (ethics). A sample student response appears at the end of this lesson.

B. Now's a great time to dive deeper into the Zeno paradox Jen mentions. On a quick read, some students may think it's only a word game. On the contrary! It explores a question that could turn our understanding of the world upside down. Is *real* movement—a *real* change in direction, degree, or even kind—even possible, or is it a mere *illusion?*

C. Many of the WB's Discussion questions ask students to share their own experiences. Some of those experiences may have been embarrassing or otherwise painful. Encourage students to share honestly, even if they need to soften or blur some of the details. If they can't think of an experience that suits a particular question, they may make something up. They should invest enough effort into any imaginary responses to make them believable.

For homework

Students complete WB Session 4, both the Quiz and the Discussion questions.

A short, simple quiz is a staple element of all WB Session 4s. The quiz is designed to check basic comprehension of terms and concepts. Quizzes aim to be straightforward, not tricky.

Session 4

During class

At the beginning of class, students submit their quiz answers. (Students should have completed the quiz as homework after Session 3.) When grading the quiz, we suggest treating each question with equal weight. Session 4 Quiz 1 (C1 S4 Q1, "All gerbils . . . ") counts as much as Session 4 Quiz 9 (C1 S4 Q9, "I don't think . . . "). A perfect quiz score is 9/9, or 100%, where each question is worth about 11 percentage points. In the sample student responses at the end of each lesson in this TE, correct quiz answers are given.

Finish any helpful discussions from the previous day. Then, discuss students' responses to WB Session 4, which they completed for homework. Below are teacher notes you may find useful for this or another session.

Notes

A. The SE's character narratives illustrate the natural interplay between thoughts and emotions. Be encouraged to point these out and discuss them. Ren and Jen moments, for example, are about equal parts cognitive and emotional. This will help students see that our thoughts and emotions aren't wholly separate "parts" of us. Each influences the other—sometimes for the better, sometimes for the worse.

B. People today sometimes speak of *the* truth, sometimes of *one's own* truth. In the former category, we might think of truth in math ("2 + 2 = 4") or science ("The moon is smaller than the earth"). In the latter category, we can think of individuals' opinions about important matters. When I "speak my truth," that is, I declare my beliefs with boldness. Both of these uses of "truth" have their place in the exchange of thoughts and feelings. We should be careful, however, not to confuse the one use with the other.

C. Some experts view logic as most closely related to math. From that angle, logic is about applying certain rules and operations to language. It's about solving "idea problems," but with words, instead of numbers. Others view logic as most closely related to philosophy. From that angle, logic is about using language to find or express what's (likely) true about reality. Strong arguments can be made for both perspectives. Still, *Logic I* leans toward the latter view.

For homework

Students read and think about WB Session 5. They'll write their response to it during Session 5's class period.

Session 5

During class

This class period is envisioned as a day for students to work on their own. They should use the time to complete Session 5's Puzzles & Perspectives. They may use some of the time to review the current or past chapters, as well. At the end of the day ("day" as defined by the teacher), students submit the current chapter's homework, Sessions 1–5.

For homework

Students read SE chapter 2 and complete Session 1 in WB chapter 2. For Session 1's Terms & Concepts, students may stick closely to the definitions given in the SE. Most important, students need to provide satisfactory answers that they'll remember. Session 1's Big Ideas, however, call upon students' reflection, not only their memory. Most Big Ideas questions are answerable in 3–5 sentences.

Sample Workbook Answers

FOR CHAPTER 1

Guidelines for grading

No two students, no two classes, no two iterations of the same course are ever identical. Nor are all types of questions the same. Some are more objective ("What does philosophy study?"). You'll find these kinds of questions in Session 1's Terms & Concepts and Session 4's Quiz. Some questions are more subjective ("When was the last time you had a Ren moment? Describe it."). You'll find such questions in Big Ideas, Discussion, and Puzzles & Perspectives. Parts of those questions' answers can be considered true or false, right or wrong. Much of their answers' content calls for grading latitude.

It's reasonable, then, to view grading guidelines as illustrative but flexible. They'll work for many classroom situations, even if not for all. Adjust grading criteria or evaluation weights as helpful. We do recommend that teachers insist on two requirements, though. One is that students write their answers in complete sentences. The other is that students try to answer questions to the best of their ability. (This is difficult to assess, but we stand behind the recommendation.)

