



Mathematics Coaching Cycle

Not Just a 3-Part Series

Burlington: October 7, November 4, December 16

London: October 13, October 30, December 16

Ottawa: October 16, November 2, November 20

Sudbury: October 22, November 12, December 3

Big Ideas in Patterns & Algebra

Proposed by Dr. Marian Small

Pattern

1. Patterns represent identified regularities. There is always an element of repetition that must be described for the pattern to be extended.
2. Many ideas in other strands of mathematics are simplified by using patterns.

Algebra

3. Algebraic reasoning is a process of describing and analyzing generalized mathematical relationships and change using words and symbols.

Pattern and algebra

4. Different representations of relationships (e.g. numeric, graphic, geometric, algebraic, verbal, concrete/pictorial) or patterns highlight different characteristics or behaviours and can serve different purposes.
5. Comparing mathematical relationships or patterns helps us see that there are classes of relationships or patterns and provides insight into each member of the class.
6. Limited information about a mathematical pattern or relationship can sometimes, but not always, allow us to predict other information about that relationship.

Series Learning Goals

Teachers [Strands A and B]	System-level Leaders, Coaches [Strand C]
Participants leave knowing:	
<ul style="list-style-type: none"> <input type="checkbox"/> Big Ideas for Algebra <input type="checkbox"/> the math coaching cycle professional learning series is focused on some of the aspects of co-planning, co-teaching, and co-debriefing <input type="checkbox"/> they will have opportunities to participate in additional related activities between sessions <input type="checkbox"/> there are hundreds of teachers and facilitators in the province working on the same things as they are in this series with whom they could connect. <input type="checkbox"/> the Coaching for Math GAINS Survey Monkey results validate approaches used in 2008-09 and adjustments in 2009-10 about successes that have been achieved by others who have participated in such projects <input type="checkbox"/> they have a role in implementing the many important elements interwoven in co-planning, co-teaching, and co-debriefing 	

Series Learning Goals

Teachers [Strands A and B]	System-level Leaders, Coaches [Strand C]
<p>Participants leave believing that:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Using open and parallel questions is a powerful approach to teaching because those strategies can: <ul style="list-style-type: none"> <input type="checkbox"/> differentiate instruction <input type="checkbox"/> engage more students <input type="checkbox"/> expose students' thinking and content knowledge needs <input type="checkbox"/> build student confidence, independence, mathematical habits of mind <input type="checkbox"/> focus the teaching, learning and assessment on Big Ideas <input type="checkbox"/> work in all grades and subjects <input type="checkbox"/> support pro-active classroom management <input type="checkbox"/> be implemented relatively quickly by all teachers. <input type="checkbox"/> you need to adjust whatever resource you are using to personalize it to your ways of thinking/being and to your class profile. <input type="checkbox"/> many existing resources could be used as a starting point to develop open and parallel questions. <input type="checkbox"/> the best teachers in the province have been coached and mentored. They weren't necessarily self-taught. <input type="checkbox"/> all students can learn mathematics, given enough time and support. <input type="checkbox"/> when planning instruction, you have to think about both the math and the students you are teaching. <input type="checkbox"/> working with a colleague is a valuable way to practise planning, teaching, and reflecting. <input type="checkbox"/> there is no one "best" way to do anything. <input type="checkbox"/> students need opportunities to learn in a safe, risk-free environment. 	<p>Participants leave believing that:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Open and parallel questions in professional learning settings can: <ul style="list-style-type: none"> <input type="checkbox"/> differentiate teacher professional learning <input type="checkbox"/> engage more teachers <input type="checkbox"/> expose teachers' content knowledge needs <input type="checkbox"/> build teacher confidence, independence, mathematical habits of mind <input type="checkbox"/> focus professional learning on Big Ideas <input type="checkbox"/> work with teachers of all grades and subjects <input type="checkbox"/> support cross-panel and cross-grade professional learning <input type="checkbox"/> be implemented with ease within existing professional learning models, e.g. TLCP-like process <input type="checkbox"/> you need to adjust professional development materials you are using to personalize it to your ways of thinking/being and to your participants' profile. <input type="checkbox"/> resources shared by colleagues could be used as a starting point to develop professional learning sessions on questioning. <input type="checkbox"/> the best facilitators in the province have been coached and mentored. They weren't necessarily self-taught. <input type="checkbox"/> all teachers can learn to teach mathematics effectively, given enough time and support. <input type="checkbox"/> when planning professional learning, you have to think both about the math and the teachers with whom you are working. <input type="checkbox"/> working with a colleague is a valuable way to practise planning, facilitating, and reflecting. <input type="checkbox"/> there is no one "best" way to do anything. <input type="checkbox"/> teachers need opportunities to practise new knowledge and skills in a safe, risk-free environment.

