DEVELOPING NUMERACY ACROSS ALL AREAS OF LEARNING

FEBRUARY 18 2022

JANICE NOVAKOWSKI, RICHMOND SCHOOL DISTRICT

#SD38numeracy

RICHMOND
SCHOOL DISTRICT NO.38

BC'S NUMERACY LANDSCAPE

- Numeracy Performance Standards (2002)
- BC Early Numeracy Project (2003)
- Renewed Curriculum (2013, implementation 2016)
  - literacy and numeracy foundations/two pillars of the curriculum framework
- Grade 10 Graduation Numeracy Assessment (began 2019)
- Numeracy Proficiency Benchmarks K-12 (2020-2022)
- Numeracy Performance Standards (estimated 2023)

WHY IS NUMERACY IMPORTANT?

Literacy and numeracy foundations - text literacy (reading and writing), number and financial literacy, visual literacy, and digital literacy–are fundamental requirements for full social and economic participation in today's world. Literacy and numeracy skills are developed through applications in all curricular areas.

from BC's Redesigned Curriculum: An Orientation Guide

WHAT IS NUMERACY?

Numeracy is the willingness and ability to interpret and apply mathematical understanding to solve problems in complex situations, and the perseverance to analyze and communicate these solutions in ways that are relevant to the given context.

-BC Curriculum Website Glossary

Defining numeracy

Student ability in numeracy is developed throughout the curriculum and applied in a variety of situated contexts. The following definition of numeracy, which guides the structure and content development of the Grade 10 Graduation Numeracy Assessment, was informed by the curricular competencies from Areas of Learning and embodies the assessment's cross-curricular nature.

Numeracy

Numeracy is the ability to interpret information within a given situation, apply mathematical understanding to solve an identified problem, and to analyze and communicate a solution.

-Grade 10 Graduation Numeracy Assessment Specifications

RICHMOND'S STRATEGIC PLAN

STRATEGIC PRIORITY 1
Inspired Learners

1

Goal 4

The district builds literacy, numeracy and digital literacy through innovation and a commonly held vision.

OBJECTIVES

1. Develop and implement a K-12 literacy vision and framework.
2. Develop and implement a K-12 numeracy vision and framework.
3. Support, develop and deepen students' and staffs' understanding of digital literacy and its integrated implementation.

WHAT DOES NUMERACY LOOK LIKE?

- In our K-7 context, numeracy looks like students using the math concepts and competencies they have learned and developed in new ways, applying them to solve problems or think about issues and applying them to other areas of learning or personal connections.
- **numeracy awareness, numeracy learning experiences and numeracy tasks**

MATHEMATICS & NUMERACY

Mathematics Tasks

- Using a centimeter ruler, measure the length of your hand. What else can you measure? Record your measurements.
- What different ways can you arrange 24 pumpkin seeds in arrays?

Numeracy Task

- Pumpkin seeds need to be planted 40 centimetres apart. Plan how to plant the pumpkin seeds in our garden bed. What tools might you need? Why do think this is a good plan? How will you share your plan?

HOW IS A NUMERACY TASK DIFFERENT THAN A MATHEMATICS TASK?

Mathematics Task

- Rank the following snacks from highest to lowest energy per serving (kJ).
- Which item provides the best value for money?

Numeracy Task

- Rank the following packaged snacks based on their nutrient value and cost: chips, almonds, popcorn, instant noodles, and crackers. Select which of the items you would incorporate into your diet and justify your response.

(students will be provided with nutrition labels for each item and the cost per package)

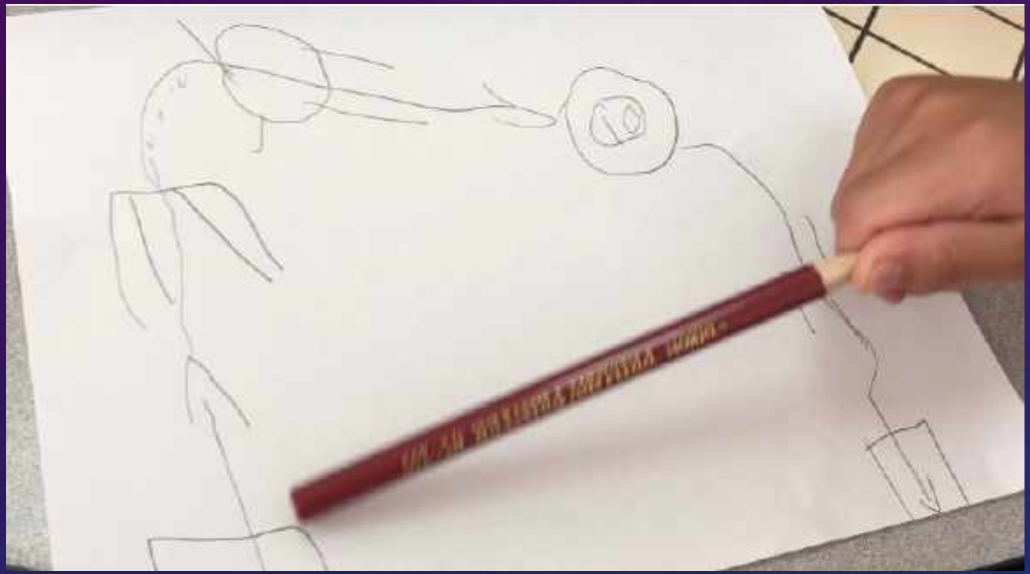
BIG MATH IDEAS
THAT HAVE STRONG CONNECTIONS TO NUMERACY LEARNING EXPERIENCES

- Number represents and describes quantity.
- We can describe, measure and compare spatial relationships.
- Analyzing data and chance enables us to compare and analyze.

KINDERGARTEN NUMERACY TASK

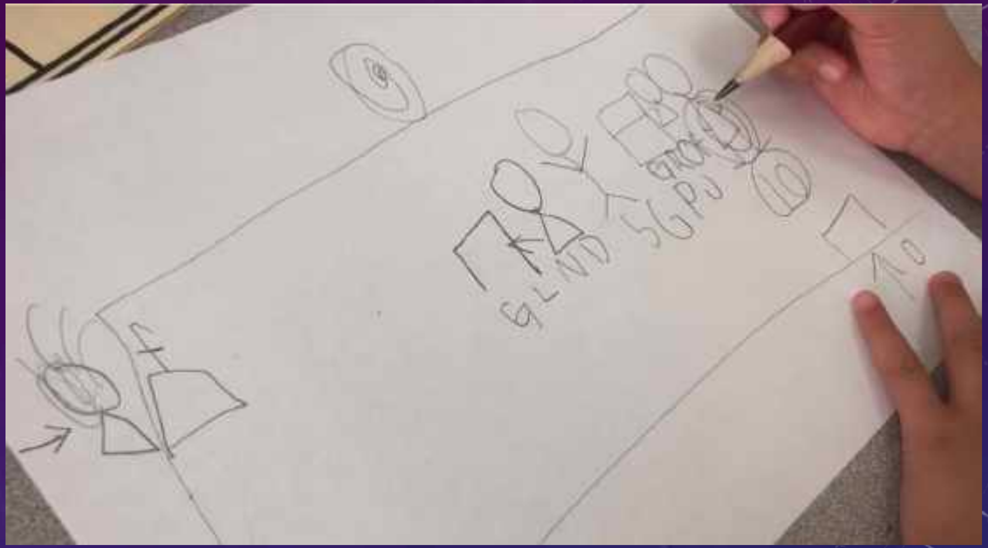
SPUL'U'KWUKS

KINDERGARTEN:
PLAN AND DESIGN AN OBSTACLE COURSE



TYPE OF NUMERACY TASK:

- Plan & Design



Curriculum Connections

Physical Education

- Develop and demonstrate a variety of fundamental movement skills in a variety of physical activities and environments
- Describe the body's reaction to participating in physical activity in a variety of environments

Mathematics

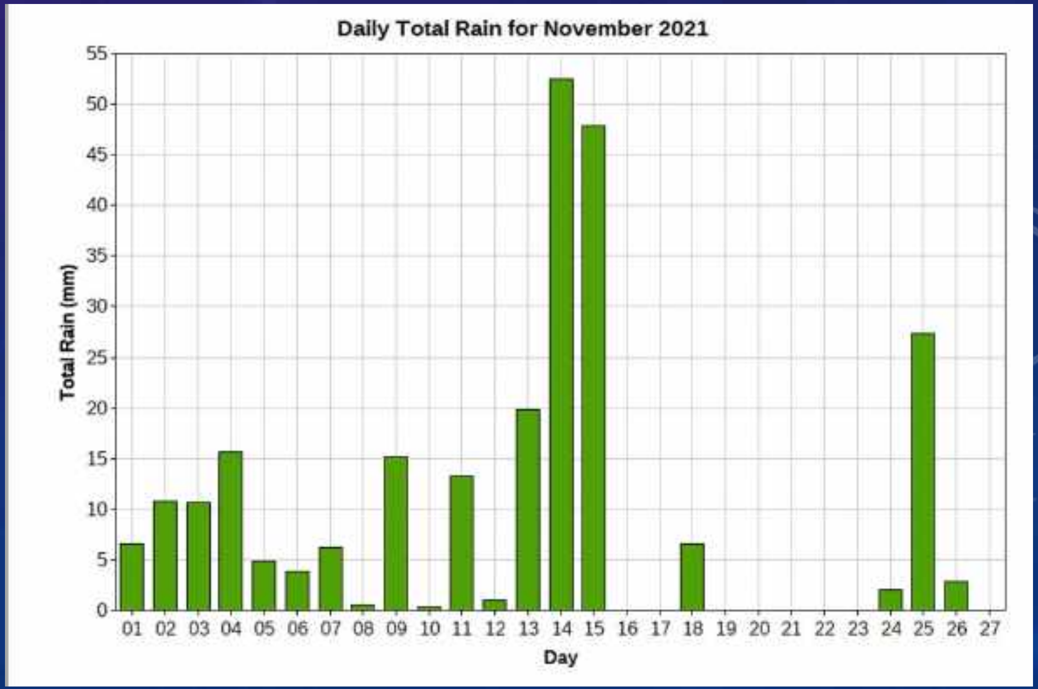
- Direct comparative measurement
- Single attributes of 2D shapes and 3D objects