Below, you'll find sample workbook responses from a "typical younger middle-schooler." We use quotation marks because *adults* wrote all sample responses in the TE. Bear that in mind as you review student work. Attached to each response below, you'll see a suggested point-value. To get a grade for each session, you might add up all points earned and divide by the total points possible. That ratio can easily be turned into a percentage, of course.

Session 1 · Terms & Concepts (1 pt each)

1. Philosophy seems to study three things. First, it studies what is really real. Second, it studies how we know things. Finally, it studies what the difference is between right and wrong.
2. A "Ren moment" is when you show someone else up. You prove something that makes them confused, and you feel proud about it. A "Jen moment" is when you are the confused one. You realize that you don't understand something you thought you did, so you feel confused and maybe fearful. I can get scared when I don't understand.
3. A statement is true when it reflects reality, when it says what really *is*.
4. Logic is the art and science of finding and using good reasons for believing something is true. We can also think about logic as a set of good thinking patterns.
5. The two main branches are informal and formal logic.
6. This book focuses on informal logic.
7. The three acts of the mind are understanding, judging, and reasoning. Understanding is knowing the meaning of something. Judging is about linking two things in a relationship. Reasoning is about proving some claim to be true.

Session 1 • Big Ideas **(3 pts each)**

1. A Jen moment reveals when we don't understand something that maybe we thought we did. Jen has to face the truth that as much as she thinks she knows, there are still things that confuse her. The book says it can be like a senior moment. This could be something that we thought we knew, or it could be some new idea. We feel like there's something we did understand or should understand, but we can't remember it or think about it clearly.

   A Ren moment reveals something about our character. Ren is proud of coming up with something to stump Jen. He wants her to feel confused. He's proud when he does. I think they are related. Ren's "invisible cat" trap is a reaction to Jen confusing him. In the past, Jen might have felt like Renny does now. She might have been happy and proud that she confused him. And I don't know if Renny really understands what he's saying. He may not really have an answer for his own questions. The chapter says Ren and Jen moments can help keep us humble and curious.
2. Our thinking can benefit from studying logic because we can learn how to think better. We can learn what we don't understand and maybe how to find answers. Our character can benefit from studying logic because we can learn to be humble. Humility is always good—when we know something and when we don't. Even if Ren thinks he's right, he needs to work on his pride. And even if Jen feels confused, it doesn't have to make her afraid. She can see that being confused is a chance to be humble enough to say she doesn't know. She can be curious to find out the truth. That's what her philosophy class should teach her.
3. The book says that for something to be true, it must reflect reality. It has to say something about what is real in how the world works. I don't think we'd live very well without knowing the truth. My logic teacher asked us how we knew our chairs would support us. We talked about how we could feel and touch them to know they are real. Our experience with chairs helped us know what they would (probably) do in the future.

   Our teacher said that we use that bit about experience all the time. I know the sun will rise tomorrow because it always has. Imagine waking up always wondering if it would be daylight. I also think we need to know the truth to live a good life. It's why we study science and math and literature and all. We are learning the truth. How to build and create and understand.

Session 2 • Discussion

1. Renny didn't convince me of invisible cats. I felt as confused as Jen at first. I can't figure out exactly where Ren is wrong, but he can't be right. I suppose he didn't prove that invisible cats exist. All he showed was what I don't know. I'm not sure if showing what I don't know is the same as proving that he is right. **(3 pts)**
2. I got curious about logic puzzles like the one Ren gave Jen. I googled them and found Zeno's paradox. Zeno said that to get to some destination, you have to go halfway there. Then half of what's left. Then another half. So, you're only going half the way each time, and you'll never get where you are going. I tried it out on my younger brother, John. He's a year younger than me and hasn't had logic. He got so confused that he started to cry and ran out of the room. When he told my mom what had happened, she sent me to my room.

I felt good about confusing John and mad I got in trouble for it. It's his fault for overreacting. When I cooled down a little, I thought about how I wasn't really wanting to prove anything. I just wanted to see him squirm. I wanted to feel smarter and better.

