
Grade 8 & 9 Numeracy Session

January 2019

Agenda

- Number Talk
- Assessment
- Unpacking First Peoples Principles of Learning
- Lesson examples: Desmos and Exploding Dots

Session Goals

- To continue to deepen our understanding of the new math curriculum
- To understand how assessment practices align with the new math curriculum and development of growth mindsets

Number Talk Examples

What is larger $\frac{13}{17}$ or $\frac{5}{8}$?

Which is greater: 49×53 or 43×59 ?

How much will a pair of \$70 runners cost including 12% tax?

Daily Number Talks:

Can take as little as 5 minutes a day (up to 15 minutes) and provide the opportunity for students to:

- Engage in mental math
- Develop numeracy and conceptual understanding of basic operations
- Learn strategies from their peers
- Learn and practice multiple strategies (as suited to context)
- Develop their mathematical communication skills
- Justify and explain their thinking

Formative Assessment

These following 3 slides are from the ATI Assessment conference in Portland, 2016 and are from Margaret Heritage:

Teachers who are

Expert in Formative Assessment

- Collect evidence of student thinking (quality of thinking)
- Interpret student responses in terms of what students are thinking
- Consider what feedback or immediate next step in instruction will move learning forward

Not expert in Formative Assessment

- Collect evidence of student performance (quantity of thinking)
- Evaluate the correctness of responses
- Re-teach topics based on percent correct

[Minstrell, Anderson, & Li (2009); Hattie (2009); Hattie & Timperley (2007); Kroog, Ruiz-Primo, & Sands (2014)]

Teachers who are

Expert in Formative Assessment

- Support learning as it is developing
- Actively involve students in the assessment process
- Share responsibility for learning with students

Not expert in Formative Assessment

- Deliver instruction
- Give students test results
- Focus on instructing students

[Cowie, Harrison & Willis, 2016;
Heritage, 2010, 2013)

Students who are

Expert in Formative Assessment

- Generate personal feedback loops
- Set goals
- Adapt learning tactics
- Make decisions about feedback use
- Provide effective feedback to peers

Not expert in Formative Assessment

- Comply with teaching/ learning directions
- Complete assignments
- Make judgments about their learning based on a grade
- Rely on grades for motivation
- Regard learning as a private activity

Assessment

Work in teams of 4 (and then as pairs) to discuss how you would assess student work based on the rubrics provided. Be prepared to share out your thoughts and how you assessed each student.

Discuss as a Whole

Share out how you assessed. Discuss similarities and differences.

Consider the following:

- What would you change in the rubric? Why?
- What part of this was the most challenging for you? Why?
- Which students would you want to have a follow-up conversation with?
What questions would you ask them?
- What else do you think needs to be assessed with this concept?

Journal Entries

Read through a few journal entries and discuss:

- How is this information valuable to teachers?
- When would you use this?
- What would you change?
- Would you assess? If so how? For what purpose?

Assessment Methods

- Portfolios:
 - assessment questions/tasks
 - individual work/reflections/write-ups from collaborative tasks
 - “Write to explain” tasks or journal entries
 - Projects
 - quizzes
- Collaborative Quizzes:
 - Students write a quiz on their own, then write the exact same quiz again with a group of 4
- Projects
- Group 4-Quadrant tasks (see examples) - then gallery walk and add/refine (then individual quiz if needed)

Assessments

- Interviews/Conferences/Conversations:
 - You don't have to conference with ALL students - some show clearly in the variety of written tasks and quizzes what they know
 - Students can conference about a 'sometimes, always, never' statement and record it for a few minutes (their final conclusions with individual explanations) - using flipgrid or other tool
 - Ex: two negatives always make a positive
- Authentic Problem Solving Task:
 - If in group, determine how you will assess individually - will each member complete a follow up reflection or summary after the task?

Projects

- Measurement: Bentwood box (or regular box): students design a box for a purpose and then creates a template from card stock and finds the volume, surface area and draws from different orientations using isometric dot paper. Finally, they build their box (out of metal or wood). You could also require each student to create a budget for the materials used. (grade 8)
- Statistics: Investigate First Nations statistics or relevant issues (like murdered and missing Indigenous women, clean drinking water on reservations, the pipeline, etc.). Students can present data that they gather or find. Alternately, do a project involving the reliability and validity of data - this is such a relevant topic right now.

Projects

- Financial Literacy: Each student chooses a large item to save for and create simple budget that will include simple interest as well as a reasonable savings plan and the cost of the item including tax.
- Financial Literacy: Create a budget for planning a cultural celebration (this could be anything from a birthday party to a naming ceremony)
- Proportion: Artwork that involve scale drawings (see previous session for example using Indigenous art), or creating art that includes multiple scale drawings of items within the piece.

Your Turn to Share...

What projects have you done? Are you willing to share your resources?

Assessment AS Learning

Students need to be an integral part of their assessment and learning.

- Set clear learning targets and expectations
- Provide students with the rubric to self-assess or provide evidence of their learning
- Conduct error analysis after assessments or assignments and set goals
- Re-write parts of assessments until mastery is achieved
- Ongoing discussions about *learning* - where are you at? Where do you need to get to? How do we get you there?

Student Agency

We want our students to be able to:

- Adjust their strategies when things aren't working
- Seek and use feedback to improve their learning
- Provide feedback to others to promote learning
- Know exactly where they are in terms of the learning targets
- Know how to work independently to reach their goals
- Self-assess regularly to monitor their own thinking and learning

How do we achieve this? Discuss

Student Agency

- Daily inclusion of learning target/goal and reflection upon that goal at the end of the lesson
- Reflection questions daily (what affected my ability to learn, what am I not understanding, what new learning did I have today, how is this concept similar/different to another concept)
- Practising assessing themselves and others (often)
- Stop them throughout lessons with a timer to assess how their current strategy is working and what they might do differently next, 'what's working?' 'what's not?' 'what do I understand and how well?'
- Coach them daily (a few at a time) on the above
- Use Vertical Non-Permanent Surfaces and Groups often

Math Error Analysis: Can I tell what went wrong?

Looking at our errors and figuring out what went wrong gives us the best opportunity to learn. There are many reasons why we make mistakes!

Use this chart to identify what types of errors were made. Can you see a pattern? What can we do to correct them? Fill in the reflection below and then attach it to your SWYK.

Type of Error and code	Tally
NCH – Not checking or looking back when done.	
BF – Basic fact error.	
CE – Copying error (wrote the question or numbers down wrong)	
RU – Reading the question or instructions wrong <u>or</u> not understanding what is being asked.	
NST – Not showing your thinking.	
IDK - Not understanding the math concept itself or how to do it	

Some/most/all of my errors were _____.

Others were _____.

A pattern I see is _____.

Some strategies I can use to avoid making these errors are:

First Peoples Principles of Learning

Explore this principle:

Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).

Let's unpack some of these terms. As you read the definitions, think about ways that we can foster them in our math classes...

Discuss...

holistic:

Holistic education is a philosophy of **education** based on the premise that each person finds identity, **meaning**, and purpose in life through connections to the community, to the natural world, and to humanitarian values such as compassion and peace.

(https://en.wikipedia.org/wiki/Holistic_education)

We just touched on these

reflexive:

When we encourage students to be self-reflexive, we are asking them to understand what they are learning as they are learning. Additionally, self-reflexivity not only allows students to understand *what* they learned but *why* they learned it.

(<https://www.chronicle.com/blogs/profhacker/reflexive-pedagogy/22939>)

reflective:

Teachers who promote reflective classrooms ensure that students are fully engaged in the process of making meaning. They organize instruction so that students are the producers, not just the consumers, of knowledge. To best guide children in the habits of reflection, these teachers approach their role as that of "facilitator of meaning making."

(<http://www.ascd.org/publications/books/108008/chapters/Learning-Through-Reflection.aspx>)

Discuss...

experiential:

“In its simplest form, experiential learning means learning from experience or learning by doing. Experiential education first immerses learners in an experience and then encourages reflection about the experience to develop new skills, new attitudes, or new ways of thinking.”

(<https://www.ryerson.ca/content/dam/lt/resources/handouts/ExperientialLearningReport.pdf>)

Discuss...

relational:

Relational learning is a way of being with students from a social constructionist perspective where those involved in education--students, mentors, and professors--learn from each other through the sharing of ideas and together create the learning/teaching world....While there may be a place and time for a teacher-centered model, the relational approach lends itself to the active process of co-constructing knowledge not only in the classroom but outside in the world.

(<https://www.taosinstitute.net/relational-learning-in-education>)

First Peoples Principles of Learning

Final thoughts and reflections...

It can be overwhelming, so, can you think of ONE thing that arose from these discussions that you can feasibly implement into your math class?

Desmos

Benefits:

- Visual, conceptual and engaging for students
- Provides real-time feedback on their learning
- Teacher notes guide you through the lesson to support you
- Efficient and student yet still student-centered
- Fun:)

Let's explore!

Desmos Lessons for Grades 8/9

LEGO PRICES: Class code: [W5TKMW](#)

(<https://teacher.desmos.com/activitybuilder/custom/57e563aa072703f509160cc2?fbclid=IwAR0xsSkBxPGMXkLTQb5UbZfMWc31yjBZfdIGuFzKoo7yb9luej58WBHg884>)

CHARGE! Class code: [H3WKVE](#)

(<https://teacher.desmos.com/activitybuilder/custom/563a59893f80f2fd0b7c77f0?fbclid=IwAR0xsSkBxPGMXkLTQb5UbZfMWc31yjBZfdIGuFzKoo7yb9luej58WBHg884>)

GRAPHING STORIES: Class code: [UYWXWP](#)

(<https://teacher.desmos.com/activitybuilder/custom/58797d35d81a612605304b1f?fbclid=IwAR0xsSkBxPGMXkLTQb5UbZfMWc31yjBZfdIGuFzKoo7yb9luej58WBHg884>)

Polygraph - great for grade 10's learning about lines and all the vocabulary (and what the words really mean). And SO many more - mostly for grades 10-12

Other Ideas and Resources

More of the graphing stories activities: <http://www.graphingstories.com/>

Using Desmos for your own projects (rather than using created activities):

[@mslailanur](#) I did a [@Desmos](#) project where students import a map of a zip code of their choice, use linear functions to recreate streets and coordinates for the buildings. Then make a system of equations for 3 friends to meet up at one of the buildings.

Noah's Ark Problem - differentiated algebraic thinking task

Misleading graph (grade 9 Stats):

<https://www.livescience.com/45083-misleading-gun-death-chart.html>

Teacher Choice!

Spend time exploring exploding dots (self paced)

Exploring Algebra tiles with Nikki

Exploding Dots

<https://www.explodingdots.org/>

A brief explanation of how it works:

<https://www.explodingdots.org/station/I2S4>

Division in base 10:

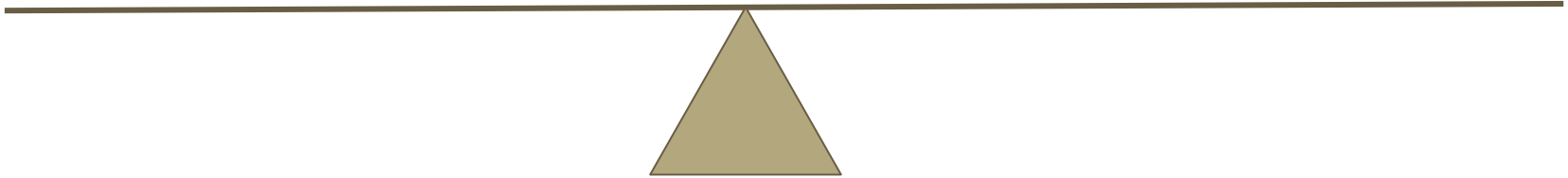
<https://www.explodingdots.org/station/I5S11>

Division in base x :

<https://www.explodingdots.org/station/I6S13>

Algebra Tiles

Use a scale or balance to visually imagine the idea of balance:



Use the algebra tiles to explore some ideas of maintaining balance

Skill Progression

- Preservation of equality
- Modeling problems with algebra tiles
- Solving for unknown
 - One step
 - Two step
 - Fractional coefficients
- Distributive property (expanding brackets)
- Multi-step equations
- Polynomials

Exploring Simplifying Polynomials

Grab a handful of algebra tiles, and drop them onto your desk (try to get a selection of all the tiles).

Write out your polynomial (expanded version) and then simplify

Reflection and Action Plan

“If you don’t use it, you lose it”

Action Plan:

- What are you going to implement this week?
- What are you going to share with other teachers in the next month?

Feedback sheets for reflections please...