
Math Workshop: Setting the Foundations

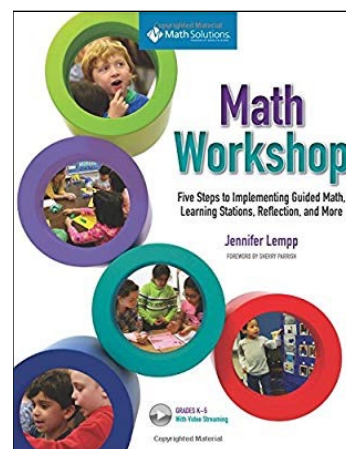
Presented by Jen Barker

DEC 2020 - September 20th, 2018
Surrey, B.C. 3:30 p.m. - 5:00 p.m.

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How would you solve the question:



LRS#179550

Math Workshop is:

- students doing most of the math
- students making choices
- students enthusiastically talking about their mathematical thinking and reasoning with each other
- teachers facilitating, clarifying, connecting, monitoring, and collecting data as students solve problems
- students working collaboratively
- teachers allowing students to struggle with challenging mathematics
- teachers working with small groups and/or individual students

Three Math Workshop Structures: An Overview

TASK AND SHARE		FOCUS LESSON, GUIDED MATH, AND LEARNING STATIONS		GUIDED MATH AND LEARNING STATIONS		
5–10 minutes	NUMBER SENSE ROUTINE An engaging, accessible, purposeful routine to begin your math class that promotes a community of positive mathematics discussion and thinking.	5–10 minutes	NUMBER SENSE ROUTINE An engaging, accessible, purposeful routine to begin your math class that promotes a community of positive mathematics discussion and thinking.	5–10 minutes	NUMBER SENSE ROUTINE An engaging, accessible, purposeful routine to begin your math class that promotes a community of positive mathematics discussion and thinking.	
30 minutes	MATH TASK A problem-solving task that students work on in small groups. The teacher circulates and probes student thinking through questions. The task typically has multiple entry points, allowing for all students to have access to the problem.	15 minutes	FOCUS LESSON A well-planned, whole-group lesson focused on the day's learning target and accessible to all levels of learners.	45 minutes	GUIDED MATH Small-group instruction that allows the teacher to support and learn more about students' understandings and misconceptions. In this structure, the focus lesson is addressed in guided math groups and is differentiated for each group.	LEARNING STATIONS Activities in which students engage in meaningful mathematics and are provided with purposeful choices.
20–25 minutes	TASK SHARE WITH STUDENT REFLECTION A math share in which students come together as a whole class and discuss the various strategies they used to solve the problem. Students ask questions, clarify their thinking, modify their work, and add to their collection of strategies.	5–10 minutes	STUDENT REFLECTION A deliberate and meaningful time for students to consider new learning.	5–10 minutes	STUDENT REFLECTION A deliberate and meaningful time for students to consider new learning.	

From *Math Workshop: Five Steps to Implementing Guided Math, Learning Stations, Reflection, and More* by Jennifer Lempp. Copyright © 2017 by Houghton Mifflin Harcourt Publishing Company. All rights reserved. www.mathsolutions.com. Downloadable from mathsolutions.com/mathworkshopreproducibles.

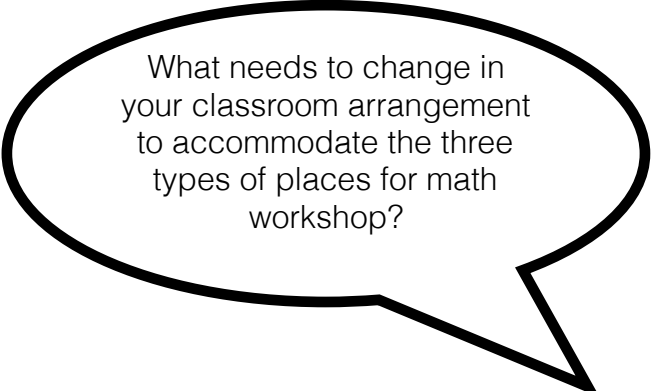
How is your current structure similar to math workshop? How is it different?

