Mathematics in the Elementary School

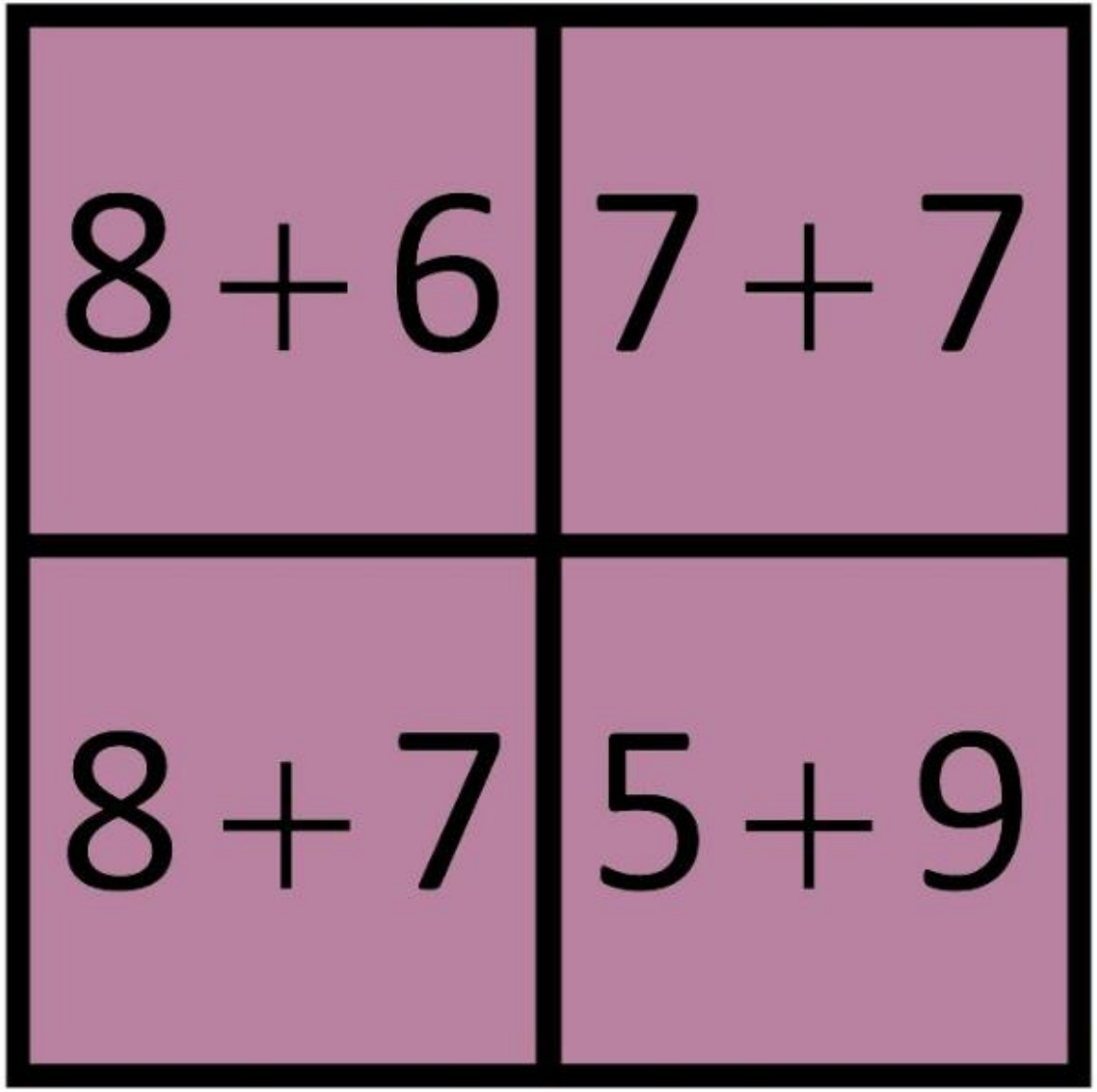
✓ Approaches to Learning Math

Avio Diniz
PYP Mathematics Department
Meadowridge School
avio.diniz@meadowridge.bc.ca

Which One Doesn't Belong?

Number Talk

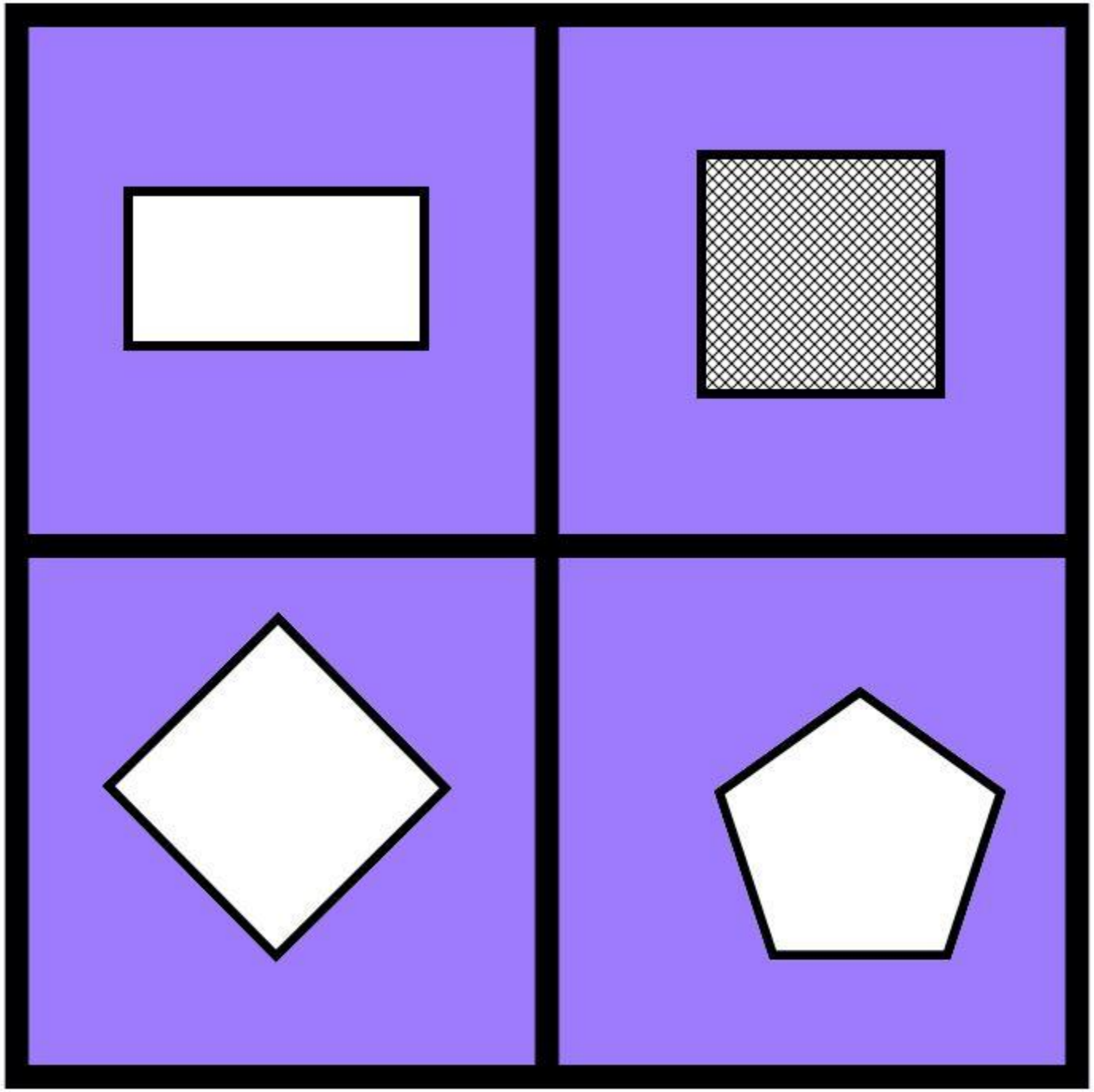
Turn and Talk.



