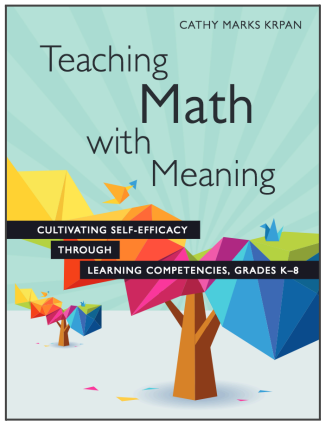
Building a Mathematical Learning Community

Grade 2 - Possible Tasks Organized by Teaching Points

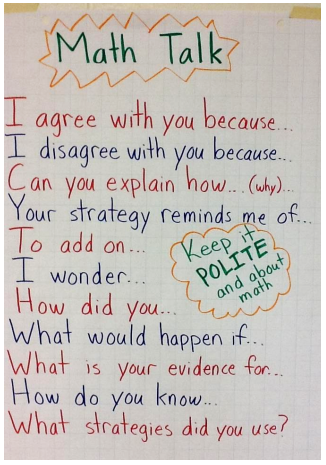
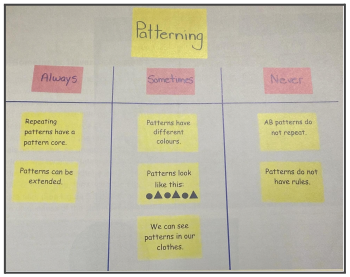
Introduction



In planning for the first few weeks of mathematics instruction, teachers are encouraged to consider how they will cultivate a learning community focused on **math-talk**, **student thinking**, and **collaborative relationships**.

To support developing this community, learning experiences have been selected that are engaging and open. The learning contexts described below will allow teachers to collect some initial **observational data** on the students' mathematical learning identity and their use of the mathematical processes. (e.g. observation logs for Social-Emotional Learning

One type of learning experience that cultivates a learning community is a thinking routine. By introducing thinking routines in the first weeks of school, educators establish clear expectations for the mathematics classroom. These routines are flexible and can continue to be used across the year in different learning contexts and topics. In helping to establish these routines, example tasks have been selected from the text “Teaching Math with Meaning” by Cathy Marks Krpan. (Note, this text has been provided to all Elementary schools for their professional libraries.)

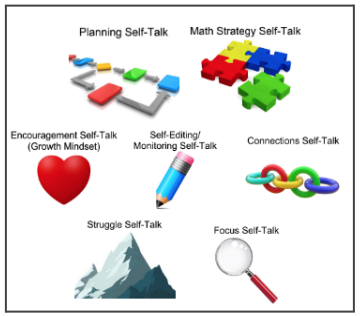
Mathematical Thinking Routine	Example Routines	
Math-Talk • sharing our mathematical ideas • reflecting on explaining one’s thinking to others • understanding and using math vocabulary • listening thoughtfully to others and building on/challenging the ideas of others • representing their mathematical ideas in a variety of ways	**Structured Math Prompts** Introducing students to mathematical discussions via Math Prompts (Pg. 73, 82-83)  Routine Overview • provide students with a problem to think about independently • then invite students to discuss the problem with a partner - choose a few math talk prompts (p 73) that will help focus the conversation • bring the students together to sharing their thinking • discuss how the math talk prompts helped in their discussion - add helpful prompts to a class anchor chart	**Always, Sometimes, Never** Developing mathematical argumentation and reasoning skills (Pg. 86-92)  Routine Overview • display a three column chart with the headings *Always*, *Sometimes*, and *Never* • share cards with mathematical statements (e.g “triangles have 3 vertices”, “triangles have sides that are the same length”, or “triangles can have parallel sides”) • students work with a partner or small group to discuss which column their statement(s) fits under, then present their thinking to the class • as groups share, invite the class to discuss and provide feedback - ensuring all students understand the reasons for each placement

Student Thinking

- making connections to prior learning
- creating by considering a problem in new or novel ways
- using reasoning and logic
- supporting answers with evidence
- teaching and using self-talk strategies to support metacognition, self-efficacy, and self-regulation

