

Framework for Formative Assessment Across the Instructional Sequence of CMP

Formative assessment is the very essence of teaching. This framework highlights how formative assessment is ongoing in *Connected Mathematics* during planning, teaching, and reflecting. This view of formative assessment extends beyond traditional paper and pencil formative tasks, such as check-ins, warm-ups, or exit cards, in that it also includes on-going assessment as part of the enactment of a lesson. Teachers engage in three components of formative assessment, supported by current research and best practices in mathematics education: (a) **anticipate** student thinking, (b) **gather and analyze evidence** of student learning, and (c) **adapt their teaching** to meet students' needs and to help students develop their own reflective habits of mind. These three components of formative assessment are an integral part of the instructional model of the Launch – Explore – Summarize phases of CMP's curriculum, *Connected Mathematics*. These components occur both as a daily and periodic practice.

Components of Formative Assessment Across the Instructional Sequence

Anticipating Student Thinking: During planning, the teacher uses the mathematical goal, the mathematical challenge embedded in the problem context, and the needs of their students to develop the lesson. The teacher goes into the classroom with an anticipation of how students will engage with the problem, what strategies might emerge; what topics might be challenging; what scaffolding might be provided; what evidence might show students' understandings; and how students can support one another during group work. Anticipating student strategies and difficulties requires the teacher to be open to new approaches to the mathematics that students may explore.

Gathering and Analyzing Evidence: During the enactment of the lesson, the teacher monitors student engagement and understanding. The teacher approaches the lesson with some anticipation of students' progress toward the mathematical goal of the lesson and then gathers evidence to make decisions about students' actual progress. A teacher carefully listens, taking an observer role, quietly watching students' interactions with each other and with the mathematics. Other times, the teacher asks questions to learn more about what students are thinking and then guides students' thinking toward the mathematical goal, using appropriate representations/notations.

Adapting Based on Student Thinking: During the enactment of the lesson, the teacher uses the mathematical goal and the data gathered about students' understanding to make necessary adjustments such as providing more time on certain topics during the lesson; assisting struggling students to connect their emerging understanding to prior knowledge; or providing more challenging questions as needed. The teacher uses the data to adjust parts of the current lesson or in forthcoming lessons.

A Framework for Formative Assessment Across the Instructional Sequence of CMP

	Anticipating Student Thinking <i>Setting up a Plan</i>	Gathering and Analyzing Evidence <i>Making Sense of What Students Know</i>	Adapting Based on Student Thinking <i>Acting on the Evidence</i>
Launch	<p>Using the mathematical goal, anticipate</p> <p><i>Connecting to Prior Knowledge</i></p> <ul style="list-style-type: none"> Students' familiarity with the Problem context Connections students can make between prior experiences and current task Connections to prior mathematical understandings Struggles students may encounter with the context or embedded mathematics Questions to reveal potential struggles <p><i>Presenting the Challenge</i></p> <ul style="list-style-type: none"> Ways to engage students in the Problem Strategies to maintain the challenge 	<p>Using the mathematical goal and your plan,</p> <ul style="list-style-type: none"> Observe student strategies Solicit feedback from students using a variety of ways Make sense of students' initial thinking about the new situation and how it connects to prior experiences Access additional resources for assessing students, if needed Gain a general idea of student thinking based on enactment of the Launch 	<p>Using the mathematical goal and the emerging evidence from the launch</p> <p><i>Connecting to Prior Knowledge</i></p> <ul style="list-style-type: none"> Use ideas gained about student understanding to tailor the amount of information or feedback provided for students Decide which questions /struggles should be addressed now or could be postpone because it will be discussed in a future lesson <p><i>Presenting the Challenge</i></p> <ul style="list-style-type: none"> Use responses and evidence from students to adapt the Problem based on the class and individual student needs Spend more or less time on the Launch depending on students' readiness Encourage students to question each other for clarification, etc. Be explicit about the learning goal Engage the students in the challenge
Explore	<p>Using the mathematical goal and the anticipated information from the Launch, plan</p> <p><i>Providing for Individual Needs</i></p> <ul style="list-style-type: none"> Appropriate questions to accommodate students' emerging understandings. Strategies for helping struggling students connect to prior knowledge Appropriate feedback as needed to accommodate both struggling and accelerated students Strategies to support student interactions Prompts to promote students sharing and challenging each others' thinking. Group arrangements and the materials needed 	<p>Using the mathematical goal, your plans, and the evidence from the launch,</p> <ul style="list-style-type: none"> Use evidence from launch to monitor students' struggles and understandings Gather evidence related to students progress toward understanding the goal Question students on their thinking Note the level of participation of each student Observe student interactions with each other Listen carefully to what students are saying. 	<p>Using the mathematical goal and the emerging evidence from the Explore,</p> <p><i>Providing for Individual Needs</i></p> <ul style="list-style-type: none"> Provide opportunities for students to spend more or less time on certain questions, topics, or Problems Encourage students to monitor their progress toward the mathematical goal of the lesson Encourage students to share thinking with each other and strategies to expand their understandings Increase the demand of the questions by extending student thinking <p><i>Planning for the Summarize</i></p> <ul style="list-style-type: none"> Prepare discussion topics and questions for the summary

	<p><i>Planning for the Summarize</i></p> <ul style="list-style-type: none"> • Methods to use student strategies, both anticipated and unanticipated, in the summary • Alternative plans to use if anticipated strategies did not surface and promote the mathematical goals 		<p>based on information gathered from students</p> <ul style="list-style-type: none"> • Decide which strategies will be discussed and in what order and the purpose for each • Anticipate what understandings you want to surface during the summarize and struggles that need to be addressed • Plan strategies to surface the understandings and to address students' struggles
<p>Summarize</p>	<p>Using the mathematical goal and anticipated information from the Launch and Explore, plan strategies to</p> <p><i>Orchestrating a Discussion</i></p> <ul style="list-style-type: none"> • Sequence student thinking that will promote the mathematical goal • Make connections that occur across and among strategies and mathematical ideas • Connect students new understandings to prior understandings • Gather the status of students' understanding <p><i>Reflecting on Student Learning</i></p> <ul style="list-style-type: none"> • Decide what evidence is needed that shows students have understood the mathematical goal of the lesson 	<p>Using the mathematical goal, your plans, and the evidence from the Explore,</p> <ul style="list-style-type: none"> • Encourage students to share their thinking and solution strategies that they used to make sense of the Problem • Challenge students to justify their solution strategies • Promote students to question and make sense of other ideas • Determine how individual students are making sense of the mathematics and progress toward the mathematical goals 	<p>Using the mathematical goal and the emerging evidence from the Summarize</p> <p><i>Orchestrating a Discussion</i></p> <ul style="list-style-type: none"> • Question students or provide additional tasks to check for understanding • Challenge students to make connections between their strategies and thinking • Encourage students to question each other and to summarize other students' thinking • Use student thinking to draw conclusions about the mathematical understandings • Insert methods to surface important strategies and representations that did not surface during the explore or summarize • Make decisions about pacing • Determine which students may need additional support moving forward • Promote students' self awareness of their learning progress • Connect the Problem to past and future Problems and Investigations <p><i>Reflecting on Student Learning</i></p> <ul style="list-style-type: none"> • What evidence is there that students understand the goal(s) of the lesson? • Where did they struggle? • What strategies did they use? • What level of abstraction did each student obtain? • How will the outcomes of the student discussion inform my plans for tomorrow? Or the next time I teach this lesson? • Where will these ideas be reinforced in the remainder of the unit? The next Unit?