

Quadrivium I

Lesson Plans

Week 2: Procedures

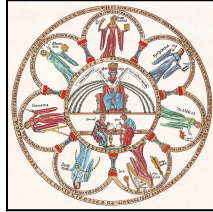
Overview: The purpose of the second week is that students use the compass and straightedge to complete some interesting geometric constructions.

Cultivated Virtue: *Prudence*. The virtue of *prudence* disposes the practical reason to discern in every circumstance one's true good and to choose the right means of achieving it. As St. Thomas Aquinas describes it, right reason in action (*recta ratio agibilium*). The procedures in this chapter provide the prudent path for the twelve geometric constructions we are studying this week. Students should contemplate the procedures as active uses of right reason. As students work through the exercises, it is worth considering alternate ways of completing each construction and wondering why Dr. Ulrickson selected the particular procedures presented in the text.

Assessment Preparation: Similar to last week, be prepared to excellently demonstrate excellent work on any of the given exercises.

Looking Ahead: Next week marks a dramatic shift, one that persists for the duration of the course (and into the Quadrivium II course). Instead of doing and making, the focus is on knowing and speaking, on given proofs. This might be quite new for you. It is good to take a peek at the next chapter and inspect the contents.

A Format Note: When presenting text from a given author, I will be adding my own thoughts and comments in [square brackets]. For example, [*from Magister: ...*].



Monday

We will be working through some of the exercises in class. Students are to complete each exercise in their journal for Day 1. (*Students may reduce the repetition from 3 to 1 if it takes them an inordinate amount of time: over an hour. However, they should be able to progress to all 3 repetitions by Friday.*)



Tuesday

- I. **Recitation/ Prayer:** Begin by reciting the “Rules of a Virtuous Classroom” and praying “A Prayer Before Study” of St. Thomas Aquinas
- II. **Reading Excerpt:** Carefully and critically read the following excerpt from Dr. Peter Ulrickson.

Another use of mathematics is less direct, less explicit. We hear that mathematics teaches us to think clearly, to think critically, to solve problems, to make arguments. On this account, the specific details of the mathematics we do are not as relevant; what matters is the intellectual muscle we gain along the way.

[from *Magister*: Dr. Ulrickson here gives advice to teachers, advice with which I wholeheartedly agree. You could even imagine that this response came from me. Notice the role of both prudence and docility (justice applied to a teacher) in his advice.] Here is one way to respond to the question about usefulness. “Wise people have often thought it good for students to spend time learning what we are now learning. I trust those people, and I hope you trust me. Let’s spend some time taking their advice seriously and attempt in good faith to complete this course of study. Perhaps, at the end, we’ll have an idea of why it is good.”

Ponder this excerpt as you complete your work. Be sure to jot down any interesting questions or thoughts you’d like to share during the next class meeting.

- III. **Exercises:** Take the time to do the simple things well. Do not rush, even if the tasks are simple.
 - o **Contemplatio:** contemplate the procedures as active uses of right reason (*recta ratio agibilium*)
 - o Complete all exercises in the class journal. Remember this journal will be reviewed each week.
 - o Try to complete all three repetitions. If it is taking too much time (more than an hour), work up to getting all three repetitions of each exercise in by Friday.)
- IV. **Problem:** If time permits, consider working on the problem described on the last page.
- V. **Close in Prayer:** As with all things, conclude with gratitude in prayer.

Wednesday

- I. **Recitation/ Prayer:** Begin by reciting the “Rules of a Virtuous Classroom” and praying “A Prayer Before Study” of St. Thomas Aquinas
- II. **Reading Excerpt:** Carefully and critically read the following excerpt from Dr. Peter Ulrickson.

The tasks that students complete throughout the book are labeled as “Exercises” and not “Problems.” This use of language is deliberate. When we encounter a problem, the point is to solve it, using whatever is at hand. Do I need to get over a wall? I might use a rope, a ladder, or a friend. An exercise, on the other hand, is more determinate. The point is not just to arrive at the end state, but to complete the whole motion. After one repetition of a back squat or bench press, the weight is right back where it started. No change occurs in the external state of things. The change occurs in the person who performs the exercise.

Ponder this excerpt as you complete your work. Be sure to jot down any interesting questions or thoughts you’d like to share during the next class meeting.

Daily plan for Wednesday continued on the next page.