GRADES 2-4 NUMERACY TASK

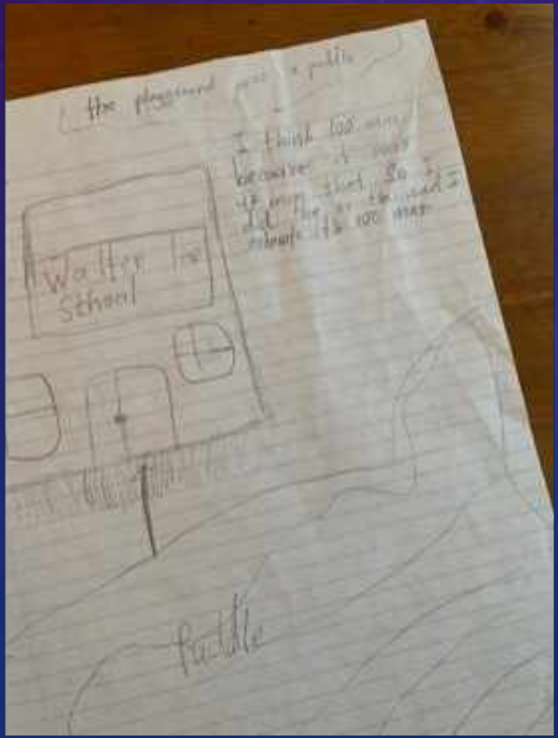
LEE ELEMENTARY

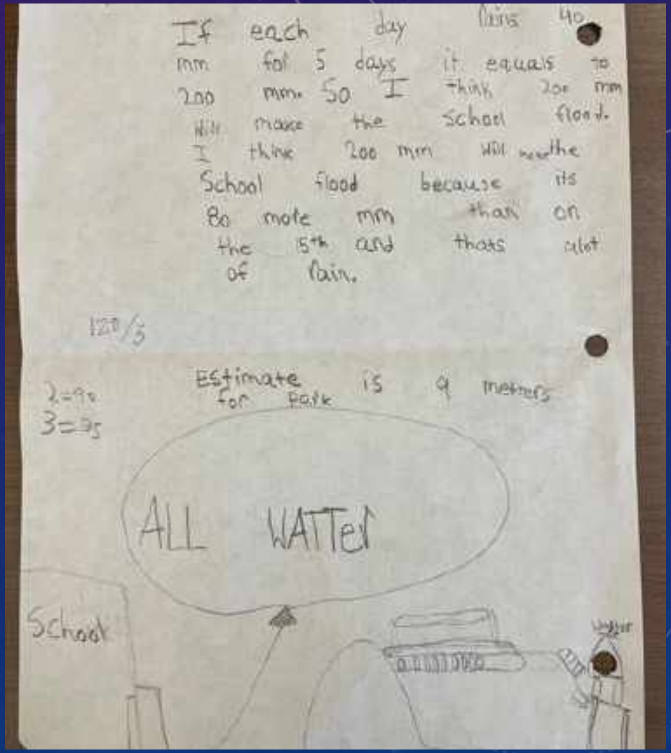
FLOODING NOVEMBER 2021

ATMOSPHERIC RIVER NOVEMBER 15



If the rain continued with a pattern of daily rain, how much rain would need to accumulate for the school building to experience flooding? Explain and justify your thinking.





What could we do to help?

GRADE 3 BC CURRICULUM CONNECTIONS

CURRICULAR COMPETENCIES

Science

- Experience and interpret the local environment
- Use tables, simple bar graphs, or other formats to represent data and show simple patterns and trends
- Represent and communicate ideas and findings in a variety of ways, such as diagrams and simple reports, using digital technologies as appropriate

Social Studies

- Explain why people, events, or places are significant to various individuals and groups (significance)

Mathematics

- Estimate reasonably
- Develop and use multiple strategies to engage in problem solving
- Explain and justify mathematical ideas and decisions

CURRICULAR CONTENT

Science

- major local landforms
- observable changes in the local environment caused by erosion and deposition by wind, water, and ice

Social Studies

- relationship between humans and their environment

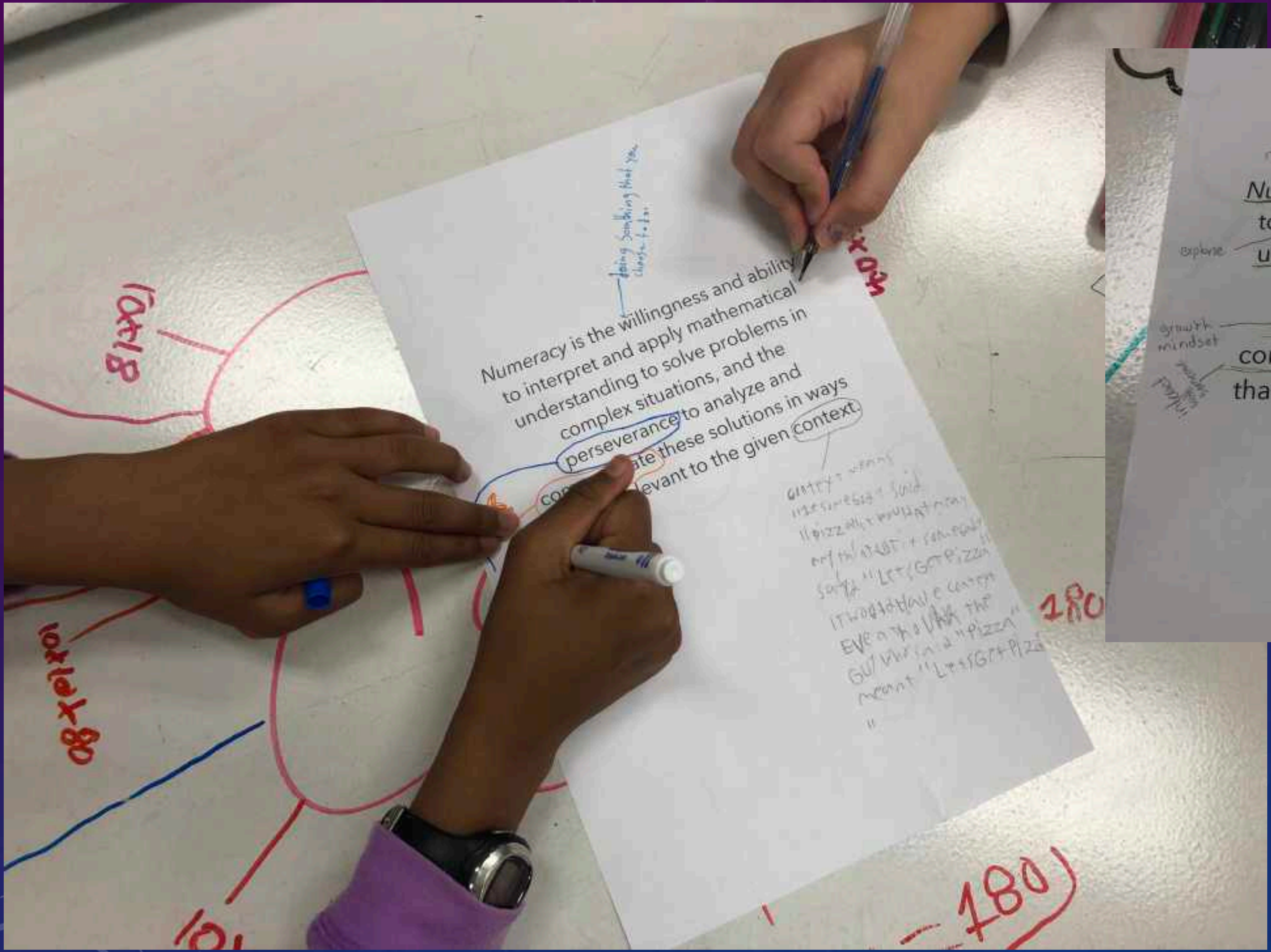
Mathematics

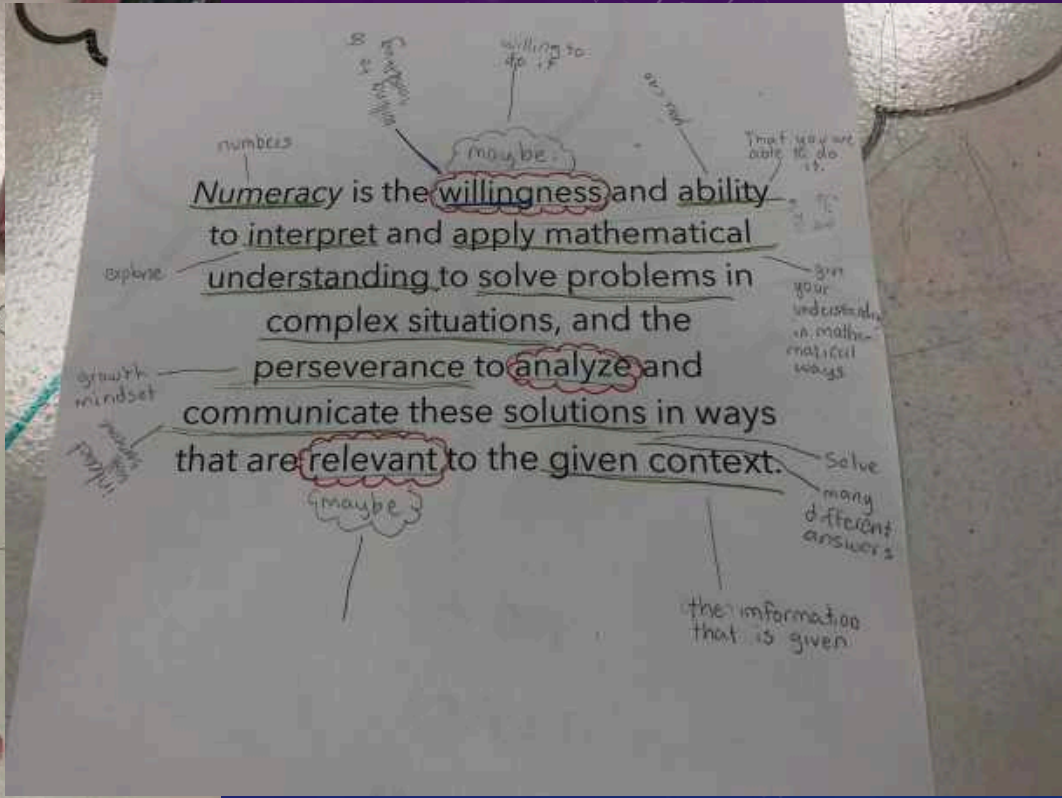
- number concepts to 1000
- measurement, using standard units (linear, mass, and capacity)
- one-to-one correspondence with bar graphs, pictographs, charts, and tables

