This acknowledges that the reasoning, revising, and connecting of ideas that occurs both during and after students' productive engagement in problem solving is far more valuable in furthering their understanding of mathematics than simply obtaining correct answers (Lambdin, 2003; Lester & Cai, 2016) and allows us to recognize **learning through problem solving** as a strategy that promotes making sense of new concepts or relationships within mathematics.

One way to guide students to learn through problem solving is to use the **Think–Share–Compare** (TSC) instructional routine. Research suggests that the regular and productive implementation of TSC can significantly increase student success with deep learning in mathematics within the PS-I (problem solving followed by instruction) structure. One possible model (among many variations) for using TSC is shown in Figure 2.

When using TSC, the learning sequence should begin with something that intentionally triggers students' prior knowledge and generates curiosity about a problem[1] that students can understand but cannot quickly resolve. The problem may be found within prepared curriculum materials, though it is also possible for teachers to create problems themselves (and even better to do so collaboratively with students). The characteristics of a productive problem include a) requiring knowledge just beyond what students possess, b) allowing multiple solution pathways without an immediately obvious solution, and c) compelling student thinking about one or two specific mathematical features (e.g., concepts, relationships, properties, representations).

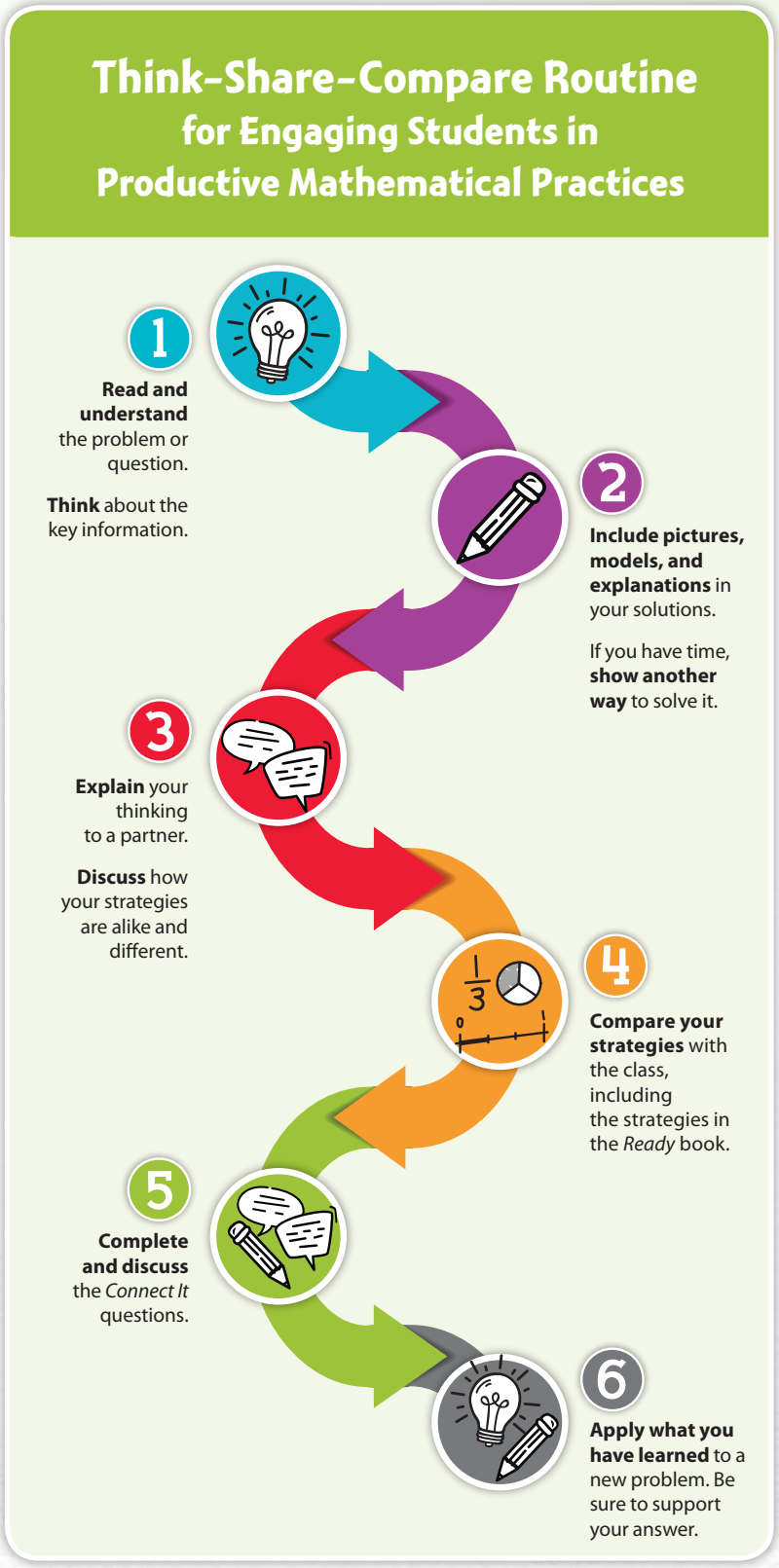
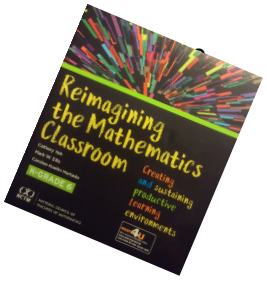


Figure 2: A Model for Using the TSC Routine

[1] The term "problem" as used here is intended to be taken as synonymous with task and scenario, two terms also used within mathematics education to denote items that are used as vehicles for learning and not merely practice.



Profundity of a Task

- Focuses on **deep, meaningful mathematical content**
- **Promotes connections** to prior learning and recognition of new mathematical relationships
- **Provokes cognitive demand** that engages students in reasoning, sense-making, and problem solving

Elasticity of a Task

- Allows **multiple pathways** for entry, exploration, and/or exit
- Invites **multiple forms of representation**
- Supports the **same learning goals for all students**

Relevancy of a Task

- Activates students' **prior knowledge and lived experiences**
- Feels **familiar and authentic** to students
- Intentionally provides **cognitive "hooks"** that support learning with coherence and connection