

Thinking Through a Lesson Protocol (TTLP)

The main purpose of the *Thinking Through a Lesson Protocol* is to prompt you in thinking deeply about a specific lesson that you will be teaching based on a cognitively challenging, worthwhile mathematical task.

Part 1: Selecting and Setting up a Mathematical Task

- ✓ What are your mathematical goals for the lesson (i.e., what do you want students to know and understand about mathematics as a result of this lesson)?
- ✓ In what ways does the task build on students' previous knowledge, life experiences, and culture? What definitions, concepts, or ideas do students need to know in order to begin to work on the task? What questions will you ask to help students access their prior knowledge and relevant life and cultural experiences?
- ✓ What are all the ways the task can be solved?
 - Which of these methods do you think your students will use?
 - What misconceptions might students have?
 - What errors might students make?
- ✓ What particular challenges might the task present to struggling students or students who are English Language Learners (ELL)? How will you address these challenges?
- ✓ What are your expectations for students as they work on and complete this task?
 - What resources or tools will students have to use in their work that will give them entry into, and help them reason through, the task?
 - How will the students work—independently, in small groups, or in pairs—to explore this task? How long will they work individually or in small groups or pairs? Will students be partnered in a specific way? If so in what way?
 - How will students record and report their work?
- ✓ How will you introduce students to the activity so as to provide access to *all* students while maintaining the cognitive demands of the task? How will you ensure that students understand the context of the problem? What will you hear that lets you know students understand what the task is asking them to do?

Part 2: Supporting Students' Exploration of the Task

- ✓ As students are working independently or in small groups, what questions will you ask to—
 - help a group get started or make progress on the task?
 - focus students' thinking on the key mathematical ideas in the task?
 - assess students' understanding of the key mathematical ideas, problem-solving strategies, or the representations?
 - advance students' understanding of the mathematical ideas?
 - encourage *all* students to share their thinking with others or to assess their understanding of their peer's ideas?
- ✓ How will you ensure that students remain engaged in the task?
 - What assistance will you give or what questions will you ask a student (or group) who becomes quickly frustrated and requests more direction and guidance in solving the task?

- What will you do if a student (or group) finishes the task almost immediately? How will you extend the task so as to provide additional challenge?
- What will you do if a student (or group) focus on non-mathematical aspects of the activity (e.g., spends most of his or her (their) time making a poster of their work)?

Part 3: Sharing and Discussing the Task

- ✓ How will you orchestrate the class discussion so that you accomplish your mathematical goals?
 - Which solution paths do you want to have shared during the class discussion? In what order will the solutions be presented? Why?
 - In what ways will the order in which solutions are presented help develop students' understanding of the mathematical ideas that are the focus of your lesson?
 - What specific questions will you ask so that students will—
 1. make sense of the mathematical ideas that you want them to learn?
 2. expand on, debate, and question the solutions being shared?
 3. make connections between the different strategies that are presented?
 4. look for patterns?
 5. begin to form generalizations?

- ✓ How will you ensure that, over time, each student has the opportunity to share his or her thinking and reasoning with peers?

- ✓ What will you see or hear that lets you know that *all* students in the class understand the mathematical ideas that you intended for them to learn?

- ✓ What will you do tomorrow that will build on this lesson?

The Thinking Through a Lesson Protocol was developed through the collaborative efforts (lead by Margaret Smith, Victoria Bill and Elizabeth Hughes) of the mathematics team at the Institute for Learning and faculty and students in the School of Education at the University of Pittsburgh.

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