When my dad came home, he came to see me. He asked what had happened and said what I was already feeling, that I was just trying to irritate my brother. Then he asked if I really believed what I'd said. I said sure, it made sense. My dad was quiet for a moment then got up and walked to my closet. He picked up my baseball and tossed it to me. I caught it. Dad smiled and said, "Why did you catch the ball?" I said, "It would have hit me if I didn't." Dad then said that that couldn't be right. To hit me, it would have to travel halfway, then halfway again. In fact, I couldn't *ever* have caught the ball. It would never have reached my hands. Well, and, I guess it would never have hit me, either! Dad said that maybe it's possible to have something seem to make sense, but our experience can show it not to be true. I'm going to ask my logic teacher about that. **(5 pts)**

Session 3 • Discussion

1. In Mr. Duff's writing class, we learned about the "reporter's questions." I think those are the ones a philosopher would need to ask. *What* and *where* and *when* are all about asking what we know about what's right in front of us. *How* is about how things relate together. *Why* is about what the motive is or what something means. If we don't know *what* and *where* and *when,* we don't know basic facts. If we don't know *how* and *why*, we don't know how to respond to hard questions about ourselves and the world. Now that I think about it, a philosopher probably thinks that *why* is the most important question. **(3 pts)**

2. Sometimes it feels like my Bible teacher, Mr. Mills, likes us to have Jen moments. He asks us questions and has us discuss ideas that can be really confusing. Last week our discussion was about Jesus' temptation in the wilderness. I've heard this story all my life. Of course, Jesus is sinless, so he passes the test. But Mr. Mills asked if it was a real temptation if Jesus couldn't possibly give in. I said that if he really could give in, he wouldn't be sinless. But Mr. Mills said that something in the book of Hebrews says Jesus was tempted like we are. And we can fail. So doesn't that mean Jesus could have? I think what bothered me was not knowing.

   I left the conversation really confused. I realized I was a little scared, too. It feels like if I don't understand this, I don't understand Jesus. And not understanding Jesus feels scary. How can I trust him if I don't understand? I realized that I feel that way a lot. When I don't understand, I feel scared that something bad will happen or I won't know what to do.

   Mr. Mills told us to talk to our parents or our pastor and then come back to class ready to share. I have to admit I was scared to ask. I felt like I'd look stupid for not knowing the answer. But I thought about our book saying we need humility, so I tried. My dad was great. He listened and asked questions and helped me not feel scared. I was ready to go back to class and defend the same position I had. But my dad helped me see that wanting to know how other people think is good, even if I don't agree. **(5 pts)**

Session 4 • Discussion (3 pts each)

1. I most identified with Renny. I like to be right, and I want other people to know I'm right. Just like Renny, I can want to get back at people who show me up. I know I've tried to make other people feel like Renny wants Jen to feel. I know I need to work on the humility the chapter talks about.
2. The chapter says something is true if it expresses what is real about the world. I think that means we should care about truth everywhere. We had to memorize the verse that says, "So then whatever you do, do all for the glory of God." I think the glory of God must be true, so in everything, we have to find and say what is true. Of course, we should care about truth in religious beliefs and moral choices. Those are about what is real about God and how He wants us to live. But it's not like God doesn't care about everything else. My math and science teachers say we learn about God through those subjects. My art teacher says true art shows something about God. So, it glorifies God to know those true things and speak about them.
3. I think good can mean two different things. Good thinking might mean solid or reliable. A good car is one that doesn't break down. So good thinking doesn't fall apart. Or good thinking might mean right morally. A good man is someone who does what is right. So good thinking is thinking about what is morally right. I suppose thinking that doesn't fall apart will be the same as thinking morally.

Session 4 • Quiz (1 pt each)

Example 1: cats	☒ 1	☐ 2	☐ 3
Example 2 : Some cats are invisible.	☐ 1	☒ 2	☐ 3
Example 3 : You can't see the cats in our kitchen because they're invisible.	☐ 1	☐ 2	☒ 3
All gerbils are visible.	☐ 1	☒ 2	☐ 3
visibility	☒ 1	☐ 2	☐ 3
No gerbils are invisible. That's because all invisible things are cats, and no cats are gerbils.	☐ 1	☐ 2	☑ 3
gray	☒ 1	☐ 2	☐ 3
The cleverest cats are gray.	☐ 1	☒ 2	☐ 3
No clever cat is gray because all cats are invisible.	☐ 1	☐ 2	☒ 3
me (as in *you*, the logic student!)	☒ 1	☐ 2	☐ 3
I think; therefore, I exist.	☐ 1	☐ 2	☒ 3
I don't think I'm invisible.	☐ 1	☒ 2	☐ 3

Session 5 • Puzzles & Perspectives (5 pts)

If we think about them like moves in a game, Renny's are the ones that go well. Jen's don't go well because Renny just denies everything she says. It's like when I play my dad in chess. We have to try to get each other in checkmate. In checkmate, the king can move. I mean, I can still pick him up and move him. But no matter which way I move him, he's still in check. There's literally no way to win. Ren thinks he has Jen in checkmate. He has Jen trapped. And Jen feels like no matter what she says, she's still trapped. It's like if one player has just a queen left in chess. He can always trap the king but never really win. The king can always move but never really get away.