What is the role of the teacher?

1. Teacher as *Facilitator*
 - talking less and asking more
 - asking effective questions to make thinking visible
2. Teacher as *Clarifier and Connector*
 - providing appropriate vocabulary
 - anticipate and sequence student solutions to foster connections
 - assisting students in making connections between concrete, pictorial, and symbolic representations
 - ask thoughtful questions
3. Teacher as *Monitor*
 - observe and note who is engaged/passive
 - use active participation strategies to hear more voices
4. Teacher as *Data Collector*
 - work to find out our students' strengths, challenges and interests
 - record anecdotal notes and use these to inform instruction
 - collect and share photos, videos, and other documentation

CLASSROOM ARRANGMENT

A place to start together
A place for learning stations
A place for guided math
A place to end together



What needs to change in
your classroom arrangement
to accommodate the three
types of places for math
workshop?



What learning opportunities encourage:

- risk taking
- value thinking processes
- understand mistakes are part of learning
- collaboration
- communication
- perseverance
- value creativity
- peak curiosity



Using Number Routines to Develop Community

Which One Doesn't Belong:

Potential learning intentions:

- Focuses attention on attributes of number and number relationships
- Engages students in problem solving
- Encourages using Mathematical vocabulary

Show the image and let the students discuss.

17	26
44	65

Guiding Questions:

What do you notice?

What makes all the items alike?

What makes them different?

Which one doesn't belong?

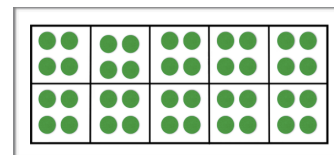
Can you share your reasoning to justify your answer?

Website: <http://wodb.ca/index.html>

Twitter Hashtag: #wodb <https://twitter.com/search?q=%23wodb&src=typd>

Quick Image Number Talks:

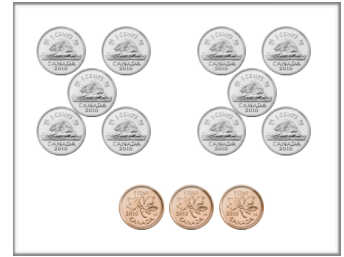
Quick Image number talks involve pictures of quantities, usually organized in a particular way to encourage students to subtilize and/or use spatial sense of quantities. The teacher shows the image for a few seconds and then asks “How many _____?” It is important not to show the images for more than few seconds, as doing so provides opportunity for students to count by ones. Students must mentally structure the amounts in efficient ways.



Next the teacher facilitates the discussion about the quantity. Teachers can help students to link the pictorial and symbolic representation of the quantities by recording how the student saw the quantities and using descriptions including numerals and equations.

CONTENT that can be explored includes:

- Perceptual and Conceptual Subtilizing
- Estimation
- Counting - one-to-one correspondence, cardinality, counting sequence, skip counting
- Place Value
- Numbers - quantity, number language (the words we use to say how many things there are), numeration (how we write how many things there are)
- Decomposing and Recomposing
- Additive and Multiplicative thinking



Items you can use:

- fingers
- dots
- 5 and 10 frames
- money
- tally marks
- base ten blocks
- rekenreks
- shapes partitioned (fractions)

For Virtual Apps that you can Screenshot on your computer: <https://www.mathlearningcenter.org/resources/apps>

How Many?

A “How Many” conversation occurs around a photo that provides multiple ways to interpret different quantities (e.g., One pair of shoes, two shoes, one box, 10 holes, etc.) These photos help focus attention on the units being counted. After a child shares how many they see, it is important to ask the students “How do you know” or “How could we check?” to discover their thinking.



Not only is “What counts as one?” an important question, its answer changes based on your perspective, and so it offers opportunities for **play**. Children like to play; they need to play. Children find numbers wonderful, delightful, interesting and fun. Numbers constitute a playground for children’s minds?