Teachers [Strands A and B]	System-level Leaders, Coaches [Strand C]
<p>Participants practice the following in safe environments:</p> <ul style="list-style-type: none"> <input type="checkbox"/> use of explicit classroom and professional learning protocols <input type="checkbox"/> creating lesson goals that focus on big ideas of algebra <input type="checkbox"/> posing open and parallel questions to evoke and expose thinking in each of the three parts of the lesson <input type="checkbox"/> planning appropriate, scaffolding questions by anticipating student responses <input type="checkbox"/> using conversation stems (generic and specific) with students <input type="checkbox"/> grounding their instruction and assessment with a focus on questioning to their School Improvement Plans and personal SMART goals 	<p>Participants practice the following in safe environments:</p> <ul style="list-style-type: none"> <input type="checkbox"/> use of explicit professional learning protocols <input type="checkbox"/> responding to lesson goals focused on the Big Ideas of Algebra as they apply to different grade bands <input type="checkbox"/> provide feedback on questions created by participants in strands A, B, and C <input type="checkbox"/> planning appropriate interactions with teachers at various stages of comfort with creating open and parallel questions and/or Big Idea <input type="checkbox"/> using conversation stems (generic and specific) with teachers <input type="checkbox"/> grounding their coaching work with a focus on questioning on their Board Improvement Plans and provincial framework

Agenda

Schedule of Events – Session 1 of 3		
8:30 am - 9:30 am	Continental Breakfast	
9:30 am - 12:30 pm	Welcome	Plenary (board teams)
	Overview of Mathematics Coaching Cycle: <i>Not just a 3-part series</i>	
	Getting ready to pose powerful questions <ul style="list-style-type: none"> • Big Ideas of Algebra • Lesson Goals • Open and Parallel and Other Types of Questions 	
12:30 pm - 1:15 pm	Lunch	
1:15 pm – 1:45 pm	Sharpen the focus on, and connection between, Consolidation Questions and Lesson Goals	
1:45 pm – 1:50 pm	Move to breakout rooms	
1:50 pm – 3:00 pm	A/B: Practice developing lesson goals and consolidation questions C: Practice providing feedback on lesson goals and consolidation questions	Breakout A/B (program/course groups) Breakout C (board representatives separated)
3:00 pm – 3:20 pm	Break and move to plenary	
3:20 pm – 4:00 pm	Provide and receive feedback on sample lesson goals and consolidation questions	Plenary (board teams)
	Share draft classroom and professional learning protocol supports to inform between session activities	
	Between session commitments	

Schedule of Events – Session 2 of 3		
8:30 am - 9:30 am	Continental Breakfast	
9:30 am – 12:30 pm	Welcome back	Plenary (board teams)
	Four Corners Activity: “View and Discuss”	
	Posing Powerful Questions: <ul style="list-style-type: none"> • Parallel and Open Questions • Three-part lesson structure and corresponding types of questions • MATCH template 	
12:30 pm – 1:15 pm	Lunch and move to breakout rooms	
1:15 pm – 1:45 pm	Posing Powerful Questions: <ul style="list-style-type: none"> • Parallel and Open Questions (continued) • Resources available 	Plenary (board teams)
1:45 pm – 1:50 pm	Move to breakout rooms	
1:50 pm – 3:00 pm	A/B: Practise posing questions in the three parts of a lesson using Session 1 template C: Create questions and practise providing feedback to question-posing	Breakout A/B (program/course groups) Breakout C (board representatives separated)
3:00 pm – 3:20 pm	Break and move to plenary	
3:20 pm – 4:00 pm	Provide and receive feedback on Posing Powerful Questions	Plenary (board teams)
	Between session commitments	