INTERMEDIATE NUMERACY PROJECT

QUILCHENA ELEMENTARY

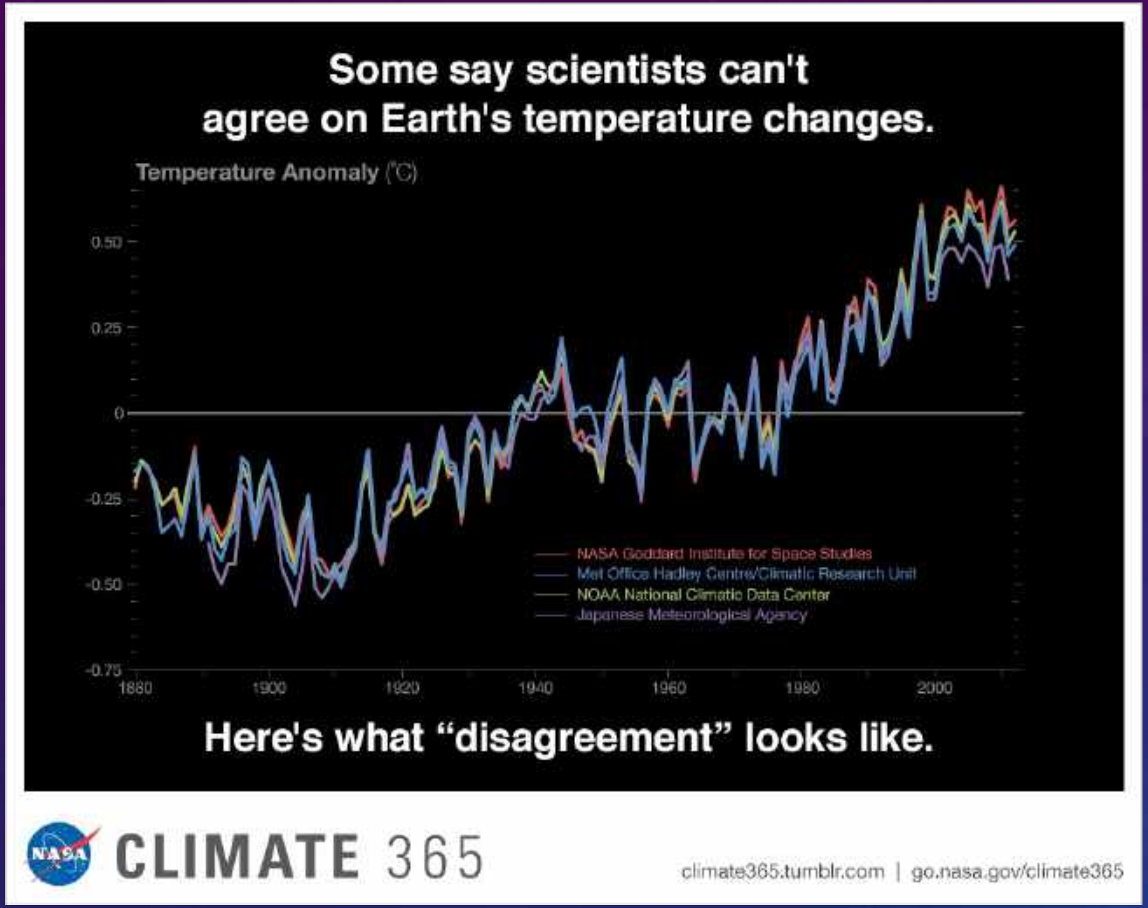
GRADES 5, 6 & 7



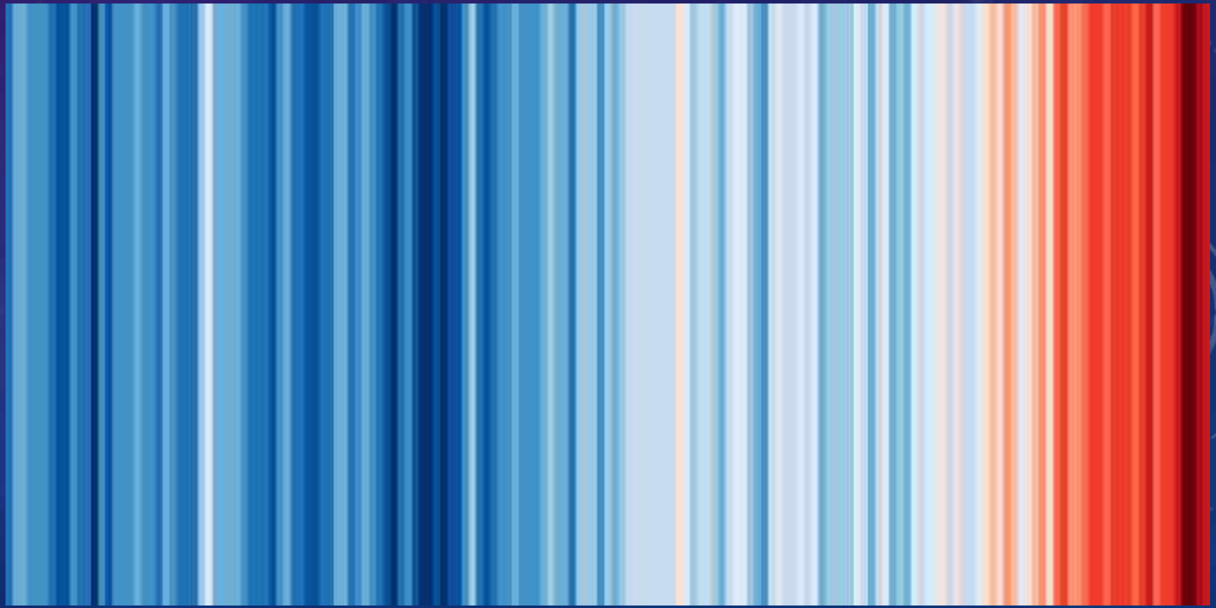


What is numeracy?

Climate Strike



responding to students’ interests



NEWS | **Election 2019** | **Indigenous Affairs** | **Rights + Justice**

VOTE 2019

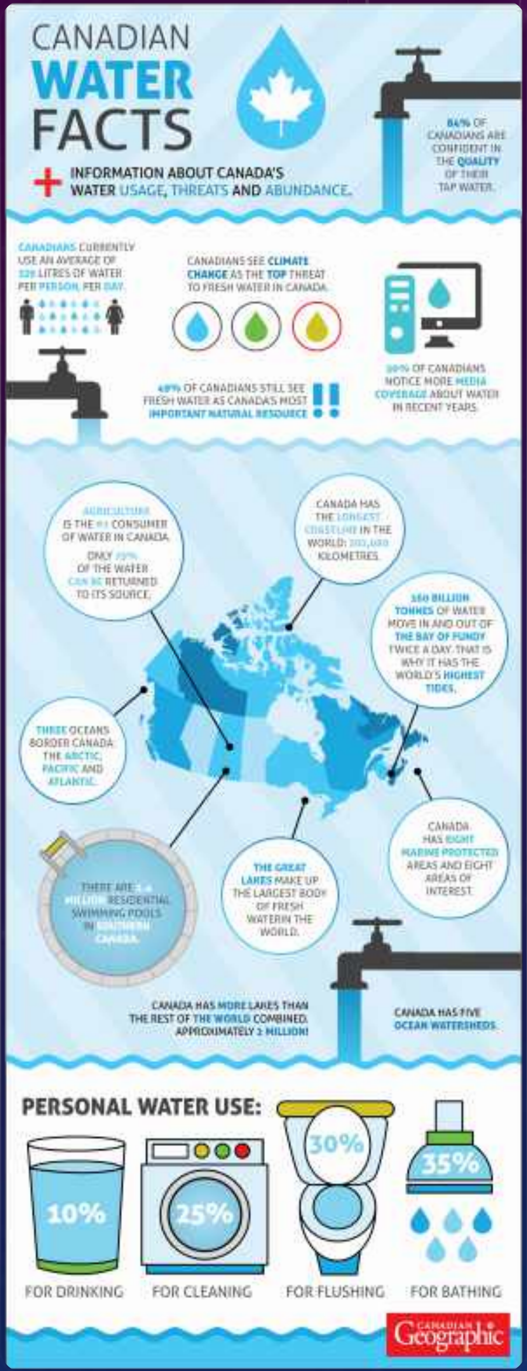
The Water Crisis in First Nations Communities: An Election Explainer

Who's promising what, and what really needs to happen.


By Jamin Mike and Christopher Cheung, 17 Oct 2019 | TheTyee.ca

Jamin Mike is an intern with The Tyee through the Journalists for Human Rights Emerging Indigenous Reporter program. He is from Treaty 6 territory in central Saskatchewan.

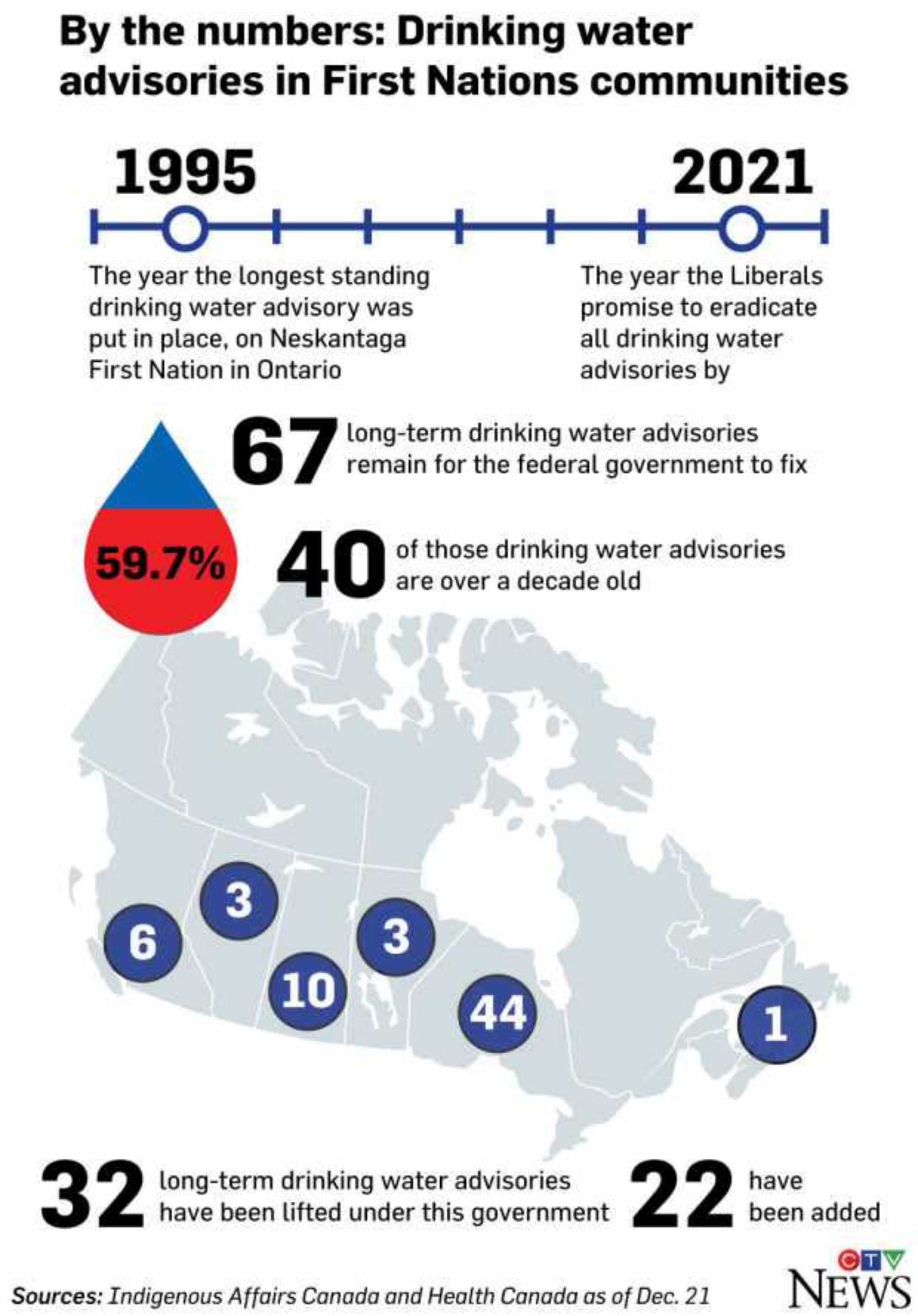
Christopher Cheung reports on urban issues for The Tyee.

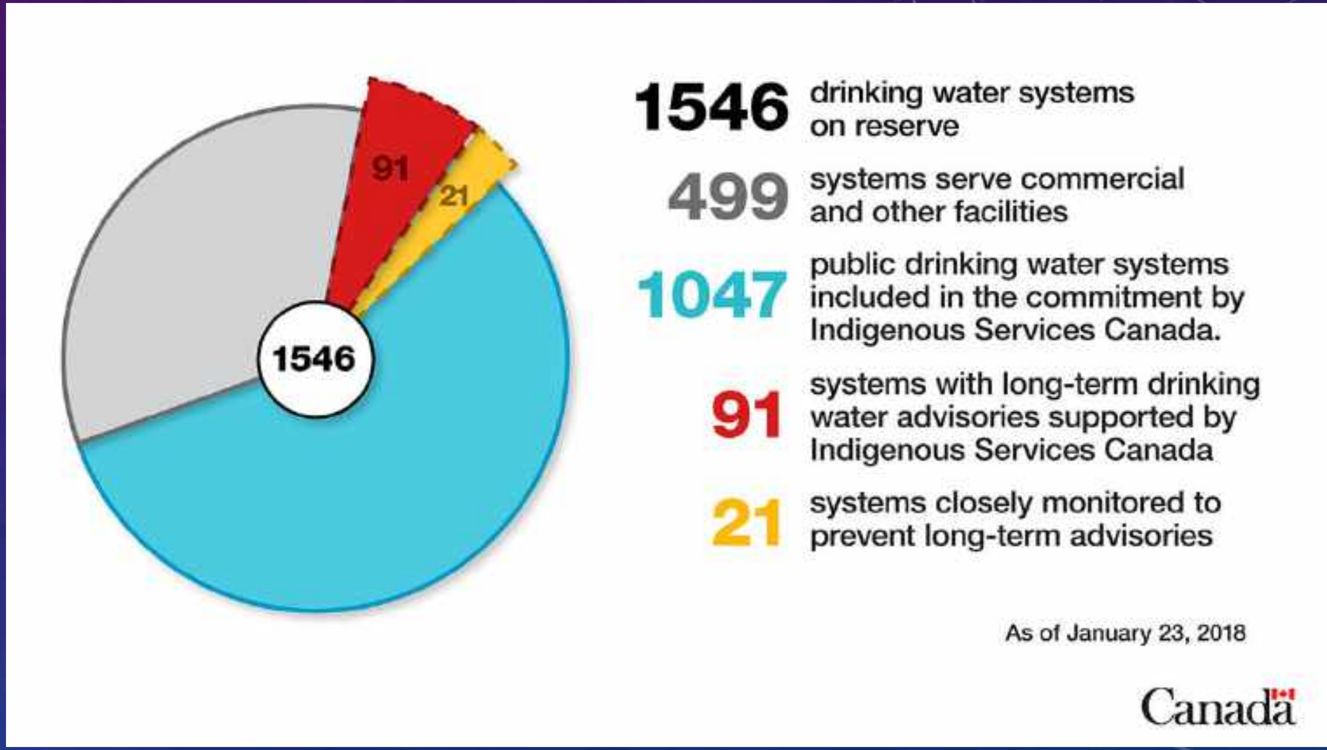


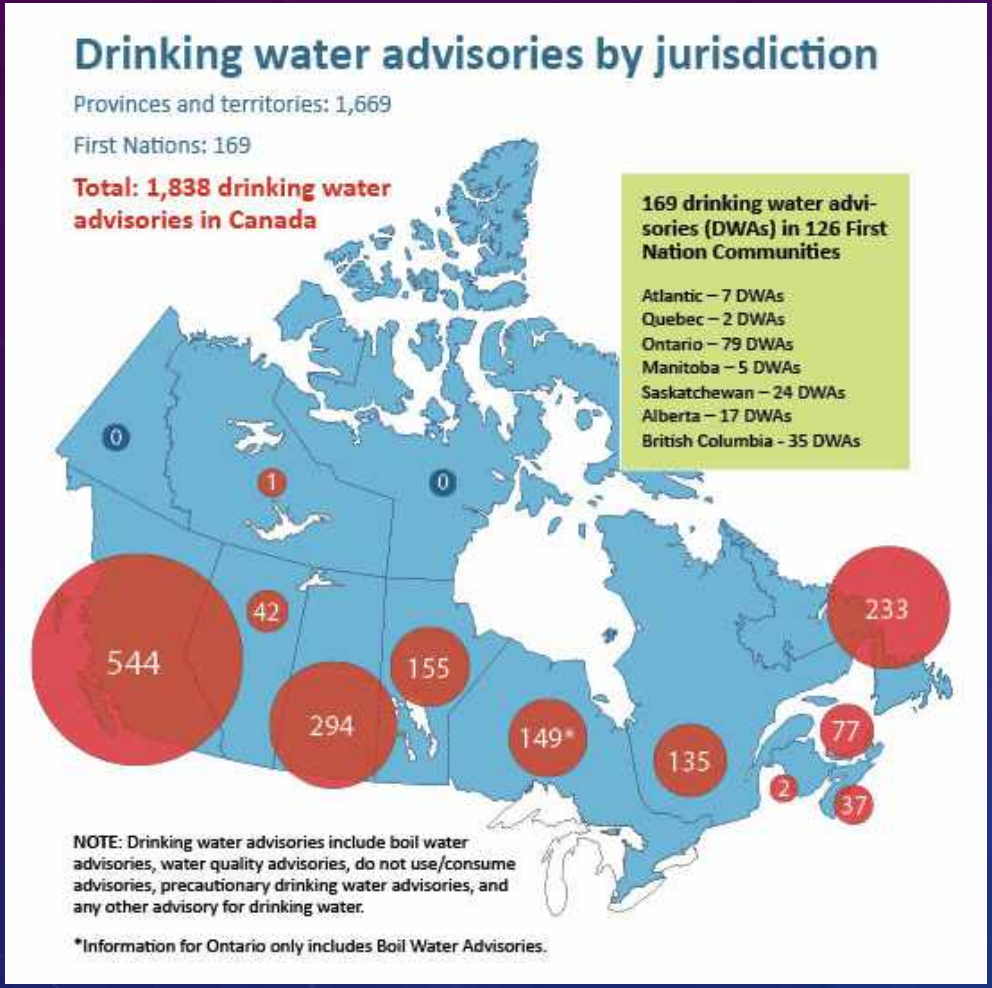
WHAT IS AN INFOGRAPHIC?

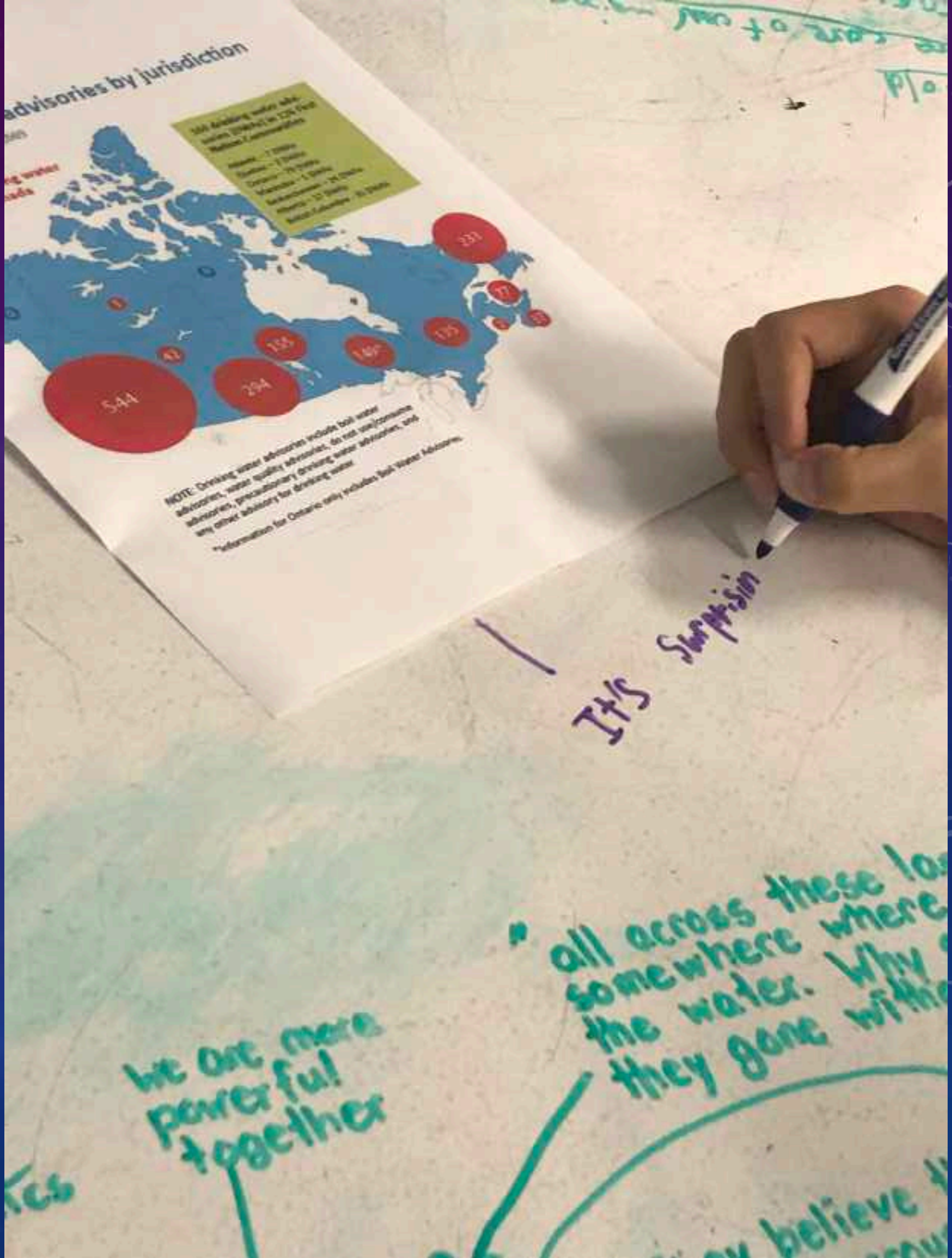
Infographics are graphic visual representations of information, data, or knowledge intended to present information quickly and clearly. They can improve cognition by utilizing graphics to enhance the human visual system's ability to see patterns and trends.

-from Wikipedia


By the numbers: Drinking water advisories in First Nations communities
1995
The year the longest standing drinking water advisory was put in place, on Neskantaga First Nation in Ontario
2021
The year the Liberals promise to eradicate all drinking water advisories by
67 long-term drinking water advisories remain for the federal government to fix
59.7%
40 of those drinking water advisories are over a decade old
6
3
10
3
44
1
32 long-term drinking water advisories have been lifted under this government
22 have been added
Sources: Indigenous Affairs Canada and Health Canada as of Dec. 21
CTV NEWS


91
21
1546
1546 drinking water systems on reserve
499 systems serve commercial and other facilities
1047 public drinking water systems included in the commitment by Indigenous Services Canada.
91 systems with long-term drinking water advisories supported by Indigenous Services Canada
21 systems closely monitored to prevent long-term advisories
As of January 23, 2018
Canada


Drinking water advisories by jurisdiction
Provinces and territories: 1,669
First Nations: 169
Total: 1,838 drinking water advisories in Canada
169 drinking water advisories (DWAs) in 126 First Nation Communities
Atlantic – 7 DWAs
Quebec – 2 DWAs
Ontario – 79 DWAs
Manitoba – 5 DWAs
Saskatchewan – 24 DWAs
Alberta – 17 DWAs
British Columbia - 35 DWAs
0
1
0
544
42
294
155
149*
135
233
77
2
37
NOTE: Drinking water advisories include boil water advisories, water quality advisories, do not use/consume advisories, precautionary drinking water advisories, and any other advisory for drinking water.
*Information for Ontario only includes Boil Water Advisories.


It's Surprisin
we are more powerful together
all across these
somewhere where
the water. Why
they gone
believe

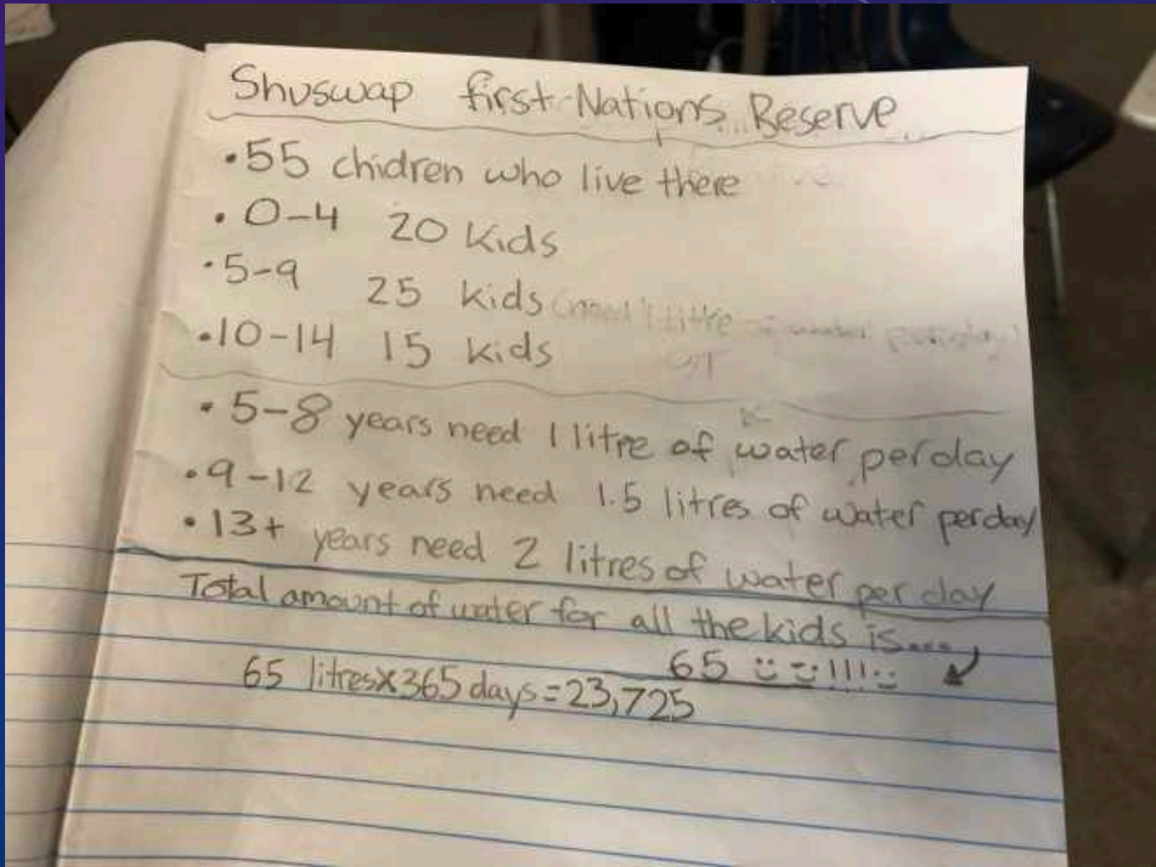
HOW MUCH WATER WILL BE NEEDED FOR THE DAILY NEEDS OF ALL THE CHILDREN FOR ONE YEAR IN ONE OF THE FIRST NATIONS COMMUNITIES AFFECTED BY A DRINKING WATER ADVISORY?

WHAT DO WE KNOW	WHAT DO WE NEED TO KNOW	WHAT DECISIONS/ASSUMPTIONS NEED TO BE MADE

Consider: sources of data and information

Explain and justify your solution.


Population
0-14 60
How much water?
Cold water
Do not consum


Shuswap first Nations Reserve
•55 chidren who live there
•0-4 20 Kids
•5-9 25 kids
•10-14 15 kids
•5-8 years need 1 litre of water per day
•9-12 years need 1.5 litres of water per day
•13+ years need 2 litres of water per day
Total amount of water for all the kids is...
65 litres x 365 days = 23,725
65 !!!

WATER, WATER EVERYWHERE!

You are in charge of a water conservation awareness campaign for our school. You have surveyed the following 12 students and have determined that they brush their teeth as listed below. Use this information to estimate the water that could be conserved if they changed their water usage habits.

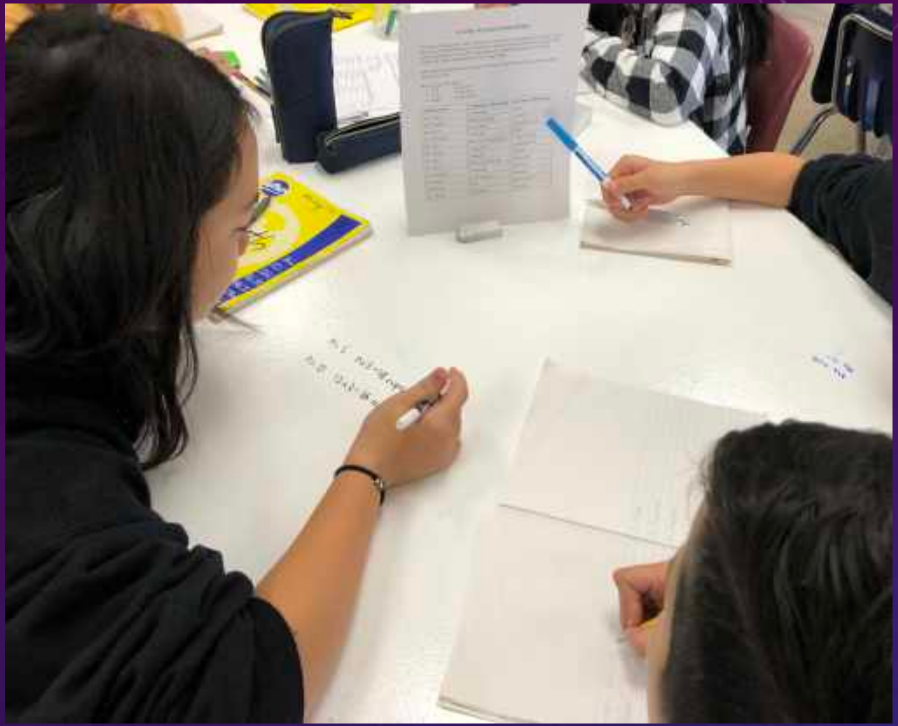
All students currently leave the water running at high flow for the entire time they brush their teeth.

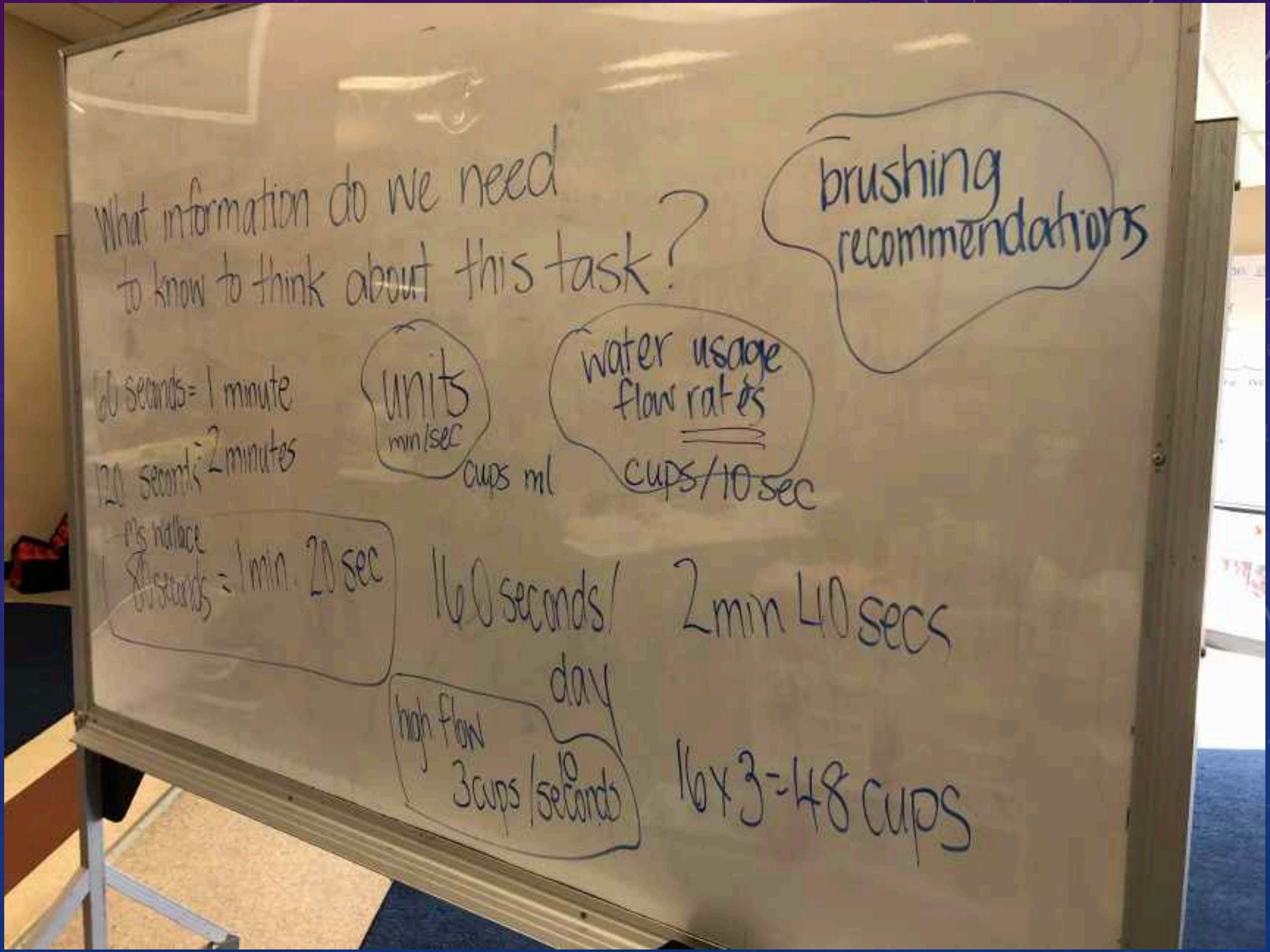
Water usage flow rates:

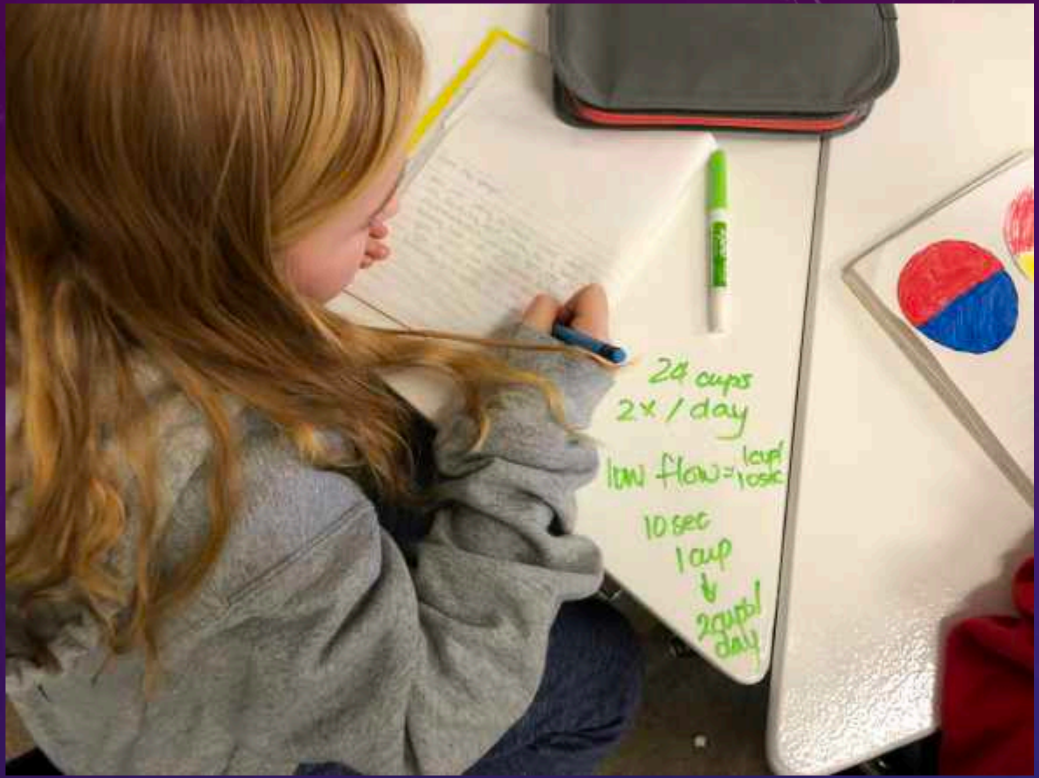
- Off - 0 cups/sec.
- Low - 1 cup/10 sec.
- High - 3 cups/10 sec.

Student name:	**Frequency of brushing:**	**Duration of Brushing:**
Johnny	2 times/day	40 sec.
Suzie	after every meal	1 minute
Joanna	3 times/day	2 minutes
George	1 time/day	30 sec.
Polly	after every time she eats	1 minute 30 sec.
Heather	2 times/day	1 minute 20 sec.
Catherine	1 time/day	2 minutes
Billy	Once every other day	195 seconds
Lana	3 times/day	35 seconds
Shane	every morning	50 seconds
Uma	twice	1 minute 10 sec.
Bob	5 times/day	70 seconds

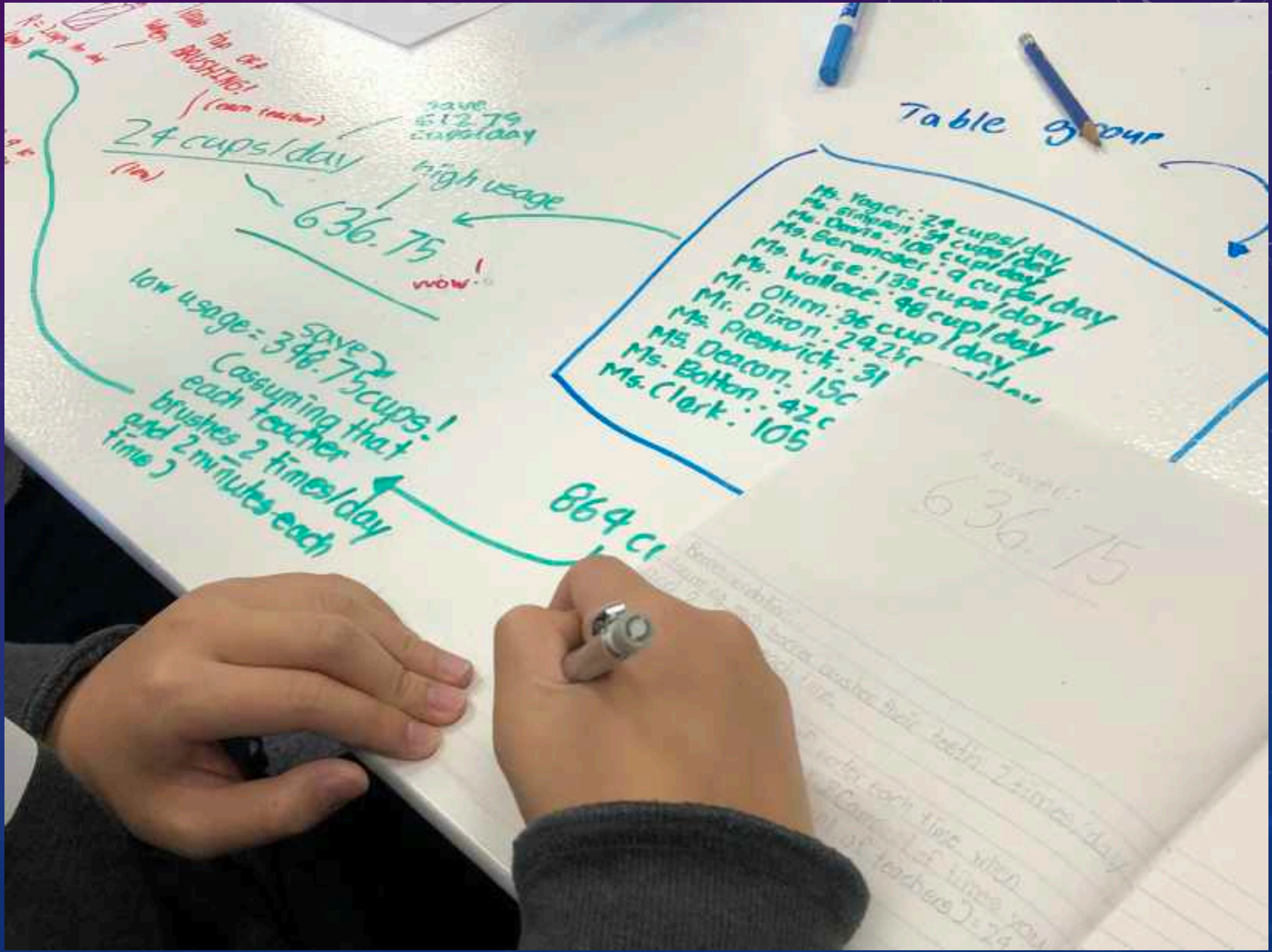
Numeracy Task
adapted from Dr. Peter Liljedahl's website




What information do we need
to know to think about this task?
brushing recommendations
60 seconds = 1 minute
120 seconds = 2 minutes
units
min/sec
cups ml
water usage
flow rates
cups/10 sec
Ms Wallace
80 seconds = 1min. 20 sec
160 seconds/day
2 min 40 secs
high flow
3 cups/10 seconds
16 x 3 = 48 cups