It seems like Renny-style claims are all based on what can't be proved. (Or what can't be *disproved!*) Renny-style claims are also about denying whatever anyone else says against your claim. It's just a list of "you can't know that." Someone like Renny doesn't actually have any evidence. Jen-style responses are all about other ways of proving something. Even if something's invisible, we have to be able to know it's there in other ways. Jen keeps giving other ways to test what Renny says. Renny just denies that any other test works.

It seems like Renny thinks he's proven something just by showing what Jen can't prove. He hasn't proven invisible cats exist. He's just shown that Jen can't prove they don't. He can deny all the ways we know things. Like the chair example. He can deny what I can feel. He can deny what I've experienced. He might think he's proven the chair won't hold me up. I have evidence for what is true. Renny doesn't have evidence. He just denies any evidence. But like my dad said, I'll bet he still sits in chairs. He might not say there's evidence, but he still acts like the chair holding him is true.

I think we can always prove something is there through some sense. Even things no one can see or hear or taste or touch we can still know. I remember our pastor talking about the wind. We can't see it. We can see things blown by it, like trees bending or dust blowing. I don't think we can touch it. We can feel something when we feel the air moving, but I don't think that's the same thing as feeling the wind. He said that's like God. We don't always see Him, but we see what He does. And God gives us his Spirit so we know he is here with us.

Lesson 2 Plan

MORE LIGHT THAN HEAT

Session 1

Before class

Students should have read SE chapter 2 and completed Session 1 in WB chapter 2. (In all lessons, as a reminder, we use abbreviations for *Logic 1*'s three components. We refer to the student edition as "SE," the workbook as "WB," and the teacher edition as "TE.")

During class

Review (but no need to reread) each section of the chapter as a chunk. Ask for summaries. Review any unusual or special terms, especially those in **blue**. Invite and answer any questions about basic comprehension. Try to avoid introducing in class any of the WB's Discussion questions. Remember that we want students to tackle those questions on their own first.

The chapters' narratives, you'll recall, are an important feature of the text. Be encouraged to discuss them. When class makeup permits, students may enjoy acting them out.

Discuss students' responses to WB Session 1, which they completed for homework. As a reminder, sample student responses to WB exercises appear at the end of the lesson.

As in all "During class" sections of TE Sessions 1–4, you'll find teacher notes below. Notes may clarify core content or call attention to something needing added emphasis. They may also invite further in-class discussion of an important topic.

Notes

A. The tone of the *Logic 1* text aims to be playful. We see no reason why the teaching of *Logic 1* can't be playful, as well. *Playful* needn't mean *ebullient*, but it certainly doesn't mean *dour*. (Renny would like that last sentence's $5 words; your students might, too.)
B. The word "argument" appears a lot both in the textbook and in the workbook. In most instances, the term will be used as it is in logic. Sometimes, though, it'll mean "disagreement" or "verbal fight." Students ought not to assume that "argument" means the same thing every time it appears. Context clues will help them discern how the term is being used in each case.
C. "Why is it important to have good reasons for what we think?" The C2 S1 B3 (Chapter 2 Session 1 Big Ideas 3) question seems innocent enough. Many students will assume that they have good reasons for *everything* they believe. Once asked to give those reasons, though, many will realize how challenging it can be.

For homework

Students complete WB Session 2.

Remember that some students may need more space for their responses than the WB provides. If so, then they may use a supplemental notebook/binder for *Logic 1*. See TE Lesson 1 for a suggestion of how students might keep their notebook/binder organized.

Session 2

During class

Finish any helpful discussions from the previous day. Then, discuss students' responses to WB Session 2, which they completed for homework. Below are teacher notes you may find useful for this or another session.