Agenda









Schedule of Events – Session 3 of 3		
8:30 am - 9:30 am	Continental Breakfast	
9:30 am – 12:30 pm	Welcome back	Plenary (board teams)
	Feedback, appropriate scaffolding/probing	
	Assessment	
12:30 pm – 1:15 pm	Lunch	
1:15 pm – 1:45 pm	Assessment (continued)	Plenary (board teams)
1:45 pm – 1:50 pm	Move to breakout rooms	
1:50 pm – 3:00 pm	A/B: Practice responding to anticipated responses. Practice grounding approaches in data by exploring meta think focused on classroom data C: Practice developing and responding to samples of scaffolding/probing. Practice grounding approaches in data by exploring meta think focused on system data.	Breakout A/B (program/course groups) Breakout C (board representatives separated)
3:00 pm – 3:20 pm	Break and Move to plenary	
3:20 pm – 4:00 pm	Forward planning	Plenary (board teams)
	Post series commitments	

TIPS 2.0 Lesson or Session Planning Template

Unit #: Day #: (Title)

Grade

Unit #: Day #: (Title)	Grade		
<p>Time Bar: Indicate the timing for each section.</p>	<p>Math Learning Goals</p> <ul style="list-style-type: none"> • Two or three math learning goals for this lesson. • • 		
<p>Minds On...</p>	<p>Identify Grouping → Strategy Get students mentally engaged in the first minutes of the class and establish a positive classroom climate, making every minute of the math class count for every student.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><i>Connect to careers</i></p> <p><i>Connect to other strands</i></p> <p><i>Connect to previous lesson</i></p> <p><i>Connect to student interest</i></p> <p><i>Orient students to an activity</i></p> <p><i>Orient students to materials</i></p> </td> <td style="width: 50%; vertical-align: top;"> <p><i>Develop interpersonal skills</i></p> <p><i>Develop learning skills</i></p> <p><i>Introduce a problem</i></p> <p><i>Do a motivating activity</i></p> <p><i>Pose a question</i></p> <p><i>Reflect on prior learning</i></p> <p><i>Connect to previous group of lessons</i></p> </td> </tr> </table>	<p><i>Connect to careers</i></p> <p><i>Connect to other strands</i></p> <p><i>Connect to previous lesson</i></p> <p><i>Connect to student interest</i></p> <p><i>Orient students to an activity</i></p> <p><i>Orient students to materials</i></p>	<p><i>Develop interpersonal skills</i></p> <p><i>Develop learning skills</i></p> <p><i>Introduce a problem</i></p> <p><i>Do a motivating activity</i></p> <p><i>Pose a question</i></p> <p><i>Reflect on prior learning</i></p> <p><i>Connect to previous group of lessons</i></p>
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<p>Action!</p>	<p>Identify Grouping → Strategy Students do mathematics: fearless talking and listening, reflecting, discussing, observing, investigating, representing, reasoning, selecting tools and computational strategies, developing understanding, valuing mathematics, constructing concepts, demonstrating concepts, applying concepts, discovering relationships, exploring, hypothesizing, building algorithmic skills, etc.</p> <p>Teachers plan appropriate student groupings and strategies, pose questions to expose thinking, listen carefully, observe, offer prompts when necessary, respond to provide appropriate scaffolding and challenge, etc.</p> <p>NOTE: Icons in sidebar (e.g. ) can be copied into your TIPS 2.0 template.</p>		
<p>Consolidate Debrief</p>	<p>Identify Grouping → Strategy “Pull out the math,” check for conceptual understanding, and prepare students for the follow-up activity or the next lesson. Often this involves whole class discussion and sharing. Students listen to and contribute to reflections on alternate approaches, different solutions, extensions, and connections.</p> <p>Note: Students should be well prepared to do mathematics individually after the three-part lesson.</p> <p> Explicitly identify planned differentiation of content, process, or product based on readiness, interest, or learning preference in order to work in zone of proximal development; save time; give students choice, ... Provide hyperlinks to:</p> <ul style="list-style-type: none"> • Rationale/research  • Video  • Lesson artefacts  • Professional dialogue  		
<p><Choose relevant label(s)> <i>Application</i> <i>Concept</i> <i>Practice</i> <i>Differentiated</i> <i>Exploration</i> <i>Reflection</i> <i>Skill Drill</i></p>	<p>Home Activity or Further Classroom Consolidation Provide meaningful and appropriate follow-up. Choose activities that consolidate understanding, build confidence in doing mathematics independently, help parents see the types of math activities students engage in during class and see connections between the mathematics being taught and life beyond the classroom. Give students some choice through differentiated activities.</p>		
	<p>Materials</p> <ul style="list-style-type: none"> • list materials required 		
	<p>Plan links between assessment and instruction:</p> <ol style="list-style-type: none"> 1) Identify what will be assessed (curriculum expectations or learning skills). 2) Choose an appropriate assessment strategy. 3) Choose an appropriate assessment scoring tool. <p>Explicitly label:</p> <ul style="list-style-type: none"> • A for L <i>Assessment for learning</i> (inform future instruction) • A as L <i>Assessment as learning</i> (reflection) • A of L <i>Assessment of learning</i> (student achievement). 		
	<p>Your plan should include activities that are:</p> <ul style="list-style-type: none"> • visual • kinesthetic • auditory 		