Mathematical Think-Alouds

Making thinking visible through teacher modeling using Self-Talk Strategies (Pg. 145-155)



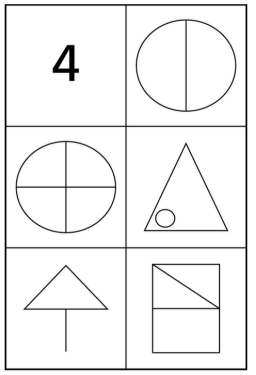
Routine Overview

- choose a rich mathematical task and **one or two thinking/self-regulation strategies** from the above list
- use visuals or concrete materials to provide a focus for the problem-solving think aloud, prepare a simple script of what you intend to model
- explain to students that you are going to "think-aloud to show you how I think through this problem" -- remember, what you are modeling is the thinking process, not a procedure
- after the modeled think-aloud, discuss what the students observed

(see the text references above for examples of think-alouds)

Making Connections

Promoting creative thinking and valuing diverse perspectives via the use of Connection Cards (Pg. 156-160)



Routine Overview

- prepare the connection cards linked above or make your own (i.e. cards with diverse mathematical images for students to compare and make connections between)
- provide each pair of students with a set of cards and time to talk about the connections they see between the images (you may decide to model this activity with the whole class first)
- invite students to share their observations with the class - encourage others to build on the thinking by sharing their own connections

Collaborative Relationships

- contributing to the group
- self-regulating to productively engage
- advocating for one's ideas
- valuing diverse perspectives
- resolving problems or differences that arise within the group - understanding the effects of your words and actions on others

Concept Circle Collaborations

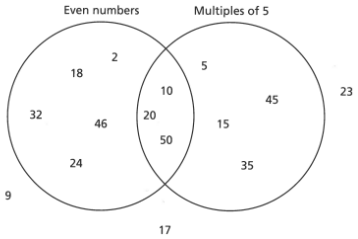
Collaboratively using concrete materials to represent and discuss mathematical relationships using Concept Circles (Pg. 205-213)

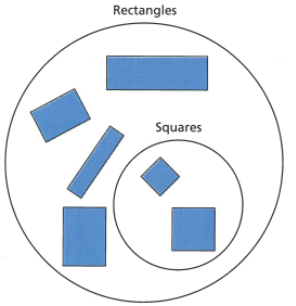
Routine Overview

- select a representation of a concept for the centre of the concept circle
- students can:
  - show difference representations of the same concept (e.g. the number 6 in the centre, students show different representations of 6 around the circle)
  - **or**, the teacher could provide labels for the outside section for the students to think about (e.g. 1 whole shown in the middle with different fraction amounts for students to represent around the circle)
- as students work collaboratively, the teacher circulates to gather assessment information (what do students understand?, what language do they use?)
- see this video explanation for more information

Set Diagram Collaborations

Using, classifying, and choosing set diagrams to compare and discuss mathematical ideas (Pg. 96-106)





Routine Overview

- display a completed Venn or Euler diagram
- invite students to share their observations and questions
- encourage discussion
  - Why do you think ___ was placed in this section?
  - What do the objects / items in this section have in common?
  - What could you add to this diagram?
  - Where would you place ____ on the diagram? Why?
  - Why do you think this title was chosen for this section of the diagram?
  - What do you notice about the objects in the area where the circles overlap?
- See pages 96-106 for extensions to this task

The tables below list possible learning tasks organized by **teaching points**. These teaching points are intended to support the teacher as they work with students to uncover the important components of a **learning community focused on collaborative mathematical learning**.