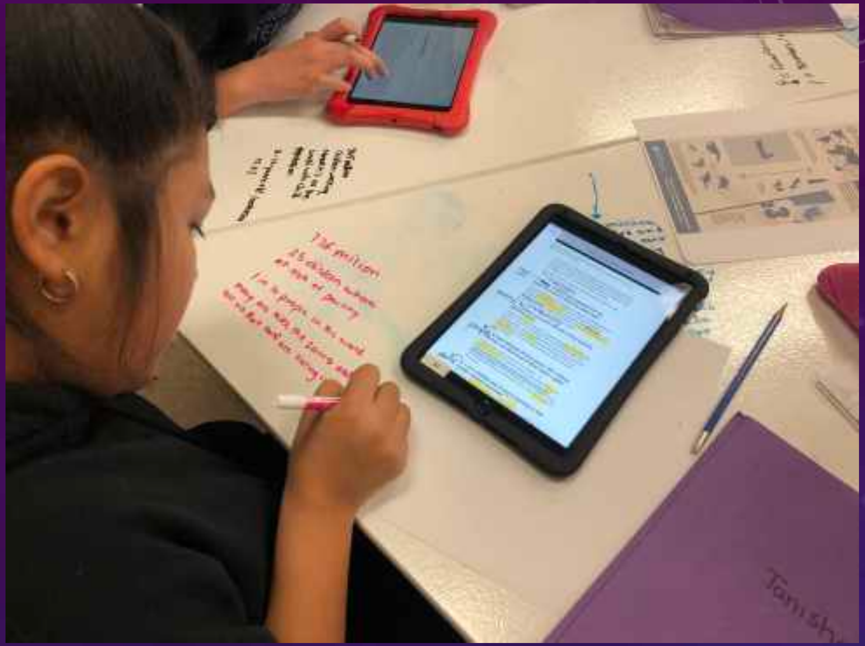


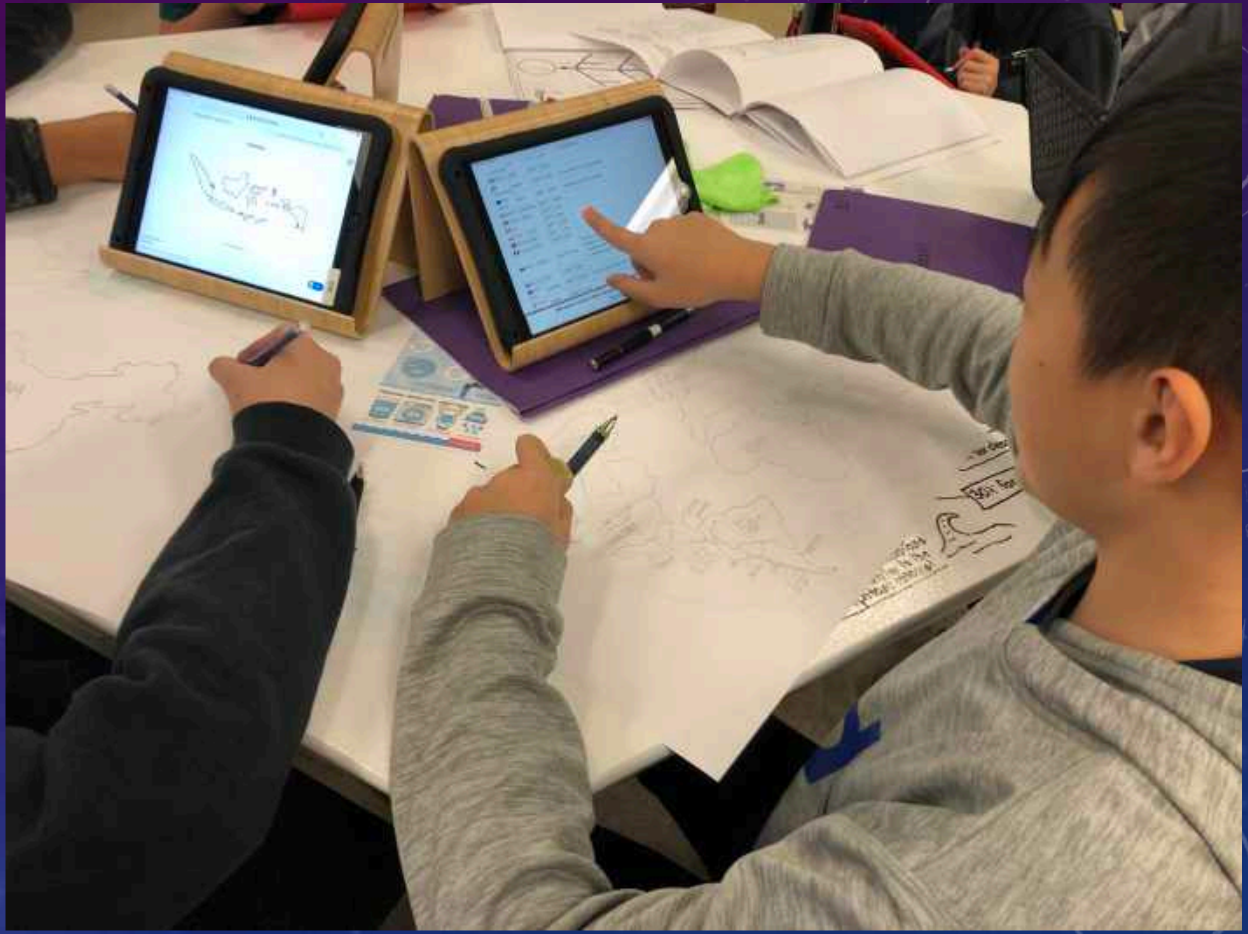
24 cups
2x / day
low flow = 1cup/10sec
10 sec
1 cup
2cups/day



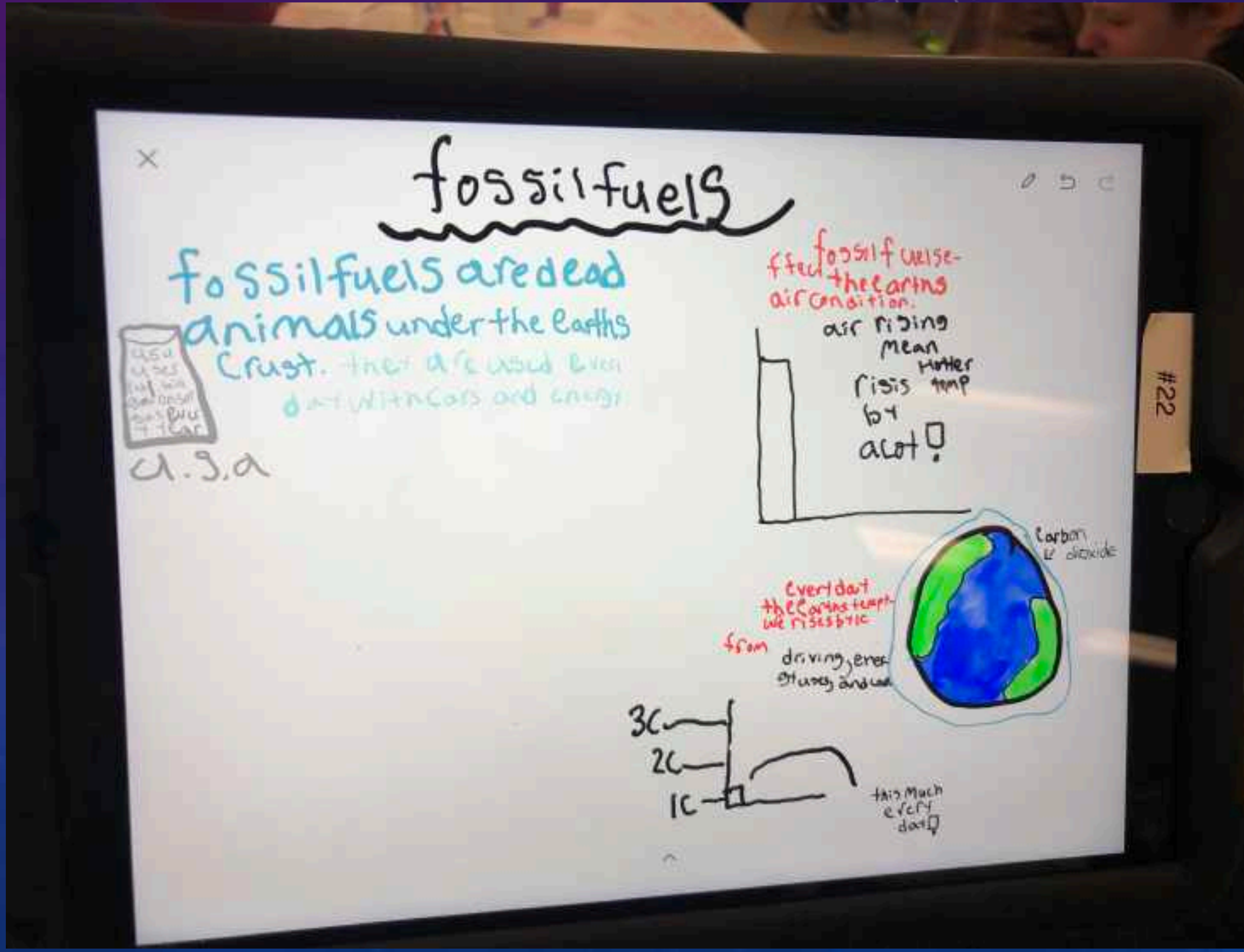
24 cups/day
save 612.75 cups/day
high usage
636.75
wow!
low usage = 398.75 cups!
save
(assuming that each teacher brushes 2 times/day and 2 minutes each time)
Table group
Ms. Wise: 135 cups/day
Ms. Wallace: 98 cups/day
Mr. Ohm: 36 cup/day

- **How do numbers, data and mathematical information help to create a compelling case for others to engage with and understand a global issue?**






99%
Of everything in the great pacific garbage patch is plastic
Other
1%
PIC·COLLAGE


fossilfuels
fossilfuels are dead animals under the Earths Crust.
fossilf uelse-ffect the Earths air condition.
air rising mean Hotter temp
risis by a lot!
carbon dioxide
u.s.a
3C
2C
1C
this Much every day!
#22

BC CURRICULUM CONNECTIONS

- **Major tenets:** inquiry-based approaches to teaching and learning, literacy, numeracy, digital literacy, visual literacy, core and curricular competencies