- Christopher Danielson (2017)

Author of website: <https://talkingmathwithkids.com/>



Number Talks With Equations or Number Strings:

The potential learning intentions:

- Develop multiple strategies (Mental Math) for Decomposing
- Develop the ability to compute with flexibility, accuracy and efficiency

10 - 15 minutes of focussed discussion on either one question or a “string” of questions designed to elicit a particular strategy (e.g., doubles plus one)

Guiding Questions:

- What answers did you get?
- Who would like to defend their answers?
- What strategies did you use?
- Did anyone think about this problem in a different way?

$$\begin{array}{r} 4 + 5 + 6 = \\ 14 + 25 + 36 = \\ 114 + 225 + 136 = \end{array}$$

Video Examples:

Number Talks at Harold Bishop <https://vimeo.com/260886488>

Number Talks at Berkshire Park <https://vimeo.com/260303277>

Multiplication video in a combined Grades 4/5 class <https://www.teachingchannel.org/videos/4th-5th-grade-number-talks>

Number Talk with Dot Images in Grade Four <https://www.teachingchannel.org/videos/dot-image-lesson-4th-grade> SPLAT!

Created by Steve Wyborney, there are FREE SPLATS for every grade level including single splats, multiple splats, and splats with fractions. <https://www.stevewyborney.com>

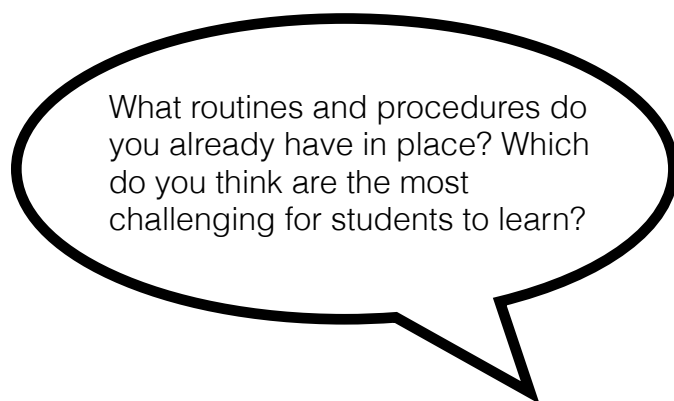
ROUTINES AND PROCEDURES

Questions to consider:

- **What can I do?**
 - What are the options for learning stations?
 - Use a system (e.g., must do/can do, menu or tic tac toe)
 - If needed, where will students record their work?
- **Who can I work with? NOTE: Do NOT ability group!**
 - Do students chose their station?
 - What are the benefits of choice?
 - How will you assist your students in making good choices about who to work with? What if they can't?
- **How long do I do it?**
 - Some learning stations may take less time than other... how will you plan for this?
 - What is a reasonable amount of time for one rotation? 15 minutes or ?
 - Timed Rotations or Open Choice - there are pros/cons to both



-
- **What do I do if I have a question?**
 - When can you ask the teacher?
 - What do you do when the teacher is busy?
 - **What do I do if I am finished?**
 - Are there extensions for each learning station?
 - How do students clean up?
 - How do you move to another station?
 - What will transitions look and sound like?



Learning Stations:

What are they?

Learning Stations often called Numeracy Centres, Math Stations, or Daily Math Investigations are mathematical activities designed for individuals, partners, and/or small groups of students. These activities are inviting, engaging and assist students in developing Mathematical understanding. Numeracy Centres are one component of balanced numeracy. It is a supplement to whole class instruction.

Why are they important?

- Students need daily opportunities to engage with mathematical ideas in purposeful and playful ways.
- They provide time for authentic, independent practice that connects to what they have learned through whole class quality instruction.
- Students need opportunities to develop the core and curricular competencies. Through the 'doing' of the mathematics, students will be building their confidence, seeing themselves as mathematicians, and seeing the connection of mathematics to their world.
- They give students choice, which increases motivation and fosters a positive disposition towards Mathematics.
- They give teachers an opportunity to meet with students one-on-one or in small groups to provide explicit instruction, engage in guided math, and/or have conferences.
- They allow students to revisit concepts. Learning takes patience and time.

What to think about?