Posing Powerful Questions

Lesson Title

Grade/Program

Goals(s) for a Specific Lesson

Use the stem "Students will:"

Curriculum Expectations

Highlight parts to be addressed in the lesson (may not be all parts)

Big Idea(s) Addressed by the Expectations

Minds On... Sample Question(s)

Indicate in brackets the type (open, parallel, other).

Action! Sample Question(s)

Indicate in brackets the type (open, parallel, other).

Scaffolding Questions *(posed to individuals as needed)*

Consolidate/Debrief Sample Question(s)

Indicate in brackets the type (open or other)

Formative Feedback on Posing Powerful Questions

Pre-instructional

Considerations	Overall	Comments
How did you align the Lesson Goals, Curriculum Expectations, Big Ideas, and Consolidating Questions?	Why did you decide to...? I can see that you've addressed...by What are you assuming will be student's prior knowledge? What do you think will be student's responses?	
How did you reflect class/student readiness?	Strengths I like...because... That connects nicely to...because... I noticed that you deliberately integrated Mathematical Processes/Learning Tools/Math Talk with the content expectations by...	
	Areas for Improvement How could we better challenge all students? How could we reword the lesson goal so that students understand it? Who can we ensure time to consolidate? How can we improve the richness, openness, or range of readiness addressed by parallel questions? How could we improve the probing/scaffolding/ extending questions, with consideration for a fuller range of student readiness?	
	Suggestions Did you think about? Could we think of a way to encourage more student independence?	

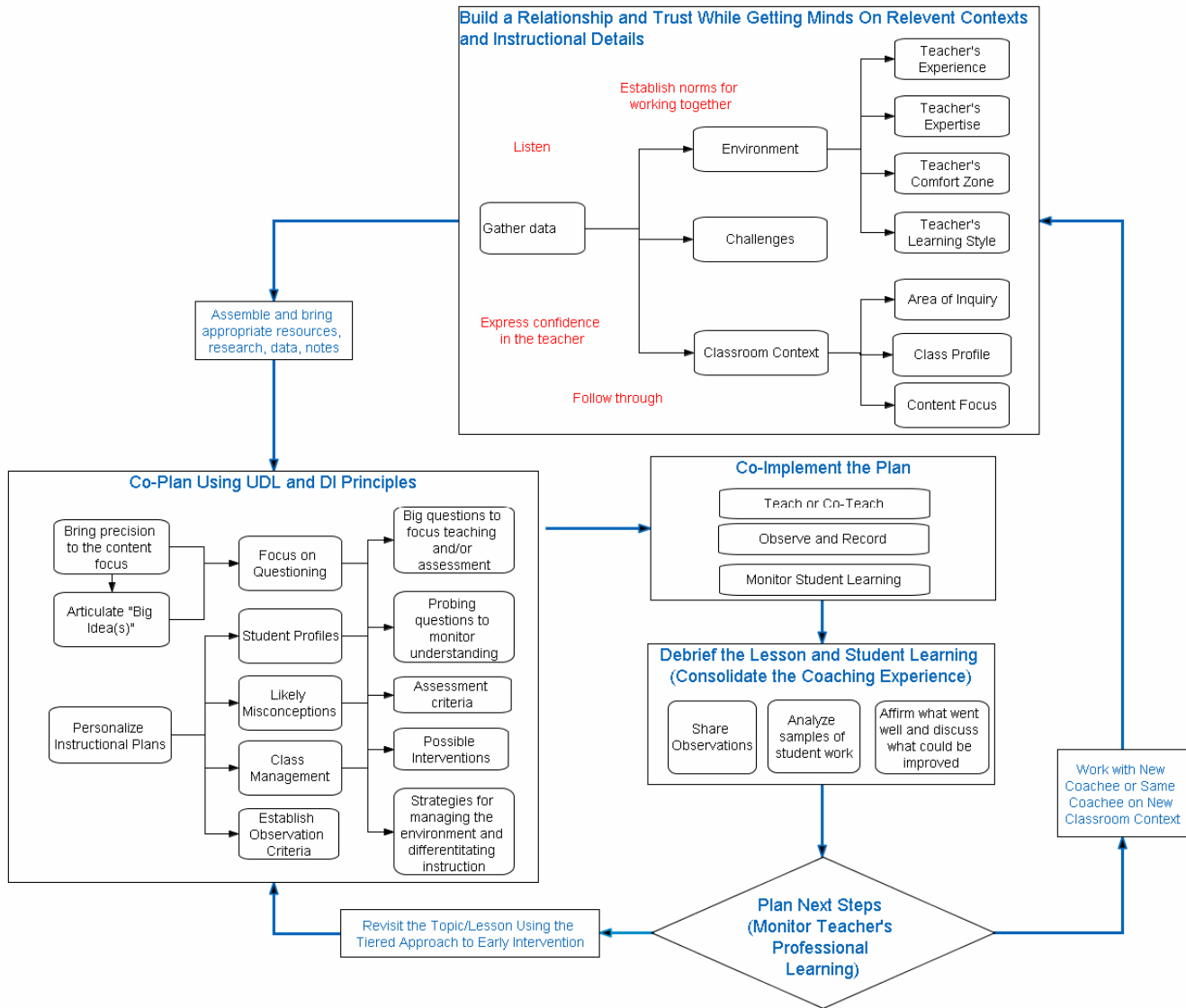
During Instruction

Considerations	Record Observations
Student questions, teacher questions, sample student responses, classroom management, reaching all students, demonstrations of "Instructional Jazz"	

Post-Instructional

Considerations	
How might we improve on the alignment of this Lesson Goals, Questions, and Big Ideas?	Strengths
What have we learned that could be applied in other lessons?	Areas of Improvement
Do we want to adjust our working norms? Other?	Suggestions

A Mathematics Coaching Cycle



LEGEND AND REFERENCES:
 UDL = Universal Design for Learning (See Learning for All)
 DI = Differentiated Instruction (See www.edugains.ca)
 Tiered Approach to Early Intervention (See Learning for All)