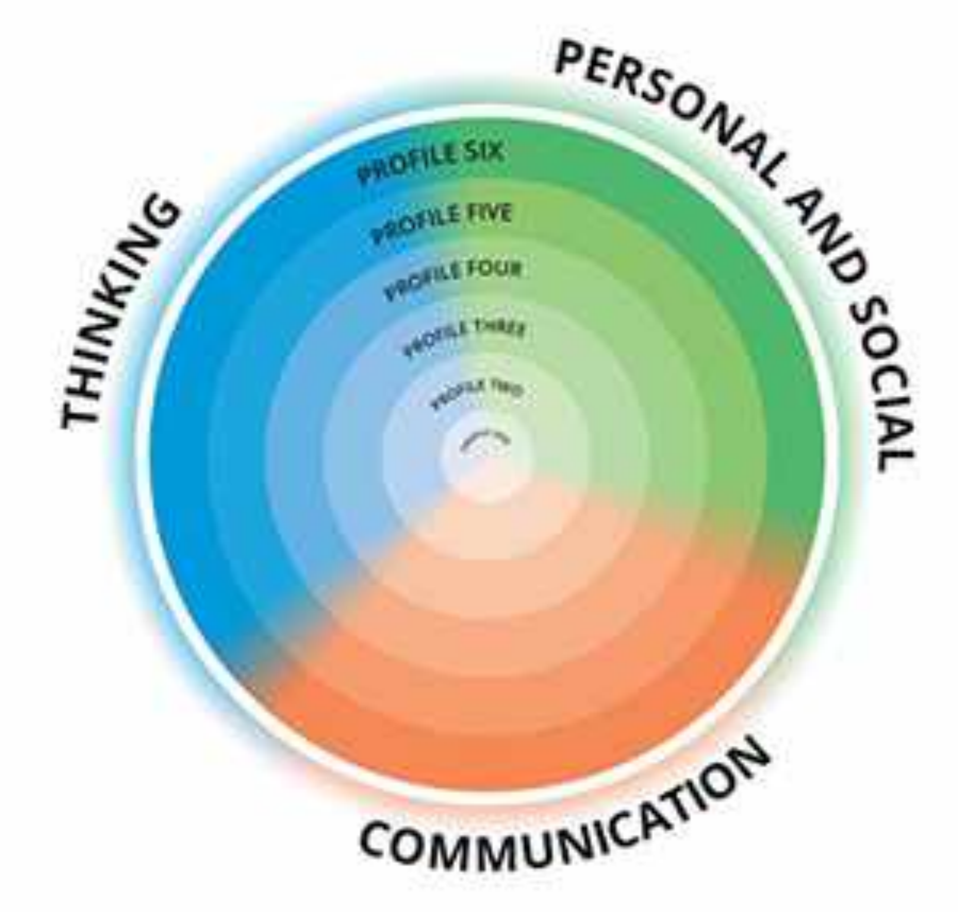
- **Mathematics, English Language Arts, Social Studies and Science Curriculum Frameworks**
  - Big Ideas
  - Curricular Competencies
  - Curricular Content

WHERE DOES NUMERACY LIVE IN THE CURRICULUM?

FINDING NUMERACY CONNECTIONS ACROSS ALL AREAS OF LEARNING

CORE COMPETENCIES

- Communication
- Thinking
- Personal & Social



NUMERACY IN ALL AREAS OF LEARNING

Applied Design, Skills, and Technologies
K 1 2 3 4 5 6 7 8 9 10 11 12

Career Education
K 1 2 3 4 5 6 7 8 9 CLE CLC

Français langue première
K 1 2 3 4 5 6 7 8 9 10 11 12

Languages
5 6 7 8 9 10 11 12

Physical and Health Education
K 1 2 3 4 5 6 7 8 9 10 11 12

Social Studies
K 1 2 3 4 5 6 7 8 9 10 11 12

Arts Education
K 1 2 3 4 5 6 7 8 9 10 11 12

English Language Arts
K 1 2 3 4 5 6 7 8 9 10 11 12

Français langue seconde - immersion
K 1 2 3 4 5 6 6T 7 7T 8 9 10 11 12

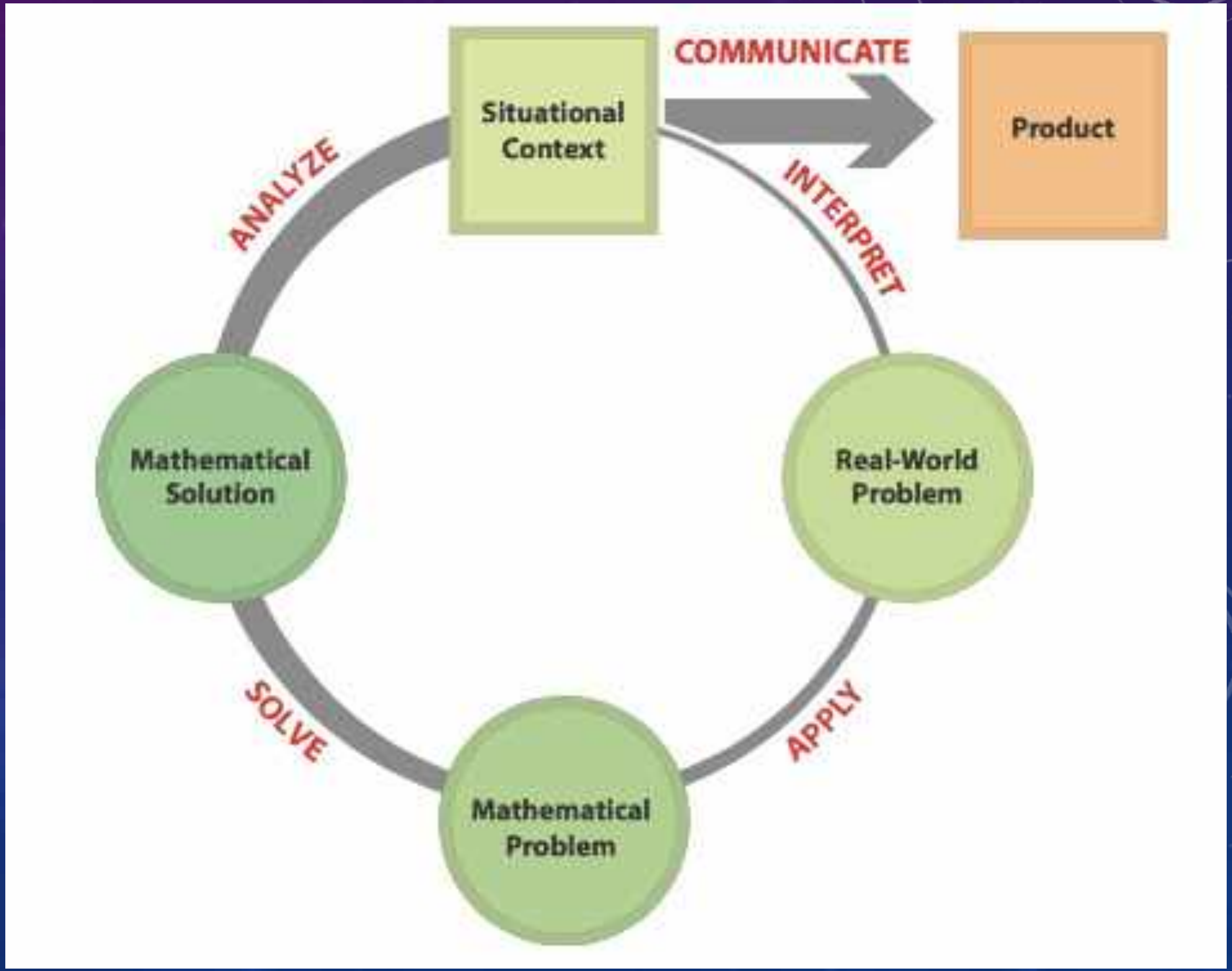
Mathematics
K 1 2 3 4 5 6 7 8 9 10 11 12

Science
K 1 2 3 4 5 6 7 8 9 10 11 12

Additional Offerings

NUMERACY PROCESSES

- Interpret
- Apply
- Solve
- Analyze
- Communicate



CURRICULAR COMPETENCIES

Grade 2 Science

Planning and conducting

- Make and record observations
- Safely manipulate materials to test ideas and predictions
- Make and record simple measurements using informal or non-standard methods

Applying and innovating

- Take part in caring for self, family, classroom and school through personal approaches
- Transfer and apply learning to new situations
- Generate and introduce new or refined ideas when problem solving

CURRICULAR COMPETENCIES

Grade 4 Social Studies

Use Social Studies inquiry processes and skills to ask questions; gather, interpret and analyze ideas; and communicate findings and decisions

- Compare information and viewpoints about a selected problem or issue
- Identify patterns in information, and use those patterns to draw inferences
- Summarize information and opinions about a selected problem or issue
- Use grids, scales, and legends on maps and timelines to interpret or represent specific information

CURRICULAR COMPETENCIES

Grade 5 Science

Planning and conducting

- With support, plan appropriate investigations to answer their questions or solve problems they have identified
- Decide which variable should be changed and measured for a fair test
- Choose appropriate data to collect to answer their questions
- Observe, measure, and record data, using appropriate tools, including digital technologies

CURRICULAR COMPETENCIES

Grade 6 Arts Education

Reasoning and reflecting

- Interpret creative works using knowledge and skills from various areas of learning
- Examine relationships between the arts and the wider world

CURRICULAR COMPETENCIES

Grade 7 ADST : Applied Design

Defining

- Choose a design opportunity
- Identify key features or potential users and their requirements
- Identify criteria for success and any constraints

Sharing

- Decide on how and with whom to share their product
- Demonstrate their product and describe their process, using appropriate terminology and providing reasons for their selected solution and modifications
- Evaluate their product against their criteria and explain how it contributes to the individual, family, community, and/or environment

BUILDING NUMERACY INTO PLANNING

- Planning through Big Ideas or Curricular Competencies
- Mathematics – one hour a day
- Numeracy experiences throughout day, connected to other curricular areas

WHAT CAN YOU DO?

- Use the term numeracy in communication with your students, staff and families.
- Plan for embedding numeracy experiences across curriculum areas.
- Include reading, interpretation and creation of graphs and infographics across curricular areas.
- Try one named numeracy task each term and collect evidence of learning for the numeracy processes.

WHERE CAN YOU FIND NUMERACY CONNECTIONS?

Add your ideas to the shared document in the chat. Indicate grade level and area of learning.

Applied Design, Skills, and Technologies
K 1 2 3 4 5 6 7 8 9 10 11 12

Career Education
K 1 2 3 4 5 6 7 8 9 CLE CLC

Français langue première
K 1 2 3 4 5 6 7 8 9 10 11 12

Languages
5 6 7 8 9 10 11 12

Physical and Health Education
K 1 2 3 4 5 6 7 8 9 10 11 12

Social Studies
K 1 2 3 4 5 6 7 8 9 10 11 12

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K 1 2 3 4 5 6 7 8 9 10 11 12

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K 1 2 3 4 5 6 7 8 9 10 11 12

Français langue seconde - immersion
K 1 2 3 4 5 6 6T 7 7T 8 9 10 11 12

Mathematics
K 1 2 3 4 5 6 7 8 9 10 11 12

Science
K 1 2 3 4 5 6 7 8 9 10 11 12

Additional Offerings

RICHMOND
SCHOOL DISTRICT NO.38

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