- What are my students' interests? How can I incorporate these in the activities?
- What activities can be used to foster the development of key mathematical concepts and competencies?
- How can I modify the centres to make them open ended and invitations to learning?
- How can I differentiate activities to meet the diverse needs of my students?
- How will I be responsive to misconceptions and gaps of understanding?
- How will I record my observations?
- What questions will I ask to move the learning forward?

What to do?

Determine where your students are at mathematically. Think about what are the students' strengths, stretches, and what is needed to move their learning forward. Next create five or six centres to meet their needs. Think about incorporating centres based on the time of the year, student interests, and different mathematical concepts (e.g., not all patterning centres). Teach these centres (e.g., model how to use the materials, take turn, clean-up). Give them a try and make observations. Modify the centres if needed.

What to look for?

What are the important math concepts my students need to know? Are the students demonstrating their understanding?

Are my students able to reflect on their learning and can they articulate this?

What questions will I ask to nudge learning forward?

Games

- Guided Math has created and shares many games http://www.guided-math-adventures.com/?page_id=125
- Box Cars and One-Eyed Jacks <https://www.boxcarsandoneeyedjacks.com/product-category/math/>
- Multiplication Games <http://bit.ly/multiplicationfactgames>
- Addition and Subtraction games created by Sandra Ball <https://startingwiththebeginning.wordpress.com/building-a-foundation/>



Visual Scaffolding Fact Cards

- Addition, Subtraction, and Multiplication Scaffolding Cards <http://bit.ly/additionscaffoldingcards>
- Multiplication Subitizing Cards <http://bit.ly/multiplicationsubitizing>
- Ten Frame Multiplication visual cards <http://bit.ly/tenframemultiplicationcards>

Playful Provocations

Places to get ideas:

- Intermediate Daily Math Investigations created by Selina Millar <http://bit.ly/intermediateinvestigations>
- Janice Novakowski Reggio-Inspired Mathematics http://janicenovkam.typepad.com/reggioinspired_mathematic/
- Patterning, Number Concepts, Fractions, Multiplication provocations can be found on my site under the “Instructional Ideas”

Open Ended Questions

Questions that not only have different strategies but also could have different answers.

- www.onetwoinfinity.ca/presentations/AMElemNov.pdf
- Marian Small's Open Questions http://www.rubiconpublishing.com/shop/?pa_focus=numeracy



The Open Questions for the Number Strand are correlated to the WCNP (BC Curriculum). The other strands are available but they are aligned to the Ontario curriculum, not BC. Number Strand K - 3 LRS #173627 and Grades 4 - 6 LRS #173628 and Grades 7 - 9 LRS #173629

The next few weeks:

- Establish and practice routines and procedures
- Build by developing your expectations with your students through mini-lessons
- Begin with one learning station
- Teach one Number Routine and do it well

MINI LESSON:

Understanding Guidelines for Math Workshop

- Give students time to discuss with each other and share with the whole class what they understand about each of the guidelines on the anchor chart.
- Anytime you find students are struggling with these guidelines, return to the chart and corresponding mini-lesson.

- I will be an active listener.
- I will talk about my thinking.
- I will use different strategies to solve problems.
- I will do my best whether working independently or collaboratively.
- I use math tools and manipulatives responsibly to help my thinking.
- I will represent by thinking visually.
- I will give my best effort and be respectful to my classmates.
- I will persevere through challenges.
- I will reflect on my learning.

Working Independently

MINI LESSON:

Through practiced independent work, students gain confidence in their own math ability.

- Think about a time that you worked independently. What did it look like? What are some ways you represented your thinking? How were your classmates acting that helped you to work independently?
- Have students brainstorm ideas, then share ideas with a partner. Have the partner share each other's ideas, not their own.
- Add to anchor chart I will do my best work whether working collaboratively or independently.

I will stay on task.
I will do my best.
I will be respectful of those around me.



Working Collaboratively

MINI LESSON:

Working together helps students clarify their thinking, share their thought process, respect others' thinking, deepen their understanding, stay focused, and justify math solutions.

- Provide stickies for students to brainstorm what it looks and sounds like.
- Create an anchor chart called "Working Collaboratively"
- Provide a problem for students to work on in collaborative groups and have them practice expectations and reflect on how it went.