Which One Doesn't Belong?

Number Talk

Turn and Talk.



Overview

- Essential Agreement
- Our Beliefs about Mathematics Learning and Teaching
- Common misconceptions
- What students do in a Math classroom?
- The Role of Assessment in a Math classroom
- Supporting Mathematics Learning at Home
- Time to Play!
- Q & A

Essential Agreement for today

- Be a risk-taker, participate in the tasks
- Be a collaborator, ask questions and share ideas
- Be kind and caring
- Use a growth-mindset, you can do this!
- Have fun with Maths! ☺

COMMON MISCONCEPTIONS

I cannot do mathematics.

I don't get it!

I had a bad experience with maths and now I cannot learn it.

I am not good at mathematics.

Mathematics is boring.

Mathematics is hard!

youcubed at Stanford University

Setting up Positive Norms in Math Class

By Jo Boaler

Here are 7 of my favorite messages to give to students in math class, and some suggestions from *youcubed* as to how to encourage them:

- Everyone can learn math to the highest levels
- Mistakes are valuable
- Questions are really important
- Math is about creativity and making sense
- Math is about connections and communicating
- Math class is about learning not performing
- Depth is more important than speed

At Meadowridge School, we believe Mathematics is...

- ✓ An Invitation to PLAY
  - Learning through cooperative Play-Based model
  - Constructivist Theory – John Dewey, “we learn by doing”.

- ✓ Developing the Hands-Heart-Mind Connection (Reggio approach)

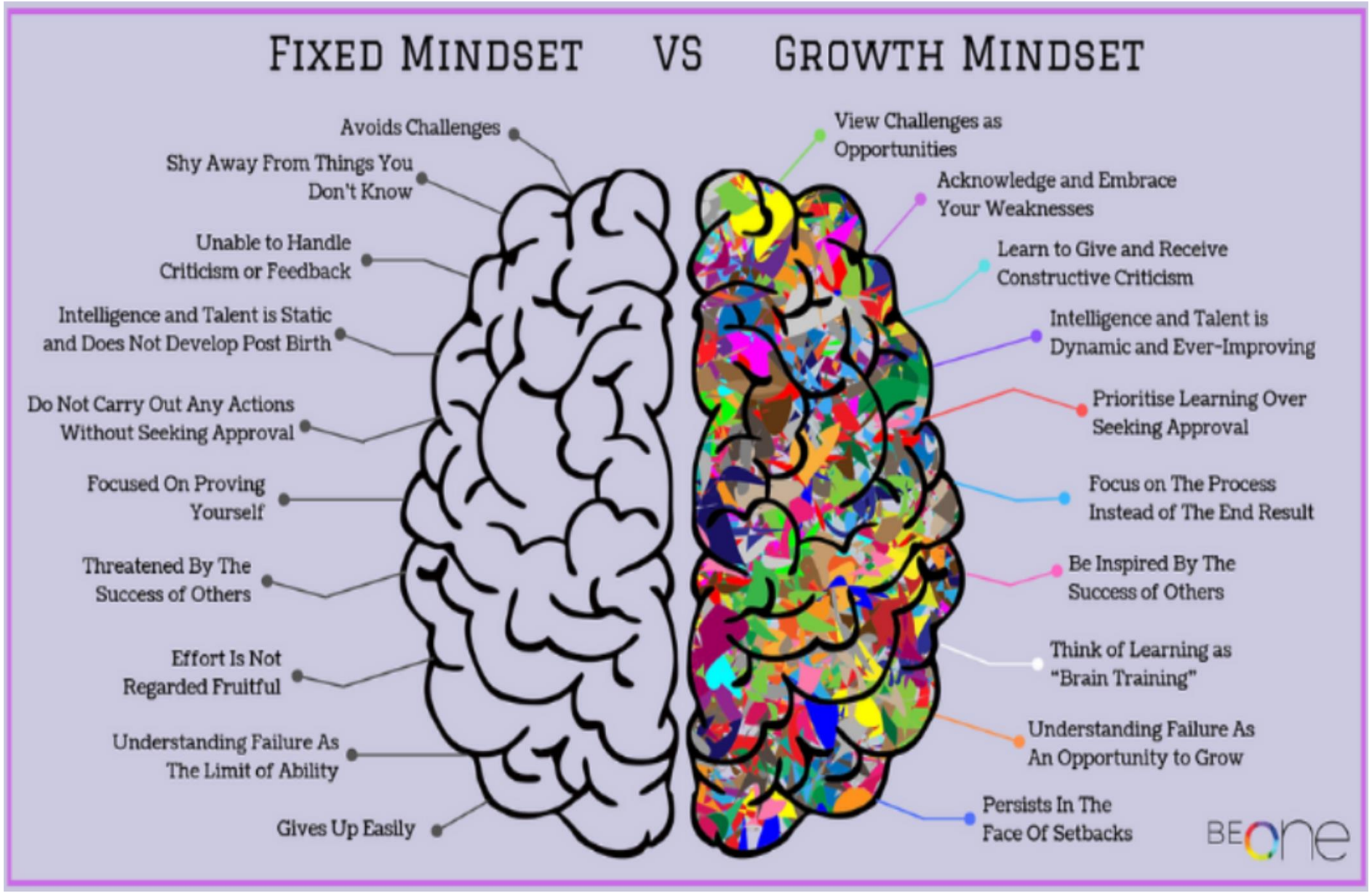
- ✓ Developing a Growth-Mindset and The Power of Yet!
  - Building self-confidence, believing in oneself, and interests.

- ✓ Student-centered learning through Inquiry, fostering curiosity, critical thinking, and problem-solving skills that are essential for success in the modern world.

- ✓ Developing a deeper understanding of mathematical concepts and mathematical thinking, helping students make sense of math in the real-world.

- ✓ Reflecting on our Approaches to Learning and Approaches to Teaching
  - PYP Teachers in a book study, *Building Thinking Classrooms*

Growth Mindset & The Power of Yet!



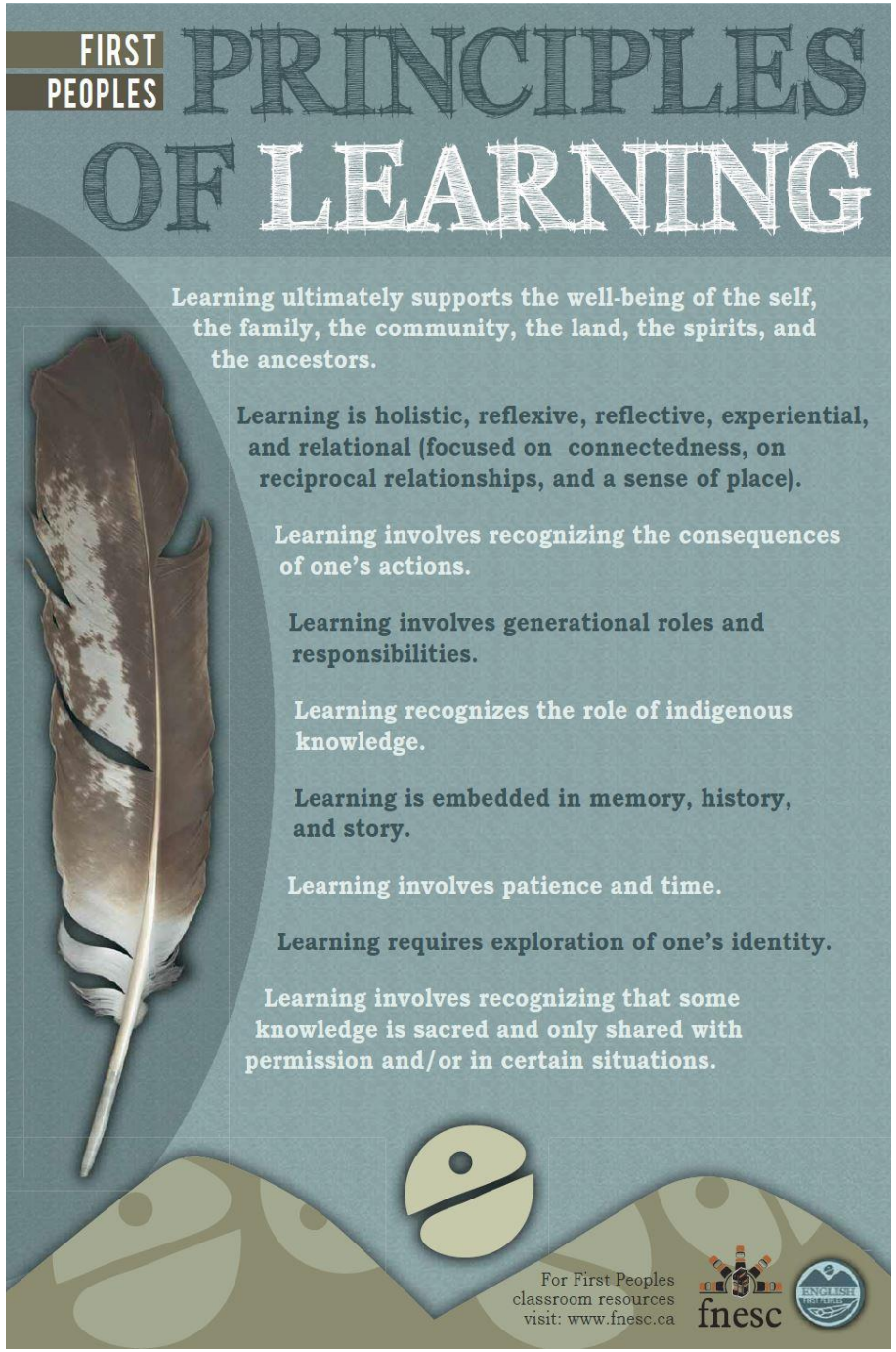
British Columbia (B.C.) Mathematics curriculum

Math K-9 – Curricular Competencies

Grade	Reasoning and analyzing	Understanding and solving	Communicating and representing	Connecting and reflecting
K-5	• Use reasoning to explore and make connections • Estimate reasonably • Develop mental math strategies and abilities to make sense of quantities • Use technology to explore mathematics • Model mathematics in contextualized experiences	• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving • Visualize to explore mathematical concepts • Develop and use multiple strategies to engage in problem solving • Engage in problem-solving experiences that are connected to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures	• Communicate mathematical thinking in many ways • Use mathematical vocabulary and language to contribute to mathematical discussions • Explain and justify mathematical ideas and decisions • Represent mathematical ideas in concrete, pictorial, and symbolic forms	• Reflect on mathematical thinking • Connect mathematical concepts to each other and to other areas and personal interests • Incorporate First Peoples worldviews and perspectives to make connections to mathematical concepts
6-9	• Use logic and patterns to solve puzzles and play games • Use reasoning and logic to explore, analyze, and apply mathematical ideas • Estimate reasonably • Demonstrate and apply mental math strategies • Use tools or technology to explore and create patterns and relationships, and test conjectures • Model mathematics in contextualized experiences	• Apply multiple strategies to solve problems in both abstract and contextualized situations • Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving • Visualize to explore mathematical concepts • Engage in problem-solving experiences that are connected to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures	• Use mathematical vocabulary and language to contribute to mathematical discussions • Explain and justify mathematical ideas and decisions • Communicate mathematical thinking in many ways • Represent mathematical ideas in concrete, pictorial, and symbolic forms	• Reflect on mathematical thinking • Connect mathematical concepts to each other and to other areas and personal interests • Use mathematical arguments to support personal choices • Incorporate First Peoples worldviews and perspectives to make connections to mathematical concepts

CONNECTING TO FIRST PEOPLES PRINCIPLES OF LEARNING

Incorporate First Peoples worldviews and perspectives to make connections to mathematical concepts.

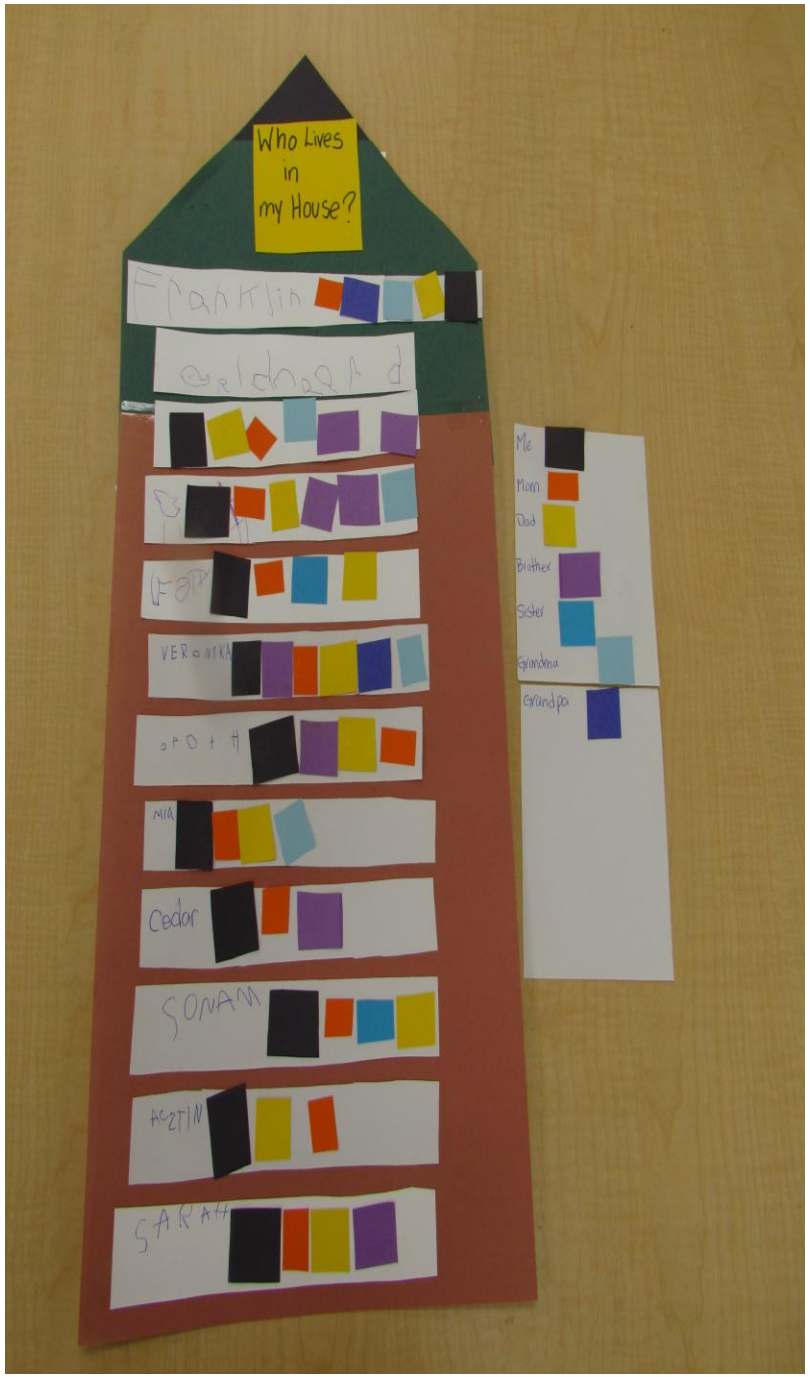


What students do in a PYP Maths classroom?

Students in the PYP classroom will,

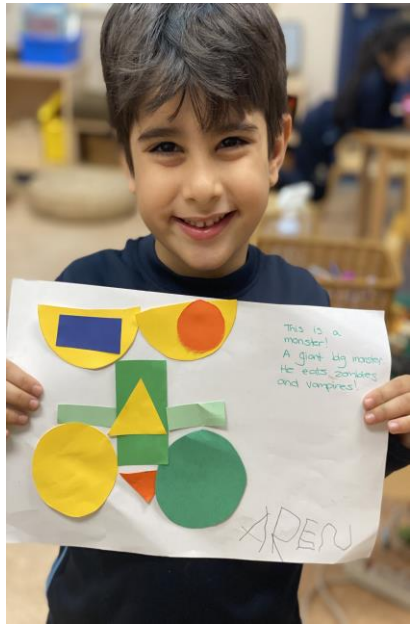
- ✓ actively engage in Number Talks and class discussions
- ✓ use manipulatives and hands-on learning tools
- ✓ collaborate and cooperate on problem-solving tasks
- ✓ journal or record their mathematical thinking
- ✓ conduct investigations and explore real-world connections
- ✓ have fun with maths!

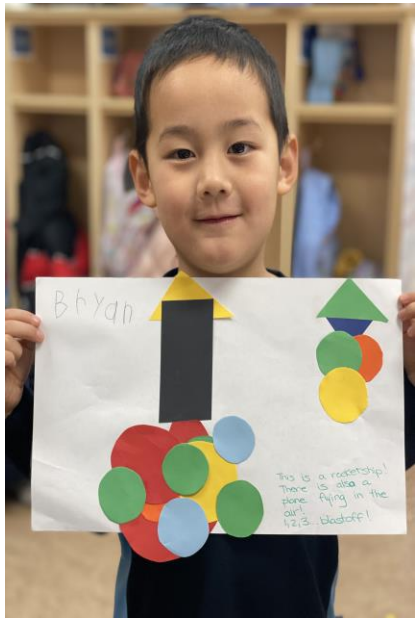
JK students exploring math concepts

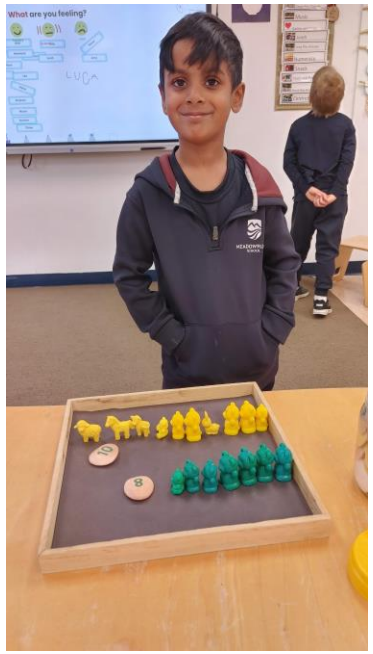


JK students exploring math concepts

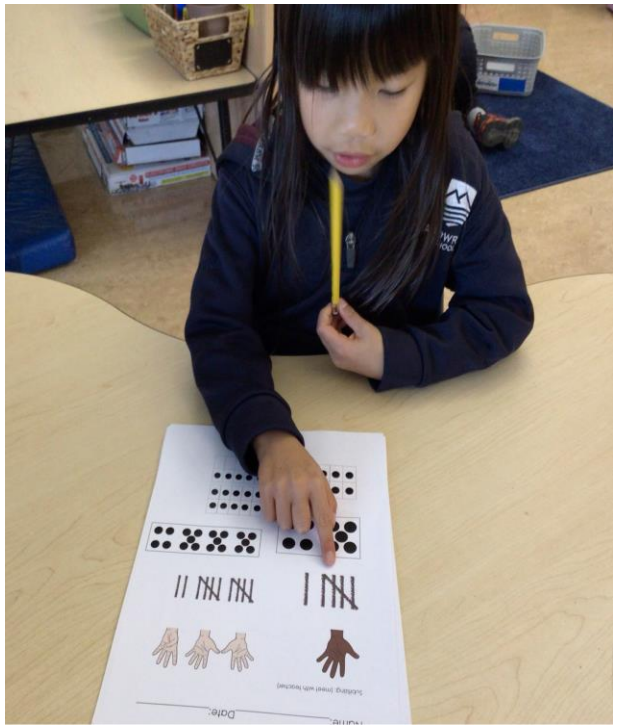
KG students exploring math concepts

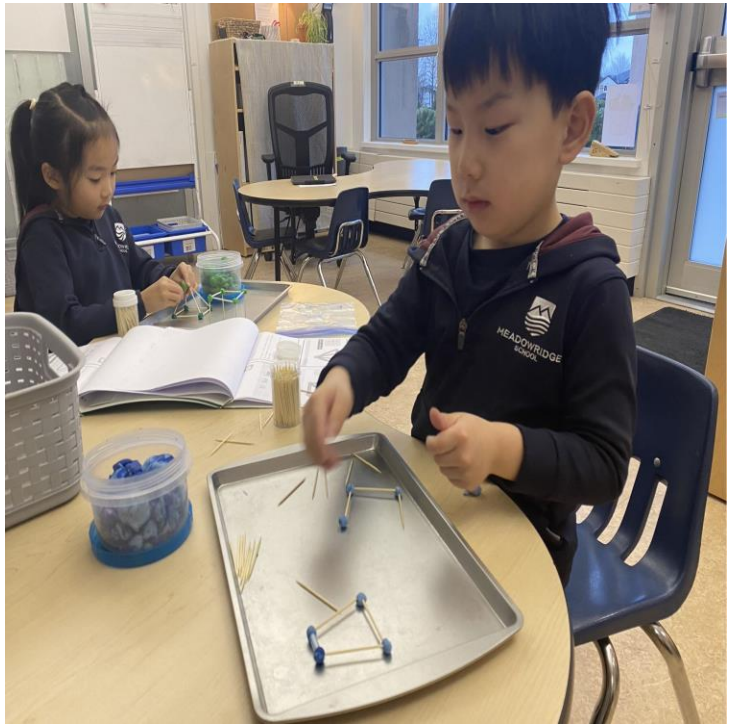




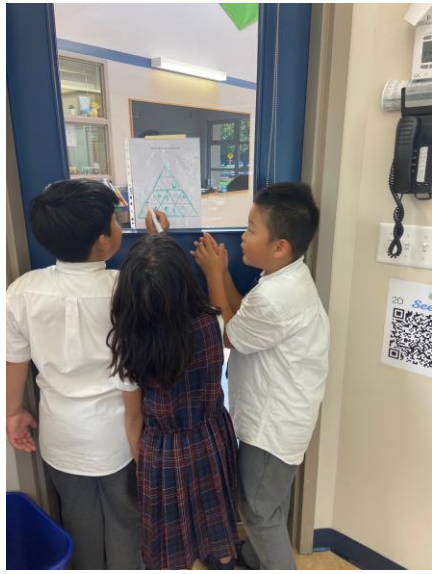


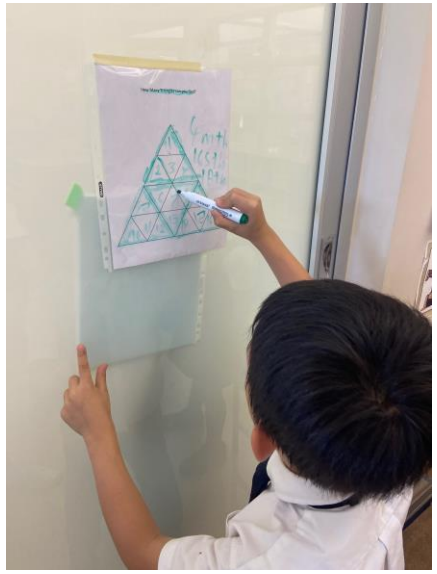
Gr.1 students exploring math concepts



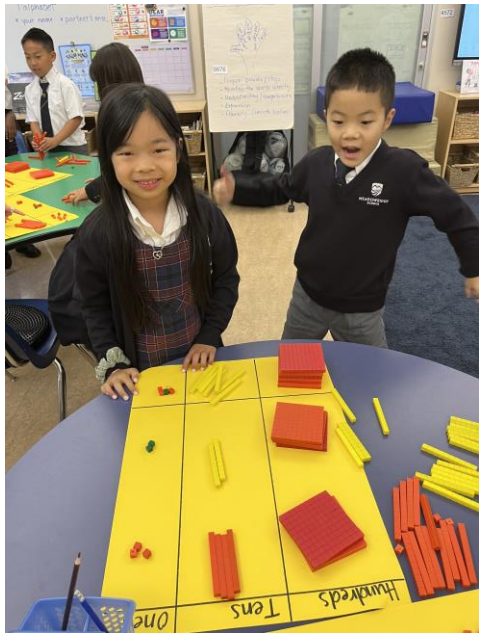


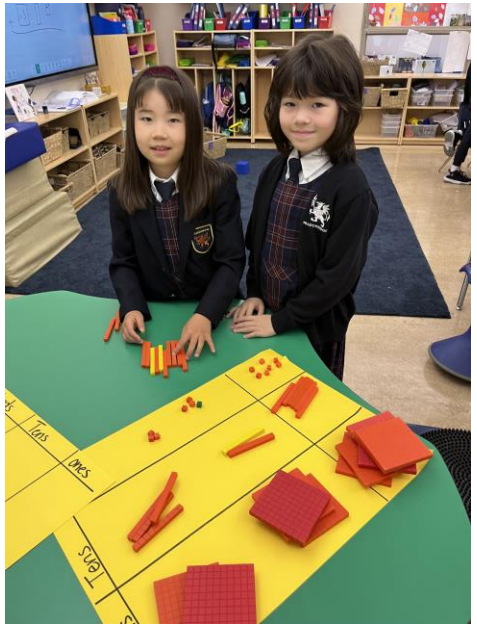
Gr.2 students exploring math concepts

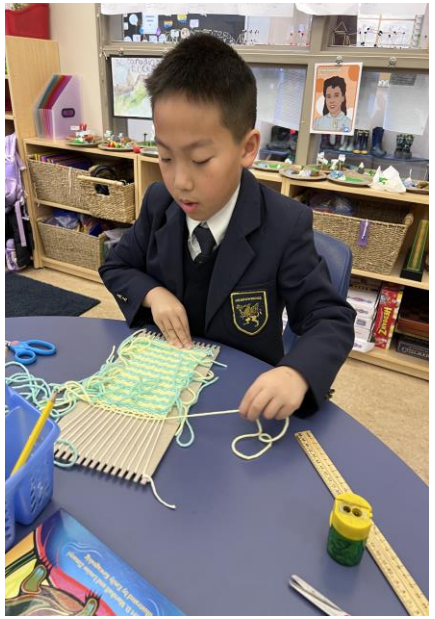




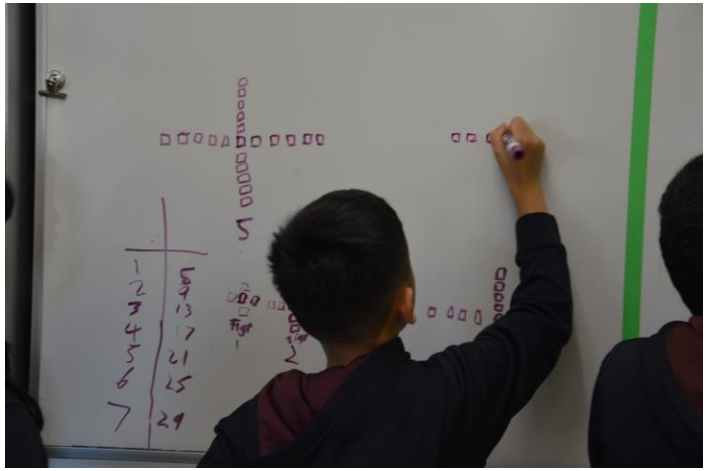
Gr.3 students exploring math concepts

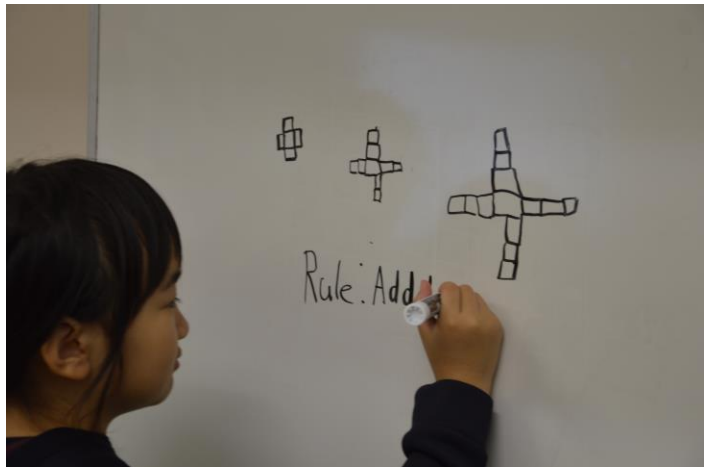




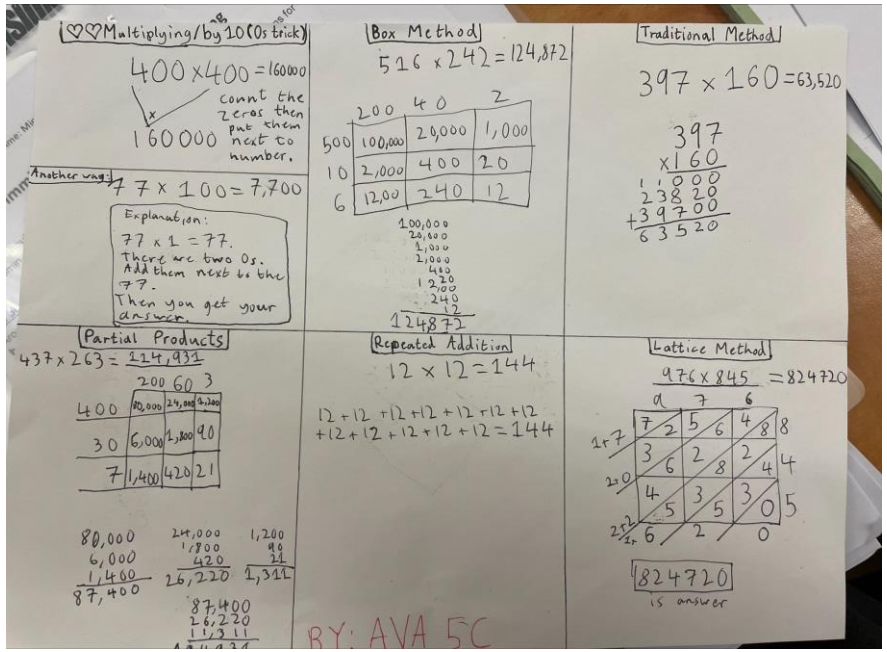


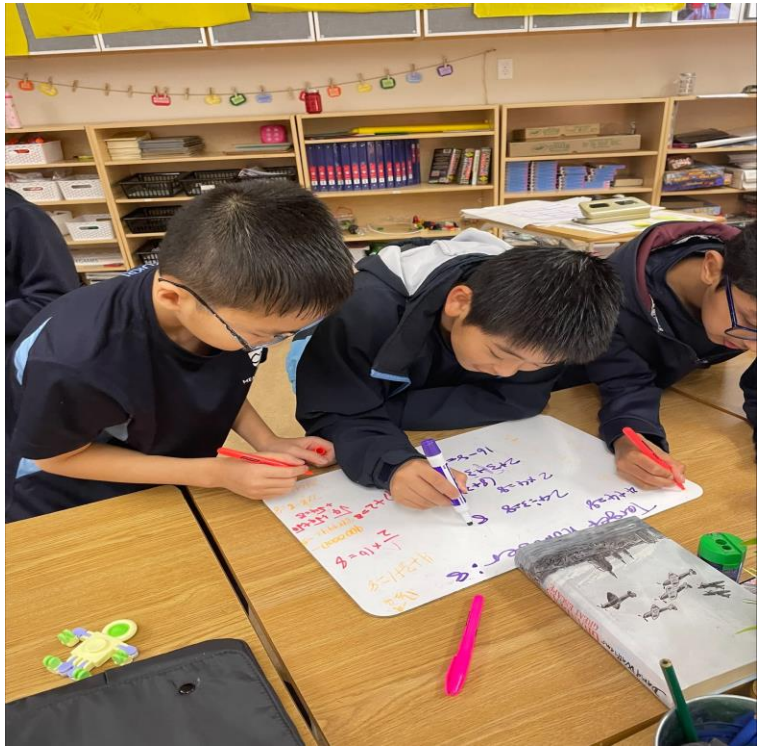
Gr.4 students exploring math concepts

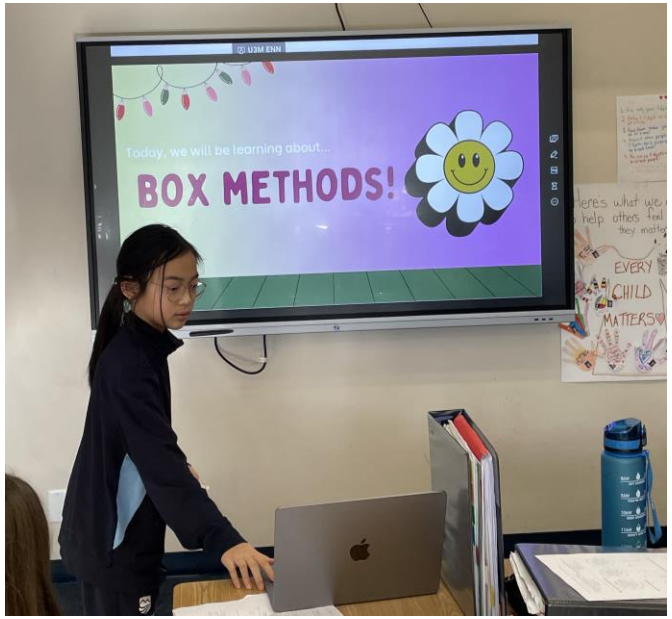


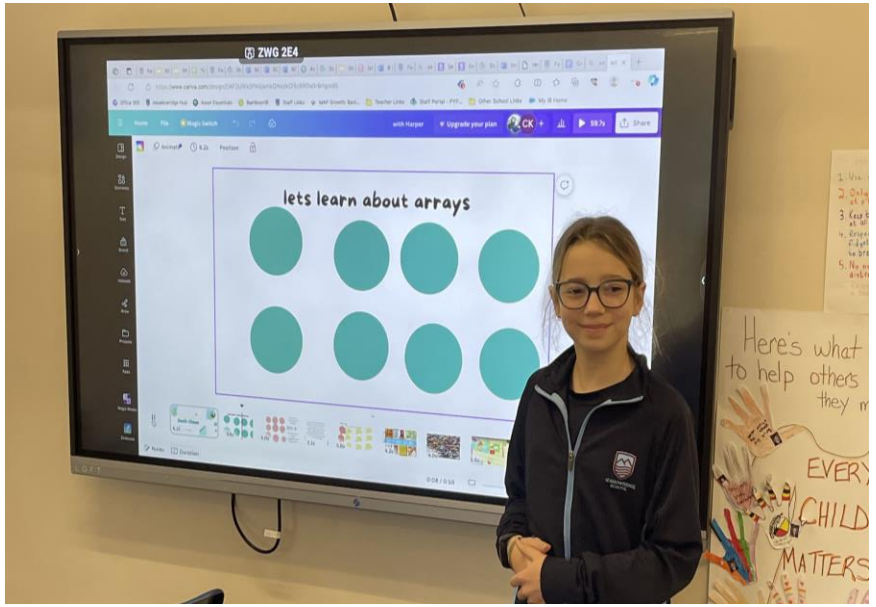


Gr.5 students exploring math concepts









The Role of Assessment

The role of assessment to provide immediate feedback on learning and to help students set goals for future learning & growth. Tasks may differ at different grade-levels and may include:

Internal assessment include,

- Rubrics
- Anecdotal observations and checklist
- Student Conferences
- Student performative tasks – Formative and Summative
- Self-reflections and goal setting