A Menu of Additional Problems and Explorations:

Learning Tasks	Possible Teaching Points					Possible Consolidation Questions
	Math-Talk - norms and routines	Collaborative Learning Skills	Representing our Thinking Visually	Honouring Math Thinking / Valuing Mistakes	Developing Perseverance	
Measuring - students work collaboratively to explore various tools as they estimate and measure their desks.	✔	✔	✔			**Math-Talk & Collaboration Questions** • How did you share your thoughts? • How did hearing ideas from your friends help you? • What do friends do to help each other so we can all grow as mathematicians? • What strategies did your group use to work effectively together? • What have you learned about working together? • What happened when you disagreed with each other? • How would this task have been more difficult if you worked alone? • What was the most challenging part of today's problem?
The Lemonade Stand - a three-act math problem where students collaborate to estimate how many cups of lemonade are in two pitchers.	✔	✔		✔		
Cube Bricks and Daisy Chains - students work collaboratively to create visible representations of skip counting patterns.	✔	✔	✔			
Representing Numbers with a Concept Circle - students work collaboratively exploring different tools and images to represent a target number.	✔	✔	✔	✔		**Representing Thinking Visually Questions** • How did you share/show your thinking? • What tools or strategies did you use to represent/solve the problem? • How did you record your thinking and organize your work? • How did using a visual representation help you to understand and solve the problem? • What was the most challenging part of today's problem?
Representing Numbers (base ten) - students work collaboratively using ten frames to solve open representation prompts.	✔	✔	✔	✔		
Decomposing Numbers - students work collaboratively as they explore various tools to represent numbers between 41 and 79.	✔	✔	✔	✔		
Cross Number Puzzles (add to 20) - students work collaboratively to solve a picture problem showing various combinations of 20.	✔	✔		✔	✔	**Honouring Thinking/Mistakes & Perseverance Questions** • What did you do when one strategy wasn't working? • What did your team members do when you got stuck? • How did you help each other? • How did having others to talk to about the problem help you solve it together? • How did you know if there was more than one solution? • How do you know you have found all the possible answers? • What was the most challenging part of today's problem?
Block Towers - students work collaboratively to combine three colours of blocks to find different ways to make a 4-block tower.	✔	✔	✔	✔	✔	
See it, Build it, Check it - students work collaboratively to recreate simple visual patterns, sharing their strategies for remembering and building with their peers.	✔	✔	✔	✔	✔	

A Menu of Additional Building Fluency Lessons (Math Talks):

Learning Tasks	Possible Teaching Points			Strategies for Facilitating Math-Talks
	Math-Talk - norms and routines	Representing our Thinking Visually	Honouring Math Thinking / Valuing Mistakes	
Estimating Blocks - students share strategies for estimating the number of pompoms in a jar.	✔		✔	1. **Classroom environment and community:** ▸ all answers are accepted - we learn from mistakes ▸ set clear expectations / norms (think time, thumbs up when ready, listening to understand, asking questions, focusing on math thinking…etc.) ▸ minilessons are brief (5-10 minutes) 2. **Student discussions are where the learning happens.** 3. **The teacher has a specific role in facilitating discussions, for example by prompting:** ▸ How did you get your answer? ▸ Does everyone agree? Did anyone see this differently? ▸ How are these two strategies alike? ▸ Can you explain _____'s strategy in your own words? 4. **Identify a clear teaching point for the lesson** (e.g., understanding a model, like the array; practicing a mental math strategy; developing fluency with a fact family…etc.) 5. **Follow the teaching point for several lessons.**
Which one doesn't belong? - students share their thinking about a visual provocation - learning that there is more than one way to think about the image.	✔		✔	
Cube Conversations - visual images encourage students to see different ways to compose shapes and numbers.	✔	✔	✔	
Dot Talks 1 - students share different ways they count dot representations.	✔	✔ (educator representing student thinking on image)	✔	
Dot Talks 2 - students share different ways they count dot representations.	✔	✔ (educator representing student thinking on image)	✔	
How many eggs? - students explore counting backwards from a visual prompt.	✔	✔ (educator representing student thinking on image)	✔	
How many clips? - students explore counting strategies to count paper clips in a visual prompt.	✔	✔ (educator representing student thinking on image)	✔	

*These learning tasks have been adapted from the SMCDSB First 20 Days of Mathematics instructional resources.