The purpose of the *Thinking Through a Lesson Protocol* is to prompt thinking deeply about a specific lesson to be taught that is based on a cognitively challenging mathematical task.

It is suggested that using the following questions may serve as a guide for the teacher in the preparation of a lesson. The Concept Lessons are designed according to this 3 part format:

• **Part 1: Selecting and Setting up a Mathematical Task**
• **Part 2: Supporting Students’ Exploration of the Task**
• **Part 3: Sharing and Discussing the Task**

**TTLP in Depth**

**Part 1: Selecting and Setting up a Mathematical Task**

• What are the mathematical objectives for the lesson? What is it that the students should know and understand about mathematics as a result of this lesson?
• In what ways does the task build on students’ previous knowledge? What definitions, concepts, or ideas do students need to know in order to begin to work on the task?
• What are all the ways the task can be solved?
  o Which of these methods will your students use?
  o What misconceptions might students have?
  o What errors might students make?
• What are the expectations for students as they work on and complete this task?
  o What resources or tools will students have to use in their work?
  o How will the students work – independently, in small groups, or in pairs – to explore this task? How long will the work individually or in small groups/pairs? Will students be partnered in a specific way? If so, in what way?
  o How will students record and report their work?
• How will students be introduced to the activity so as not to reduce the demands of the task? What will be heard that indicates that the students understood the task?

**Part 2: Supporting Students’ Exploration of the Task**

• As students are working independently or in small groups:
  o What questions will be asked to focus students’ thinking?
  o What will be seen or heard that indicates that the students are thinking about the mathematical ideas?
  o What questions will be asked to assess students’ understanding of key mathematics ideas, problem solving, or representations?
  o What questions will be asked to advance students’ understanding of the mathematics ideas?
  o What questions will be asked to encourage students to share their thinking with others or to assess their understanding of their peer’s ideas?
• How will students remain engaged in the task?
  o What will be done if a student does not know how to begin to solve a task?
**THINKING THROUGH THE LESSON PROTOCOL (TTLP)**

- What will be done if a student finishes the task almost immediately and becomes bored or disruptive?
- What will be done if students focus on non-mathematical aspects of the activity? What if student’s focus on a project is making colorful drawings or downloading pictures from the internet and the mathematics is not addressed?

**Part 3: Sharing and Discussing the Task**
- How will the class discussion be orchestrated so that the mathematical objectives are accomplished? Specifically:
  - Which solution paths will be shared during 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 the lesson?
  - What specific questions will be asked so that students will:
    - Make sense of the mathematical ideas that need to be learned?
    - Expand on, debate, and question the solutions being shared?
    - Make connections between the different strategies that are presented?
    - Look for patterns?
    - Begin to form generalizations?
- What will be seen or heard that indicates that the students understand the mathematical ideas taught?
  - What will be done tomorrow to build on this lesson?

**REFERENCES**


<table>
<thead>
<tr>
<th>ACADEMIC RIGOR IN A THINKING CURRICULUM</th>
<th>Principles of Learning: Accountable Talk</th>
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<tbody>
<tr>
<td>Commitment to a Knowledge Core</td>
<td>Accountability to the Learning Community</td>
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<tr>
<td>• There is an articulated curriculum in each subject that avoids needless repetition and progressively deepens understanding of core concepts.</td>
<td>• Active participation in classroom talk.</td>
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<td>• The curriculum and instruction are clearly organized around major concepts specified in the standards.</td>
<td>• Listen attentively.</td>
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<td>• Teaching and assessment focus on students’ mastery of core concepts.</td>
<td>• Elaborate and build on each other’s ideas.</td>
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<td>High-thinking Demand</td>
<td>• Work to clarify or expand a proposition.</td>
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<td>• In every subject students are regularly expected to raise questions, to solve problems, to think, and to reason.</td>
<td>Accountability to Knowledge</td>
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<tr>
<td>• Students are doing challenging, high-level assignments in every subject.</td>
<td>• Specific and accurate knowledge.</td>
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<td>• Assignments in each subject include extended projects in which original work and revision to standards is expected.</td>
<td>• Appropriate evidence for claims and arguments.</td>
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<tr>
<td>• Students are challenged to construct explanations and to justify arguments in each subject.</td>
<td>• Commitment to getting it right.</td>
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<td>• Instruction is organized to support reflection on learning processes and strategies.</td>
<td>Accountability to Rigorous Thinking</td>
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<td>Active Use of Knowledge</td>
<td>• Synthesize several sources of information.</td>
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<tr>
<td>• Each subject includes assignments that require students to synthesize several sources of information.</td>
<td>• Construct explanations and test understanding of concepts.</td>
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<tr>
<td>• Students in each subject are challenged to construct explanations and to test their understanding of concepts by applying them and discussing them.</td>
<td>• Formulate conjectures and hypotheses.</td>
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<td>• Students’ prior knowledge and out-of-school knowledge is used regularly in the teaching and learning process.</td>
<td>• Employ generally accepted standards of reasoning.</td>
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<tr>
<td>• Instructional tasks and classroom discourse require students to interpret texts and construct solutions.</td>
<td>• Challenge the quality of evidence and reasoning.</td>
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