Wednesday (continued)

- III. **Exercises:** Take the time to do the simple things well. Do not rush, even if the tasks are simple.
- **Contemplatio:** contemplate the procedures as active uses of right reason (*recta ratio agibilium*)
 - Complete all exercises in the class journal. Remember this journal will be reviewed each week.
 - Try to complete all three repetitions. If it is taking too much time (more than an hour), work up to getting all three repetitions of each exercise in by Friday.)
- IV. **Problem:** If time permits, consider working on the problem described on the last page.
- V. **Close in Prayer:** As with all things, conclude with gratitude in prayer.
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Thursday

- I. **Recitation/ Prayer:** Begin by reciting the “Rules of a Virtuous Classroom” and praying “A Prayer Before Study” of St. Thomas Aquinas
- II. **Reading Excerpt:** Carefully and critically read the following excerpt from Dr. Peter Ulrickson.

To study *A Brief Quadrivium* in its entirety is a challenging task, one that will take some time. Things that take a long time require us to be patient. It is good to know in advance some of the points requiring patience. [from *Magister*: We will look at just the second one this week.]

- Practicing the actions.
- **Going from actions to explanations.**
- Understanding the statement given.
- Understanding the proof of a statement.
- Understanding how the various statements form a single, structured body of thought.
- Understanding how the various disciplines—geometry, arithmetic, music, astronomy—themselves amount to one single thing, one way composed of four ways.

Going from actions to explanations: After a couple of weeks of instrumental work, we will make a dramatic shift. Our goal will be not to make but to explain. Doing this is a dramatic advance in human thought. It means that we are concerned not only with what is useful, with what works. Instead, we strive to grasp *what is* and to give a comprehensible account of it in our own words. This is a different sort of mathematical activity than making and computing. Adopting the new perspective demands patience.

Ponder this excerpt as you complete your work. Be sure to jot down any interesting questions or thoughts you’d like to share during the next class meeting.

- III. **Exercises:** Take the time to do the simple things well. Do not rush, even if the tasks are simple.
- **Contemplatio:** contemplate the procedures as active uses of right reason (*recta ratio agibilium*)
 - Complete all exercises in the class journal. Remember this journal will be reviewed each week.
 - Try to complete all three repetitions. If it is taking too much time (more than an hour), work up to getting all three repetitions of each exercise in by Friday.)
- IV. **Assessment Prep:** Review the assessment preparation on the first page. What do you need to do before Monday to prepare to excellently demonstrate excellent work? What are you willing to do?
- V. **Problem:** If time permits, consider working on the problem described on the last page.
- VI. **Close in Prayer:** As with all things, conclude with gratitude in prayer.

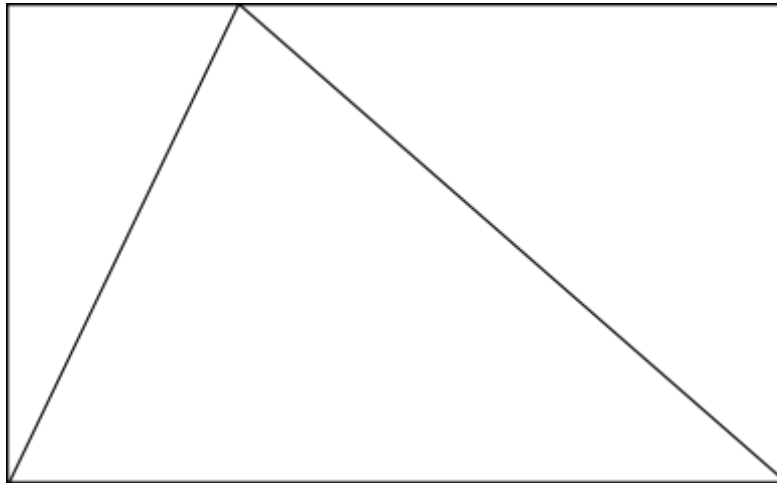
Friday

- I. **Recitation/ Prayer:** Begin by reciting the “Rules of a Virtuous Classroom” and praying “A Prayer Before Study” of St. Thomas Aquinas
 - II. **Exercises:** Take the time to do the simple things well. Do not rush, even if the tasks are simple.
 - **Contemplatio:** contemplate the procedures as active uses of right reason (*recta ratio agibilium*)
 - Complete all exercises in the class journal. Remember this journal will be reviewed each week.
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Week 2 Problem

from Paul Lockhart's Measurement.

Imagine a rectangular box built around a triangle. It turns out the area of the triangle is always half that of the rectangle. Do you see why? [*from Magister*: Try imagining you fold the rectangle along the sides of the triangle. Or even better, trace out the image below. Cut it out. Then, actually fold and cut along the sides. Play with the pieces to see how they fit back into the original triangle. What do you notice?]



Why does a triangle take up exactly half of its box?

What happens to the area of the triangle as we slide the tip horizontally? What if it goes past the sides of the box?