Notes

A. "The universe is a big place," José says, "with millions and billions of stars and planets. What's crazy about thinking that at least one of those planets has intelligent life on it? . . . And if there are intelligent beings out there, what's so crazy about believing that some of them may've come to earth?" What do students think of José's implied argument

here? More accurately, what do students think of José's implied arguments, plural? He makes implicit arguments for aliens' existence and for their having visited earth.

B. "Next time," Renny remarks, "let's talk about something much easier to prove, like ghosts." As is common among some middle-schoolers, Renny uses sarcasm on occasion. (*Sarcasm* is the use of irony to mock someone or convey contempt.) Important note: the *Logic 1* textbook never uses sarcasm outside the narratives. If something in the core content reads as though sarcastic, know that it was unintended!

C. Chapter titles and headings often make allusions. Feel free to point them out. This chapter's A Tale of Two Logics heading alludes to *A Tale of Two Cities* by Charles Dickens.

D. What do students imagine an argument's *form* is? What are we talking about when we talk about the *form* of *anything*? Most likely, students will view *form*'s closest synonym as *shape*, and that's understandable. In logic, though, the meaning of *form* is closer to *pattern*.

For homework

Students complete WB Session 3.

Session 3

During class

Finish any helpful discussions from the previous day. Then, discuss students' responses to WB Session 3, which they completed for homework. Below are teacher notes you may find useful for this or another session.

Notes

A. Informal logic revolves around the logic and arguments *embedded* in ordinary language. Formal logic, though, involves the *abstraction* of logical patterns from natural language. As Session 2 Discussion 2 suggests, there's an analogy to math. Arithmetic ("informal math") says 3 + 3 + 3 = 12; 7 + 7 + 7 = 21; 11 + 11 + 11 = 33; etc. Algebra ("formal math"), however, says that for any number x, $x + x + x = 3x$.

B. "Some people find (formal logic's) use of symbols convenient. It can reduce pages of arguments to a few lines of 'math-ish' code." This hints at one reason Veritas chose to teach informal logic before formal logic. Students tend to do better in formal logic after they've had a year of (pre-)algebra. Informal logic, however, has no math "prerequisites."

C. "Saying that(an argument is) logical isn't the same thing as saying that it's reasonable." The paragraph that begins with this sentence is worth stressing and repeating. *Logical* and *reasonable* aren't synonymous. *Logical* means that an argument follows a good thinking pattern. *Reasonable* means that the argument is logical and also makes sense in the real world.

For homework

Students complete WB Session 4, both the Quiz and the Discussion questions.

A short, simple quiz is a staple element of *all* WB Session 4s. The quiz is designed to check basic comprehension of terms and concepts. Quizzes aim to be straightforward, not tricky.

Session 4

During class

At the beginning of class, students submit their quiz answers. (Students completed the quiz as homework after Session 3.) When grading the quiz, we suggest treating each question with equal weight. In the sample student responses at the end of each lesson in this TE, correct quiz answers are given.

Finish any helpful discussions from the previous day. Then, go over students' responses to WB Session 4's Discussion questions. Below are teacher notes you may find useful for this or another session.

Notes

A. "How can we know to be true what we believe to be true?" This is one of the basic questions of epistemology and the focus of *Logic 1*'s first quarter. A branch of philosophy, *epistemology* explores what distinguishes justified belief from sheer opinion.

B. Session 4's Discussion 1 and 2 and Session 5's Puzzles & Perspectives have something in common. All touch on the topic of a term's definition. *Logic 1* addresses the topic in an ad hoc way, but *Logic 2* will say much more. Discerning what a term means is of vital importance in evaluating any argument. It may be even more important in formal logic, though. To abstract a term to a symbol, such as p or q, we need to be clear and precise about what we're abstracting.

C. We can't stress enough that *judge* and *judgment* don't mean in logic what they often mean in ordinary speech. To answer Session 4 Discussion 3, students need to understand the distinction. In ordinary use, the terms are often associated with being judgmental. To be *judgmental* is to have or to express an overly critical point of view. In logic, to judge is to link two concepts. When my mind creates a judgment, it forms an opinion about how one idea relates to another. Those ideas may be concepts, qualities, people, things, whatever.

For homework

Students read and think about WB Session 5. They'll write their response to it during Session 5's class period.