Working Collaboratively

- give everyone a turn
- respect others' answers and strategies
- using kind words
- ask questions rather than giving answers
- look at and listen to each other
- stay on task and participate
- encourage each other
- give your best effort

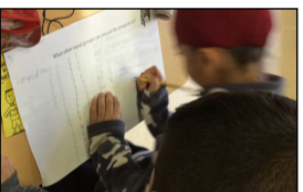


Representing Your Thinking

MINI LESSON:

Drawing pictures is a problem solving strategy. Sometimes drawing pictures helps us to represent our math thinking and make sense of the question. Pictures help us visualize and can represent numbers.

- Today, as we learn about _____, practice drawing pictures to represent your math thinking. Share a problem with students and have them draw pictures to represent their mathematical thinking.
- Add to anchor chart I will represent my thinking visually when it is helpful.

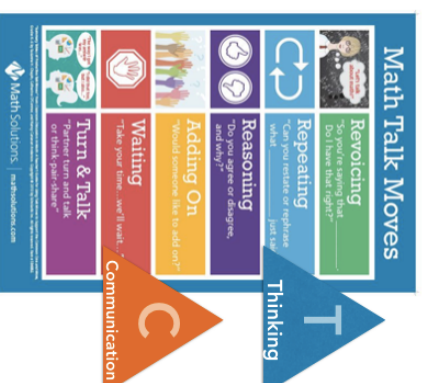


Being an Active Listener

MINI LESSON:

It is important not just to listen to the teacher but also to each other.

- What is an "active listener"?
- Brainstorm what it looks and sounds like?
- Ask for someone to volunteer to share aloud in front of the class a favourite thing they like to do. Using talk moves have ensure that the students have actively listened to their classmate.
- Begin an anchor chart called "Guidelines for Math Workshop" and add I will be an active listener.



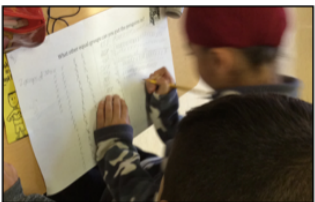
MINI-LESSONS:

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MINI LESSON:

Reflecting and Sharing

Reflecting on what we've learned is key in everything we do. It can be done formally and informally.

- Provide an open ended problem. Anticipate the ways students will solve. Monitor and determine a sequence you will ask students to share. The sequencing you determine is intentional so that you can assist students in making connections between strategies, etc.
- Ask students to reflect upon the learning experience.
- Begin an anchor chart called Guidelines for Math Workshop. Add I will reflect on my learning.



MINI LESSON:

Using Manipulatives

Manipulatives are items that help children construct understanding. They also assist children in representing their thinking. It is tempting to play with manipulatives but when used responsibly they can help you learn.

- Provide students with a manipulative and ask them to take 5 min to explore. As them what they notice, what they wonder, and how they think they could use the manipulative.
- Add to anchor chart I will use tools and manipulatives responsibly to help my thinking.

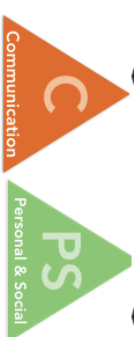
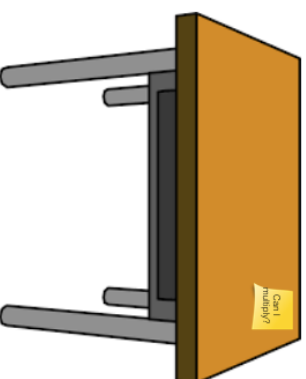


MINI LESSON:

Asking Questions

We want to promote an environment where students feel free to ask questions, challenge one another, and look for justification for answers. We also want to promote perseverance and avoid asking for help before giving our best effort.

- Provide students with a problem. Ask them to solve it themselves. Use sticky notes to write down any questions you have. "Park" your questions on the corner of your desk for now. In the end, check your questions to see if you answered them on your own. For the unanswered questions, check with a friend. Walk around the room and review the questions. Select and share strong examples of good questions.
- Add to anchor chart I will persevere through challenges and believe in myself.



NOTES: