
Grade 8&9 Numeracy

Session 1

October 2018

Agenda

- Recap of new curriculum and growth mindset
- Formative Assessment practices - how do YOU know what your students know?
- Summative Assessments - consider Depth of Knowledge
- Lesson sequence with competencies
- Math through an Indigenous Lens

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

New Math Curriculum

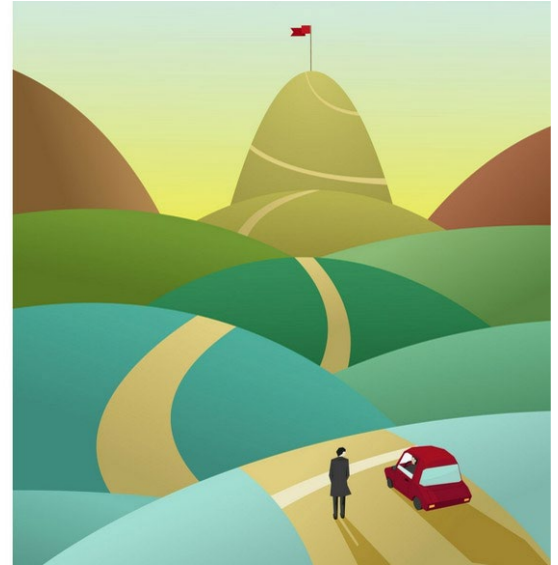
- Focus on skills and processes as much as content
- All areas of learning are based on a “Know-Do-Understand” model to support **a concept-based competency-driven** approach to learning.
- Three elements, the Content (Know), Curricular Competencies (Do), and Big Ideas (Understand) all work together to support deeper learning.

An Analogy

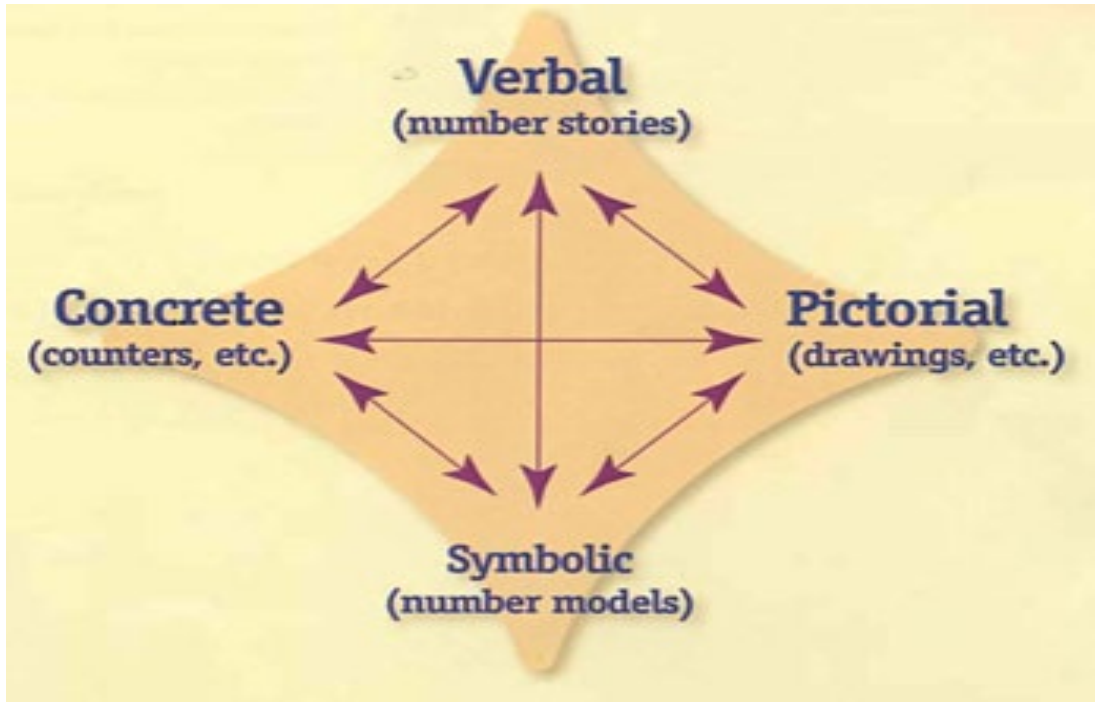
The Curricular competencies are the vehicle

The Curricular content are the passengers

The Big Ideas are the destination



MultiDimensional Mathematics



Math concepts are explored and understood in all of these ways to improve engagement, meaning and conceptual understanding

Growth Mindset

What Kind of Mindset Do You Have?

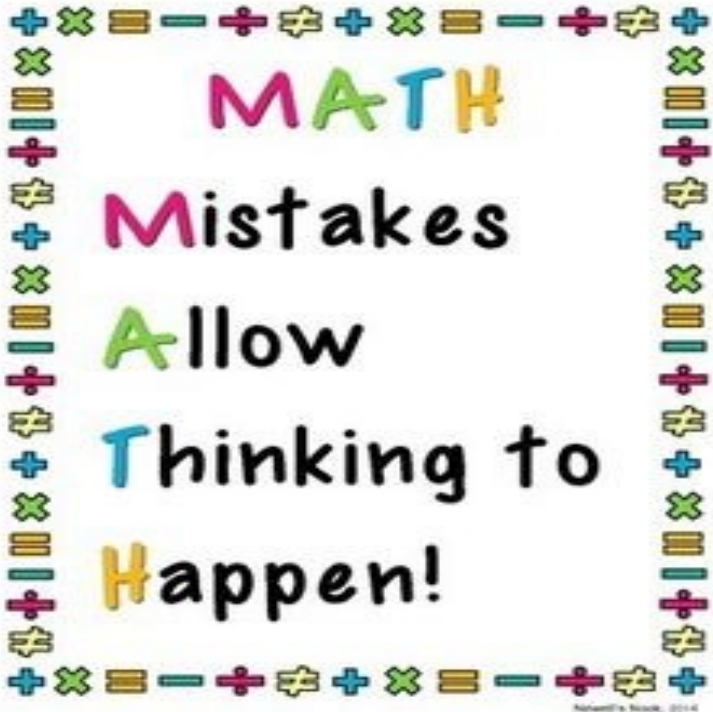


I can learn anything I want to.
When I'm frustrated, I persevere.
I want to challenge myself.
When I fail, I learn.
Tell me I try hard.
If you succeed, I'm inspired.
My effort and attitude determine everything.



I'm either good at it, or I'm not.
When I'm frustrated, I give up.
I don't like to be challenged.
When I fail, I'm no good.
Tell me I'm smart.
If you succeed, I feel threatened.
My abilities determine everything.

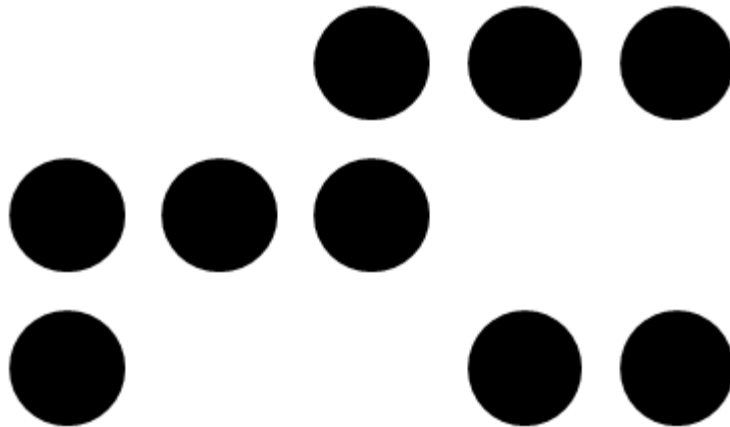
Shifting the Culture



Mistakes are an opportunity to learn

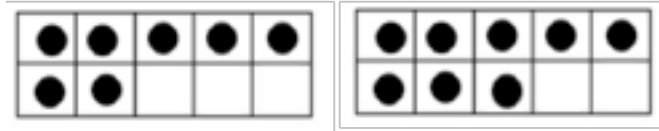
Productive struggle means that you are being challenged at the right level - if it doesn't challenge you, it doesn't change you!

Number Talk



Number Talk

$$7 + 8 =$$



Number String

$$2 \times 32$$

$$4 \times 32$$

$$10 \times 32$$

$$14 \times 32$$



Routines/Strategies

Formative Assessment = Minute by Minute - What do they 'get' and 'not get'

- Accountability sticks
- Questioning the answers 'basketball' technique
- Individual white boards/pouches
- Thumbs up/side/down
- Think-Pair-Share
- Daily Reflections on learning - last 5-7 minutes (or homework)
- Journals - formative feedback only about 2 times a week
- Ticket out the door - into piles of "got it", "kind of", "not yet"



Other References

Inside the Black Box:

<https://www.rdc.udel.edu/wp-content/uploads/2015/04/InsideBlackBox.pdf>

1 Hour Long Documentary (part 1) with Dylan Wiliam:

<https://www.youtube.com/watch?v=J25d9aC1GZA>

Depth of Knowledge:

<https://robertkaplinsky.com/depth-of-knowledge-examples-for-secondary-mathematics/>

<http://www.openmiddle.com/category/high-school-algebra/>

<https://www.popularmechanics.com/science/g2816/5-simple-math-problems/>

Summative Assessments

Consider Depth of Knowledge: Level 1 is “Recall”

Example: Solve for x:

$$3x + 1 = 5x - 7$$

- This will show if they can execute the procedure accurately

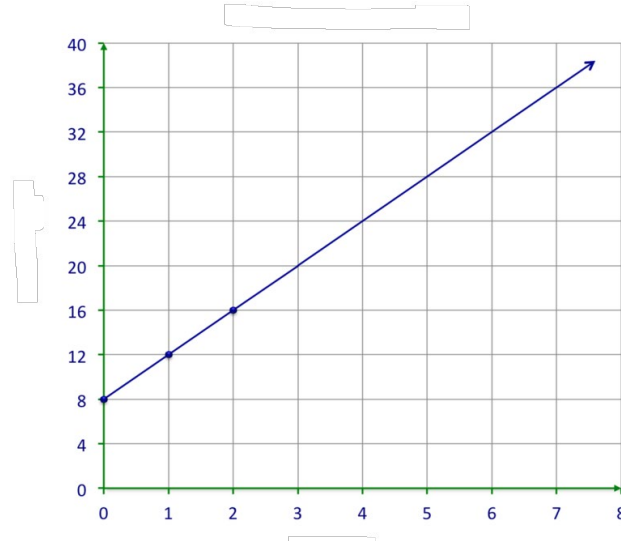
Level 2: “Skill/Concept”

Example: Sandra is organizing a school dance and is trying to determine how much she needs to charge for the tickets. If the cost of the dance is \$1200 and she'll charge \$5 per ticket, (a) write an expression that represents her profit for 'n' number of students attending the dance. (b) write an equation and solve for how many students would need to attend in order for the dance to make a profit of \$500

<https://curriculum.gov.bc.ca/provincial-assessment/graduation/numeracy>

Level 3 “Strategic Thinking”

Example: Given the graph below, create a contextualized situation that would be represented by this graph. Explain how your situation is represented by the graph and create an equation that matches the graph and context. Create a problem related to your context that is not represented on the graph and solve using your equation:



Reflect

How many questions on the assessments you use are:

- Depth of knowledge 1
- Depth of knowledge 2
- Depth of knowledge 3
- Procedural only
- Conceptual only
- Procedural and conceptual
- Applied math
- Pictorial

Visual Patterns

Goals:

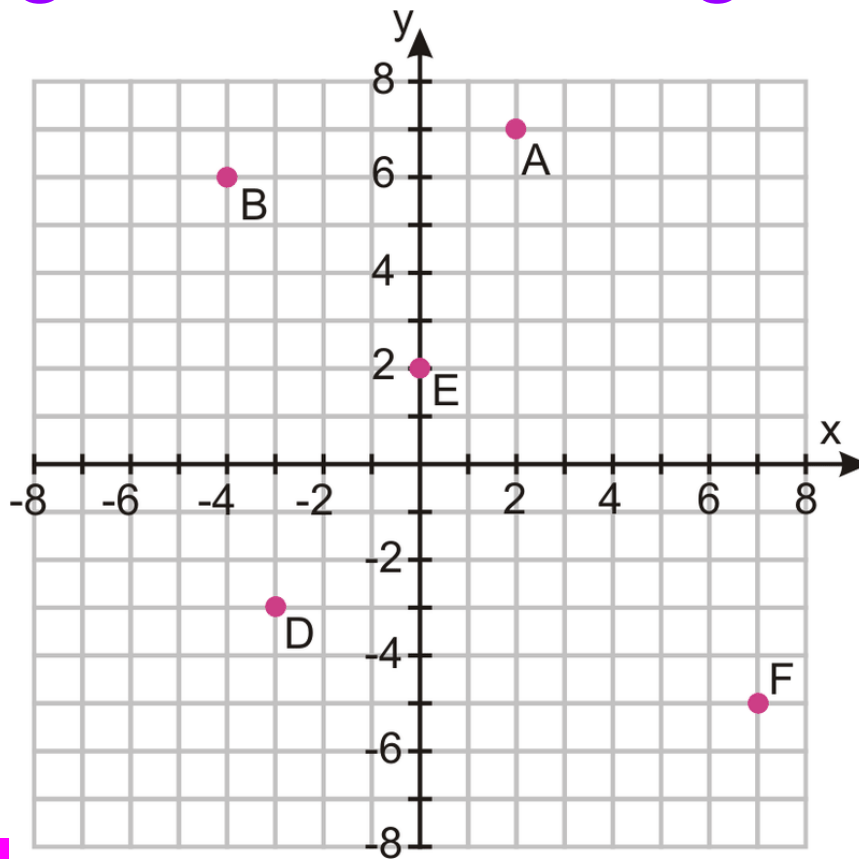
- 1) To understand how to create table of values, linear graphs and equations from visual patterns
- 2) To understand generalizations - how to see the constant and the rate of change in each visual example and how this is connected to the table, graph and equation
- 3) To understand the concept of variable

Accessing Prior Knowledge

On your whiteboards write

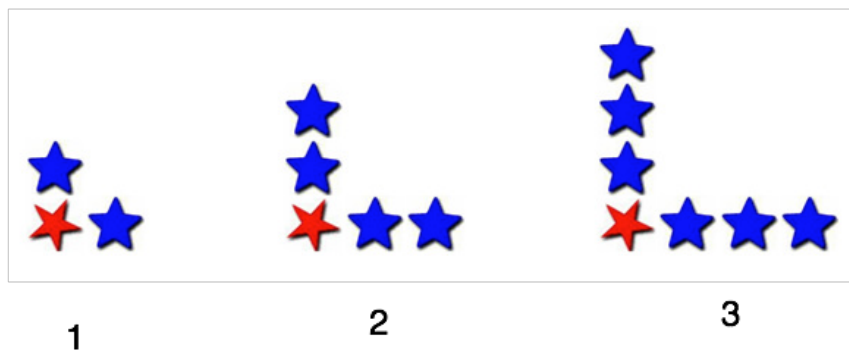
the coordinates for A, B, E, D, F

as ordered pairs and in a table:



Processing

How do you SEE this pattern growing?

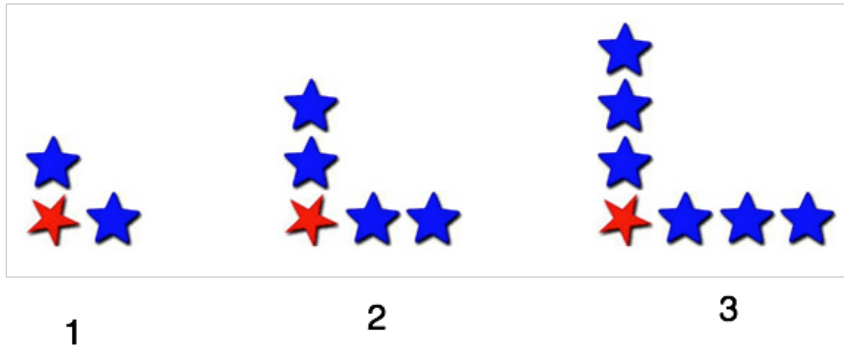


Can you see the constant and the rate of change as it refers to the figure number?

<http://www.visualpatterns.org/>

Processing

Create a table of values for the first 6 figures (you see the first three):



Create a graph for these values and describe what you notice (slope, intercepts, linear)

Processing

Describe how you could figure out the amount of stars in ANY figure number (think constants and variables):

Now create an equation for figuring out the amount of stars in any figure:

Test it out to make sure it works

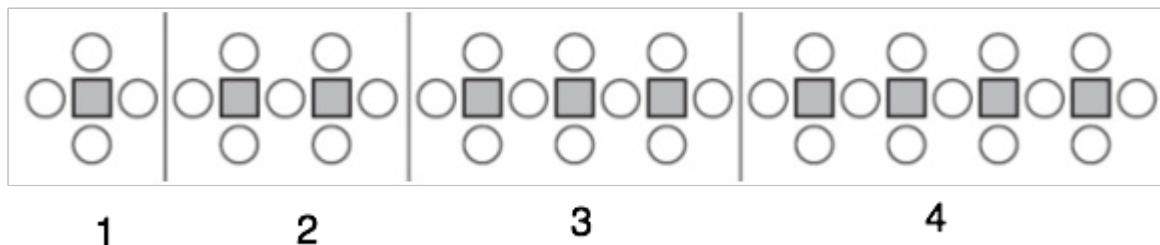
Processing

How many stars will there be in figure number 27?

What figure number will have 75 stars in it?

Processing by Another One

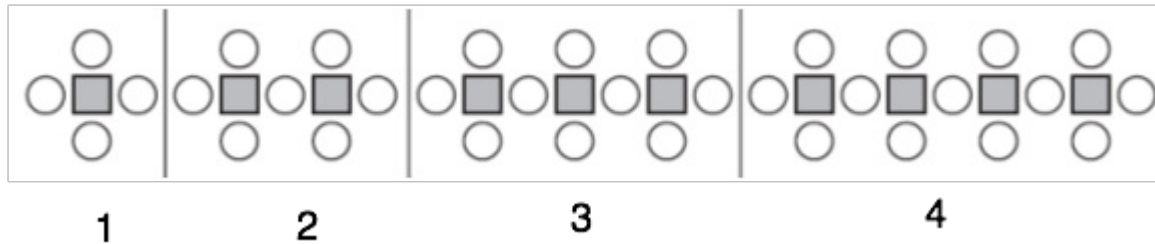
How do you see this pattern growing?



Looking at just the circles, can you see the constant and the rate of change as it refers to the figure number?

Processing

Create a table of values for the number of circles in the first 7 figures (you see the first four):



Create a graph for these values and describe what you notice (slope, intercepts, linear)

Processing

Describe how you could figure out the amount of circles in ANY figure number (think constants and variables):

Now create an equation for figuring out the amount of circles in any figure:

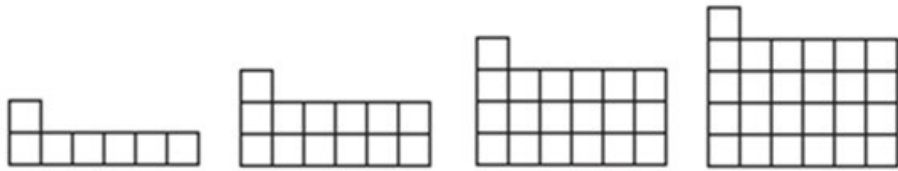
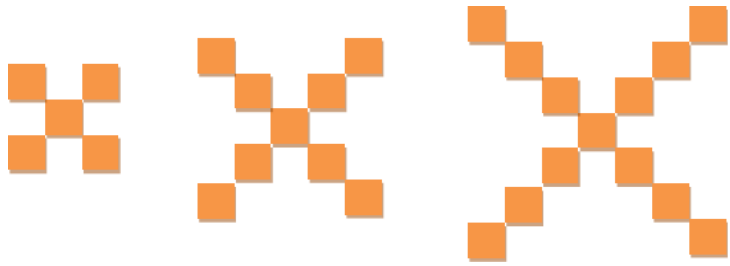
Test it out to make sure it works for all values

Processing

How many circles will there be in figure number 60?

What figure number will have 150 circles in it?

Let's Try a Few More...



Transforming

Create your own pattern that increases as the figure number increases.

- 1) Create a visual pattern
- 2) Create a table of values for your pattern
- 3) Create a linear graph of our pattern
- 4) Create a statement in words of how to find the number of objects in any figure number
- 5) Create an equation that represents your pattern
- 6) Create 2 questions about your pattern that another group will solve

Reflections

How did using visual patterns affect your understanding of the meaning of linear equations?

What part did you find the most challenging?

How did you learn from others in today's class?

What did you do in today's class that supported someone's learning?

What is this connected to? (other math problems concepts, home life, etc.)

How could we use this idea to solve other problems?

What is your learning goal for next lesson?

Competencies

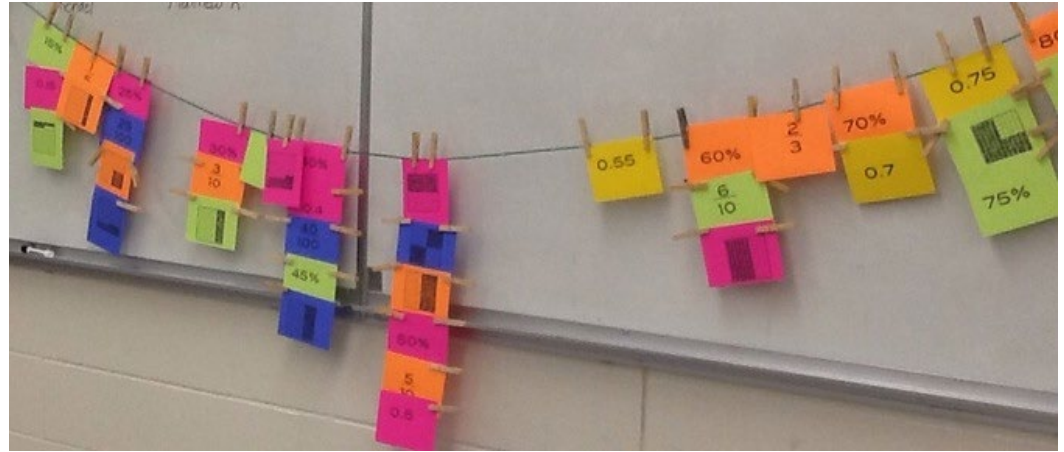
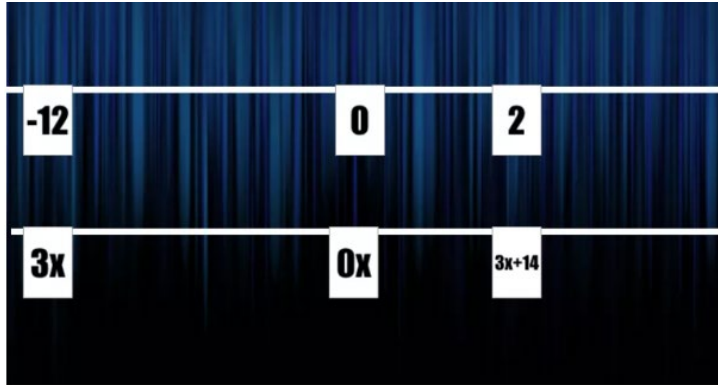
Take a look at the curriculum grid and identify the competencies we engaged in while learning to create linear equations and graphs that are represented by visual patterns.

What Big Idea are we heading towards?

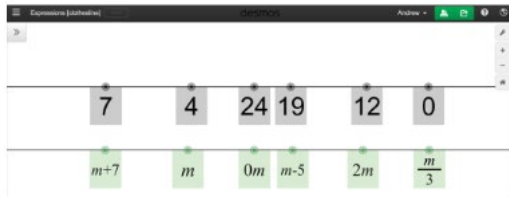
Clothesline Activities

Fantastic way to actively engage students in understanding equivalency as well as relative size:

- Decimals, fractions, percentages and how they are connected
- Rational Numbers and their relative sizes
- Algebra



See it with Desmos



use this clothesline activity
with desmos

Resources

<https://clotheslinemath.com/>

<http://www.estimation180.com/clothesline.html>

http://mr_-stadel.blogspot.com/2015/08/clothesline.html

http://mrorr_-isageek.com/double_-clothesline_-solving-equations/

Clothesline Algebra!

As we work through these, put yourself in the role of your students...what big ideas are we working towards?

What competencies are we engaging in?

What obstacles and misunderstandings will you expect and how can you help to scaffold when needed?

What coaching questions can you ask them to support them?

What First Peoples Principles of Learning are we using?

Math Through An Indigenous Lens

Let's Consider how a Traditional Western Worldview differs from an Indigenous Worldview and how that can make a difference in our classrooms

What do you think are the components of a Traditional Western Worldview and an Indigenous Worldview?

Traditional Western Worldview

5 consistent characteristics (no ONE Western Worldview):

- “Knowledge is linear, singular and static in nature, resulting in the valuing of one correct answer to any problem or question and one correct way to achieve these answers
- Valuing of hierarchies within knowledge → specialization
- Absolute belief in scientific method (observation that is done in total isolation of all other variables and is based on measurable data). This leads to truth being linked to measurability
- Valuing of compartmentalisation and categorisation of knowledge into small components in order to facilitate complete understanding → knowledge that is valued is abstract, void of context, and dissected for meaning
- Valuing of knowledge that is captured in written form, with more abstract forms, like mathematical symbolism, being highly prized”

Russell, G.L., Chernoff, E.J. The marginalisation of Indigenous students within school mathematics and the math wars: seeking resolutions within ethical spaces. Mathematics Research Group of Australia, 2012

Discuss

New learning

How these relate to how you teach and how your students learn

Which worldview is aligned with our curriculum?

Reflection and Action Plan

“If you don’t use it, you lose it”

Action Plan:

- What are you going to implement this week?

Feedback sheets for reflections please...