Session 5

During class

This class period is envisioned as a day for students to work on their own. They should use the time to complete Session 5's Puzzles & Perspectives. They may use some of the time to review the current or past chapters, as well. At the end of the day ("day" as defined by the teacher), students submit the current chapter's homework, Sessions 1–5.

For homework

Students read SE chapter 3 and complete Session 1 in WB chapter 3.

Sample Workbook Answers

FOR CHAPTER 2

Guidelines for grading

At the end of Lesson 1, we introduced guidelines for grading students' WB exercises. The summary is that all types of questions are not created equal. Some are more objective, as in Terms & Concepts and Quiz questions. Some are more subjective, as in Big Ideas, Discussion, and Puzzles & Perspectives questions.

It's reasonable, then, to view grading guidelines as illustrative but flexible. Adjust grading criteria or evaluation weights as helpful. We do recommend that teachers insist on two requirements, though. One is that students write their answers in complete sentences. The other is that students try to answer questions to the best of their ability.

Below, you'll find sample workbook responses from a "typical younger middle-schooler." (Remember that an adult wrote these responses.) Attached to each response, you'll see a suggested point-value. To get a grade for each session, you might add up all points earned and divide by the total points possible.

Session 1 · Terms & Concepts (1 pt each)

1. Understanding creates a concept. Judging creates a judgment. Reasoning creates an argument.
2. A concept is an idea or a notion. I have an idea of my cat. In my imagination, I can see her color and feel the softness of her fur and hear her yowl.
3. A judgment is when we link two or more concepts together and show how they connect. Here is an example: cats are better than dogs.
4. People can think about an argument as a fight. Or they can think of it as a disagreement.
5. An argument is an attempt to give reasons, evidence, or support for some point of view.
6. An argument's form is about its shape or structure. It's about how one idea connects to another. An argument's content is the topic the argument is about.
7. Both formal and informal logic are ways we can learn to think better. And they can help us to think better thoughts. Both help us to understand arguments that we and other people make. Both give us tools to think about those arguments, too.
8. Formal logic is about an argument's structure or shape. Informal logic is about an argument's content. Formal logic often uses mathematical symbols. Informal logic uses normal language. Formal logic is often harder to understand because it is more math-y. Informal logic is easier to understand because it's how we normally talk.

Session 1 · Big Ideas (3 pts each)

Now is a good time to comment on another grading consideration. Many students will answer a question well enough to earn its full points. Some students, though, will write more than they need to. The

"typical middle-schooler" who wrote this lesson's answers is an example of the latter. Writing more than enough is fine, but it's also unnecessary.

1. My favorite sports team is the Chicago Cubs. My friends make fun of me sometimes. I know they don't win all the time, or some years much of the time, but they are a great team. I tell them about all the hard work and persistence. They work harder than other teams because they don't win as much. They have to have endurance and grit. And they have more loyal fans than other teams. We cubbies don't change who we support on a whim. Our team inspires steadfast devotion.
2. I do have a friend, Christine, worried about a zombie invasion. The reasons she has aren't always tied together. But what she's talked about before is in this list:
    1. We know that there are viruses that spread really quickly and are very deadly.
    2. Viruses can affect the way people think and behave.
    3. We know people experiment to create new types of viruses and bacteria. If something got out, it could go quickly.
    4. Lots of people have mythology or stories about some sort of undead.
    5. If there's a zombie apocalypse, there's not really any way to stay safe.
    6. There are places in the world where cannibalism is still practiced.

    I'd say that 1–3 are good reasons to think something might happen. But they aren't good reasons for the zombie apocalypse. It's a jump from something happening to something like the zombie apocalypse. Number 4 isn't a good reason. We could say the same thing about flying horses or half-bull/half-man creatures or anything else. Number 6 isn't a good reason. It's true, but cannibalism and zombies are way different. Number 5 is a good reason if she already knows the apocalypse will happen. So I'd say that 1–3 are her best reasons. They are reasons to worry, but not good ones for zombies.
3. It's important to have good reasons for what we think because without reasons, we can just make up whatever ideas and believe them. And with bad reasons, we can just pick what makes sense or supports what we already have decided is true. Having good reasons means we are seeking the truth. We are seeking how the world really is and trying to live in that real world.

    I don't think we need good reasons for everything we think. I'll be honest. I think the Cubs are the best baseball team. But I'm also okay that my reasons don't have to be "good." It sort of doesn't really matter. I mean, I like them and will argue why they are great. But someone who likes another team has other reasons, and I think that's okay.

    I think we should have good reasons for things that really affect how we live and how we live with others—and the world God created. My list: God existing. Jesus coming. The world working a definite way. After all, logic is about thinking true things about reality. If reality doesn't work a certain way, there's nothing to think truly about. Who we vote for is on my list also. Going to war. Who we hang out with. What movies are good.

Session 2 • Discussion (3 pts each)

1. We study informal logic with normal language. Maybe it's easier to have a concept of informal logic. We can understand our ideas in words and images we already know. We aren't used to

thinking about the words we use with mathematical symbols. That is less familiar, so more difficult to understand. I think Veritas began with informal logic so we can learn using what we're familiar with. We can become comfortable with logic and then learn more complex ideas.

I remember in math how we started with things we could touch, like real apples and oranges. We'd count as we moved them from one pile to another. Then they gave us pictures of those things, and we would count those pictures. Then they gave us the pictures and the numbers so we would connect the two. Finally, they took away the pictures, and we just had the numbers. It was hard to learn, but we felt really proud because we knew we were doing what the older kids were doing.

When we were really young, the process was the same. We learned addition and subtraction with images first and then with numbers. We were learning about "some more" and "some less," about getting more and taking away. We learned that multiplication was repeated addition and division was repeated subtraction. So we learned math concepts in relation. We'd already learned to do problems where there was a blank in place of a number. The blank represented one specific number. So Algebra was learning that the variable did the same thing.

I think I see how learning math is similar to learning different kinds of logic. Learning informal logic is like learning with apples and oranges and blocks. Those are things we can see, and informal logic starts with what we are used to. We're used to using words and seeing what they mean. Formal logic is like numbers, and from the example a lot like algebra. So we are studying informal logic first to be ready to study the more abstract formal logic.

2. Saying that an argument is logical means that the form fits together. The ideas are connected well. Saying an argument is reasonable means the content makes sense.

   I don't think the perfect shape argument is reasonable. There are two reasons. The first is that it is true that we find a lot of math in nature. My math teacher loves pointing out things like the golden ratio or Fibonacci series. So it's reasonable to say that we find math in nature. But I don't think that's the same thing as saying math can predict nature. We don't say, "Here's the golden ratio, so that must account for that animal's shape." We find it. We don't start with deciding. And the second reason is that nature isn't perfect. I mean, in art we learned about proportions in the face when drawing a portrait. There are ratios there. But no one person has a perfect ratio. We all have slight variations. But we wouldn't say someone whose ears are a bit off or whose eyes are a bit closer are somehow imperfect. I mean, we could, but that's not right or true. So just because something in nature has mathematical relations, it doesn't mean there has to be mathematical perfection, like the earth being a sphere.

3. I have a friend who argued for a long time that plants must be able to think because their roots grow towards water.

   I think his argument was something like this: *Anything that grows with a purpose must have thinking behind it.* Plants' roots grow towards water. Plants *must be thinking*

that the roots need to go towards the water. So *plants must be thinking.*

I'd usually just have that gut feeling something was wrong. I mean, I know that plants don't think like we do. But he always seemed so certain, and it is true that plants' roots grow towards water. Now looking at it, though, I think I see what's wrong. He's not just saying something about plants. He's saying something about how all things grow. And what he says isn't true. I mean, I've grown in the past year. I'm growing "up" so getting taller. But it's not like I'm trying or thinking about that. It happens. Or the same argument would work for a tall animal like a giraffe. A giraffe grows tall, but I don't think it's thinking about growing tall. If it doesn't grow tall, it can't eat, but it's not like it's thinking that way. It grows because God grows it. I think the same thing is true with the plants. There is something going on. Probably something chemical. They respond to the water. Just like they respond to the sun—some plants follow the sun through the day. So that's a reaction, but not a thought.

Session 3 • Discussion (3 pts each)

1. My cereal isn't making a claim about all natural. I love chocolate cereal. But it does make some claims about health. The three claims I see are:
    1. "9 out of 10 kids prefer our chocolatey taste!"
    2. "Full of 10 essential vitamins and minerals!"
    3. "Free decoder ring inside!"

    I'm really only partly convinced by 1. The reason seems to be that if most kids like it, so would I. I mean, that's not always true, but I do think if lots of kids like it, I might. But I already like the cereal and would eat it if no one else did. Number 2 isn't convincing. I mean, come on. It's a chocolate cereal. I'm not eating it for health. But I'm guessing they may put that there for parents. "Look how healthy this is" as a reason to buy what the kid wants. Number 3 would have worked on me when I was younger, but I'm not interested. I think that the reason is that eating the cereal gets you something not related to the cereal at all. To a younger kid, this would probably seem reasonable. They already want to eat the cereal, so this is one more reason. I remember bugging my parents about cereal because of the prizes. They never found that reasonable, though.

    Here is my list of other places where I find arguments in my house: Cookies. I found little stickers on apples that were about how fresh they were. Book jackets. My toothbrush box. Toilet paper. Lightbulbs.

    My mom LOVES Jane Austen novels. I found one that had what seemed to be advertisements on the cover. There were two claims I found:

    "One of the most beloved classics of all time." This one is about how important the book is. I think that means that if something is important, you should read it. It seems like it's saying that to not read it is to miss out. And maybe to be ignorant of something important.

    "Jane Austen's most famous novel. Enjoyed by millions worldwide!" This one is similar. But instead of being about it being important (like something people study),

it's about it being popular . . . which is a way to be important. It's sort of saying that you don't want to miss out on what lots of other people are doing.

I'm not fully convinced. I know both of the claims are true. But just because a lot of people like it doesn't mean it's good. I mean, I find the first one maybe more convincing. Something being a classic means that people have thought it important enough to read and enjoy. That's what we talk about in class and why we read what we do. I know I'm supposed to like *Pride and Prejudice*, and maybe I will one day. So it doesn't convince me to read it on my own, but it is a reason that I know why we read it, and I can appreciate that.

My dad loves war novels. He's kind of a WW2 buff. I found one of his books that had "Now a major motion picture!" label on it.

This one is sort of strange. I think it's saying something like both the ones about *Pride and Prejudice*. It must be popular to be made into a movie. And maybe that it's important, too. But also it's sort of like you should want to read it before seeing the movie. Like you'll be ahead. Maybe like you'll know something other people don't.

If I don't think about it, this one is more convincing than *Pride and Prejudice*. Something being made into a movie must mean that it's interesting and exciting enough for people to want to watch the movie. And I want to go into the movie knowing something about why it's going to be good. But when I thought about it, this shouldn't be as convincing. There are lots of books made into movies, and lots of movies in general. Just because something is being made into a movie doesn't mean it's good. It just means it's popular and someone is trying to make money. Those aren't great reasons to read a book.

One of my aunts knows that I love soccer. She found this ball that is designed to curve when you kick it. The box says, "Learn the perfect kick to win the game!' There are lots of pictures of kids kicking the ball and lines showing how the ball curves in the air. And it's always a goal. I'm not convinced. Kicking a ball that's designed to curve isn't going to help me learn how to kick a real soccer ball so it curves. It will just teach me to believe that it doesn't matter how I kick the ball, that it will still curve like I need it to. That's the opposite of helping me become a better player.

2. It depends on what you mean by aliens. If alien is like a human on another planet, I don't believe in aliens. If you mean any other life in the universe, then I do. My reasons for believing in some alien life are:
    1. The cosmos is incredibly huge. It seems strange there would be so much without any other life.
    2. I don't think God would create so much without filling it somewhere with some other life. It seems like God wants to fill what didn't have life with life. That's a part of the pattern of creation. And it seems to be what he wants with the earth. So why not the rest of the universe?
    3. I don't believe in aliens like humans on another planet. God says there's something special about people in His image. If there are other human-like creatures

LOGIC IS THE ART AND SCIENCE of reasoning well. It focuses on finding and using good reasons for believing something's true. Studying logic is an invaluable part of learning to think well.

Logic 1 focuses on informal logic. This branch of logic deals with arguments as they appear in ordinary language. Students learn to assess and construct arguments that use inductive and abductive reasoning. First, though, they learn about the nature of truth and the justification of belief. *Logic 1* also covers common hurdles to sound thinking and reasonable inference. Chief among these hurdles are cognitive biases and informal fallacies.

Logic 1 aims to teach young adults how to think in better ways so that they may think better things. It offers them basic tools for cogent reasoning and clear communication. This book aims to teach students how to argue, but to do so with honesty and humility. Conversations today too often lack both careful thought and thoughtful care. This book strives to set a better course.

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