

# Learning Opportunities

The Carnegie Math Pathways curriculum and pedagogy employ three “learning opportunities” embedded in the instructional design—productive struggle, explicit connections to concepts, and deliberate practice. They are interconnected and not necessarily exclusive of each other.

## Productive Struggle

The goals of productive struggle are:

- To engage students in challenging and substantive mathematical tasks to engage their thinking about important mathematics concepts.
- To support students to explore tasks in order to develop strategies and their own thinking about the use of mathematics to investigate a problem situation or question.
- For students to make meaning of mathematical content for themselves.

Tasks that promote productive struggle:

- Should ideally be compelling to students.
- Employ contexts that genuinely motivate students to search for an answer(s).
- Could be somewhat complex and novel, and slightly beyond immediate comprehension by the students in order to stretch or provoke student thinking.

## Explicit Connections

The goals of explicit connections are:

- To make explicit the relationships among and between mathematical facts, procedures, and concepts, as well as the contexts in which the mathematics is engaged
- To allow students to place the new idea in relation to what they already know thereby making more robust current understandings and laying the foundation for future learning
- To both provide students with opportunities to make those connections themselves, in interactions with their peers, and with the guidance of their instructor

Tasks that promote explicit connections:

- Address important mathematical and disciplinary content
- “End” with important mathematical/disciplinary takeaways that can be clearly drawn from the students thinking on the task

## Deliberate Practice

The goals of deliberate practice are:

- To provide students with tasks that are designed and sequenced to overcome gaps in understanding, apply what has been learned, and/or deepen fluency with key concepts.
- To select and implement tasks over time to build greater conceptual understanding, as opposed to rote drill or repetition.
- To support students to apply what is learned to new situations and to build learning through practice with scenarios that differ slightly and purposefully from those experienced previously.