ACTIONS and INTERACTIONS

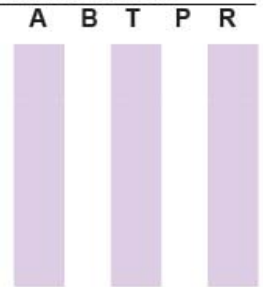
FOCUS for ACTION or INTERACTION:

A	Developing Awareness Focus on developing awareness of new information; elicit thoughtful questioning
B	Building Knowledge Focus on building knowledge to help deepen understanding of content and practice and to address implementation challenges
T	Translating into Practice Focus on translating new knowledge into practice help educators plan and improve their work
P	Practising Focus on on-the-job practise to help educators deepen their understanding as they try new approaches with students or colleagues
R	Reflecting Opportunities for educators to reflect on their own practice to help them to assess impact on student learning. Reflection on others' practice allows educators to choose what to adapt for their own use

ACTIONS, INTERACTIONS, and FOCUS SHOULD REFLECT PARTICIPANT READINESS

Aligning and Implementing Curriculum

- 1. Developing instructional materials**
Participate collaboratively in developing new or tailoring existing instructional and assessment materials, and professional learning materials that align with curriculum and research.
- 2. Curriculum implementation**
Analyze and refine instructional materials for use in your classroom.



Examining Teaching and Learning

- 3. Examining an externally developed unit**
Try out a learning module that demonstrates effective teaching, and in so doing gather evidence to inform practice.
- 4. Action research/inquiry**
Examine your own teaching and your students' learning, or your own practice and its effect, through a research project.
- 5. Case discussions**
Study written narratives or videotapes of interactions and discuss the issues, e.g., classroom teaching and learning.
- 6. Examining student work and thinking, and scoring assessments**
Examine student work together to understand students' thinking, to adjust instruction and assessment, or to arrive at a consensus score.
- 7. Lesson Study**
Systematically examine practice; collaboratively create, deliver, observe and refine study lessons; and report on learning.
- 8. Demonstration lessons**
Develop a shared vision through discussions before and after a demonstration lesson.



student success
 Professional Learning

ACTIONS and INTERACTIONS

ACTIONS, INTERACTIONS, and FOCUS SHOULD REFLECT PARTICIPANT READINESS

Collaborative Structures for Building Capacity

- 9. Coaching**
Work together to improve practice through a variety of activities, e.g., classroom observation and de-briefing, co-planning.
- 10. Mentoring**
Work with and learn from a more experienced colleague.
- 11. Developing professional facilitators**
Build facilitation and differentiation knowledge and skills, make connections, and align priorities for colleagues.
- 12. Study groups**
Regularly collaborate on topics identified by the group, e.g., examine new information, book study, reflect on practice, analyze data.
- 13. Professional networks**
Link with others to explore topics of interest, pursue learning goals, and address common problems.
- 14. Workshops, institutes, courses, conferences, and seminars**
Use learning opportunities outside the classroom or place of work.
- 15. Partnerships with business, industry, and universities**
Work collaboratively with partners to improve content knowledge, instructional materials, and access to facilities.

A	B	T	P	R

Means of Interacting

- 16. E-learning**
Use various kinds of technology, e.g., computers, video, CD-ROMs, telecommunications, and materials prepared by others to learn content and skills, e.g., pedagogy, timetabling, or to build new knowledge together.
- 17. Face-to-face**
Come together to enhance professional learning.
- 18. Immersion in inquiry and problem solving**
Immerse yourself in the approaches that you are expected to use, e.g., inquiry-based investigations.
- 19. Immersion in real world context**
Participate in intensive subject/work-related, day-to-day work experience, e.g., in a laboratory, industry, museum, or research facility.
- 20. Job exchange**
Exchange jobs with a colleague for a period of time long enough to experience all aspects/phases of the job.

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