External Assessments

- MAP Testing from K-5
- Foundations Skills Assessment (FSA) – Grade 4

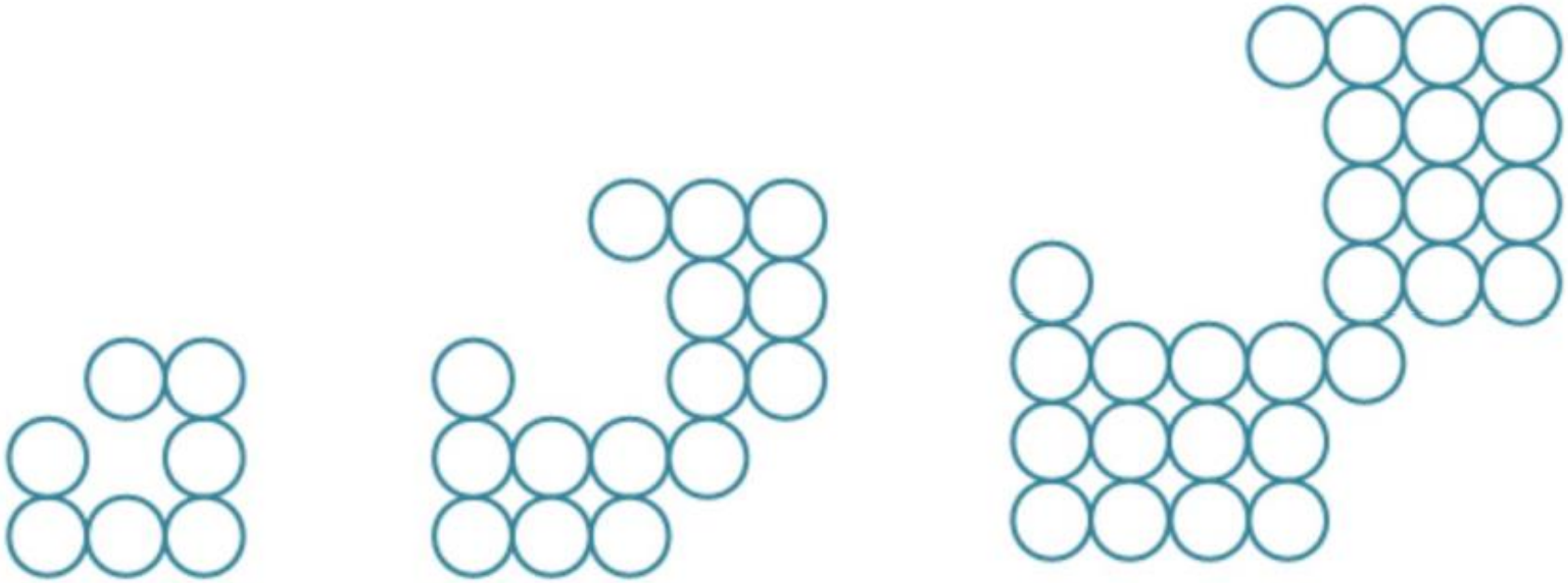
Supporting you child at home & in the "Real-World"

- ✓ Be involved in Home Learning tasks.
- ✓ Play Math games as a family (preferably face-to-face & online).
- ✓ Share and explain how you use mathematics in the real-world.
  - ✓ **Cooking:** discuss time, fractions, measurement,
  - ✓ **Shopping:** money, fractions, number operations,
  - ✓ **Travelling:** elapsed time, measurement, mapping, currency
  - ✓ **Building:** measurement, fractions, engineering,
  - ✓ **Board games:** problem-solving, strategy games,
  - ✓ **Current Events:** climate change data, health-care, finance,
- ✓ Connect with your child's homeroom teacher.
- ✓ Suggested Math Resources for Home Learning: https://www.meadowridge.bc.ca/home-learning/elementary/math

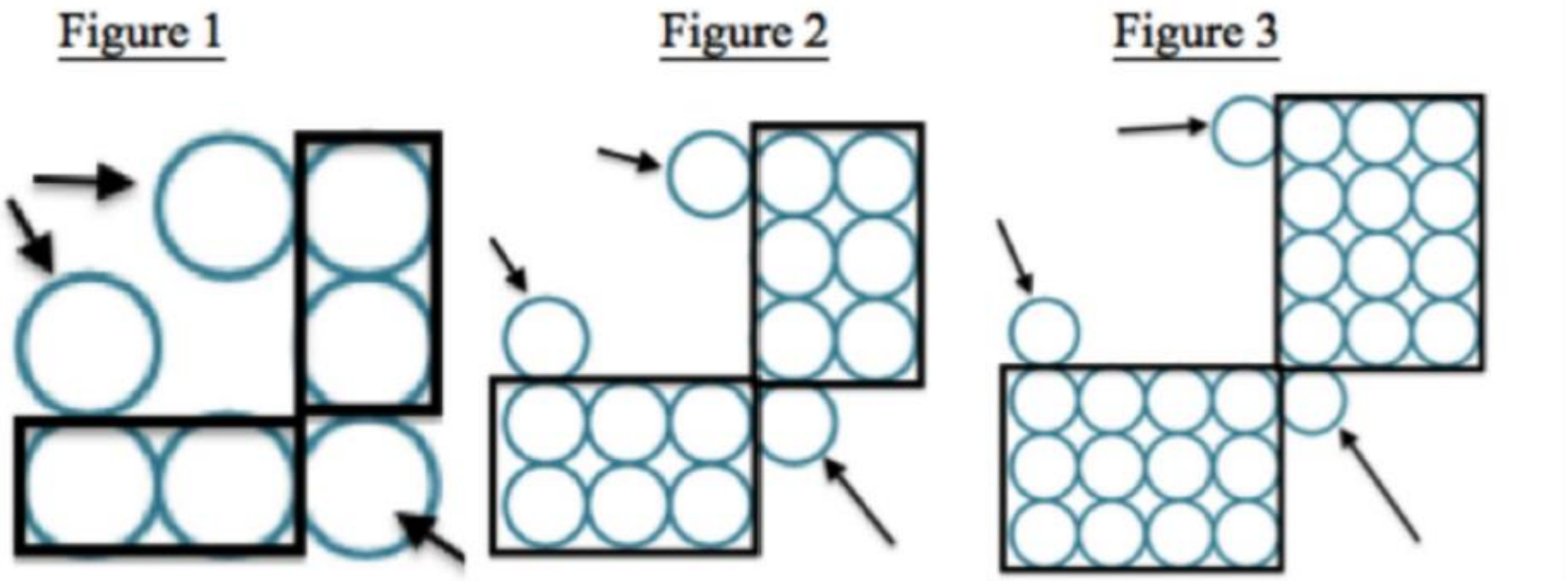
Number Talk

Without counting one by one, figure out how many circles there are.

Number Talk



Number Talk



A Farmer Problem

A farmer has some chickens and some pigs. One day they notice that their animals have a total of 22 legs. How many chickens and how many pigs might they have?

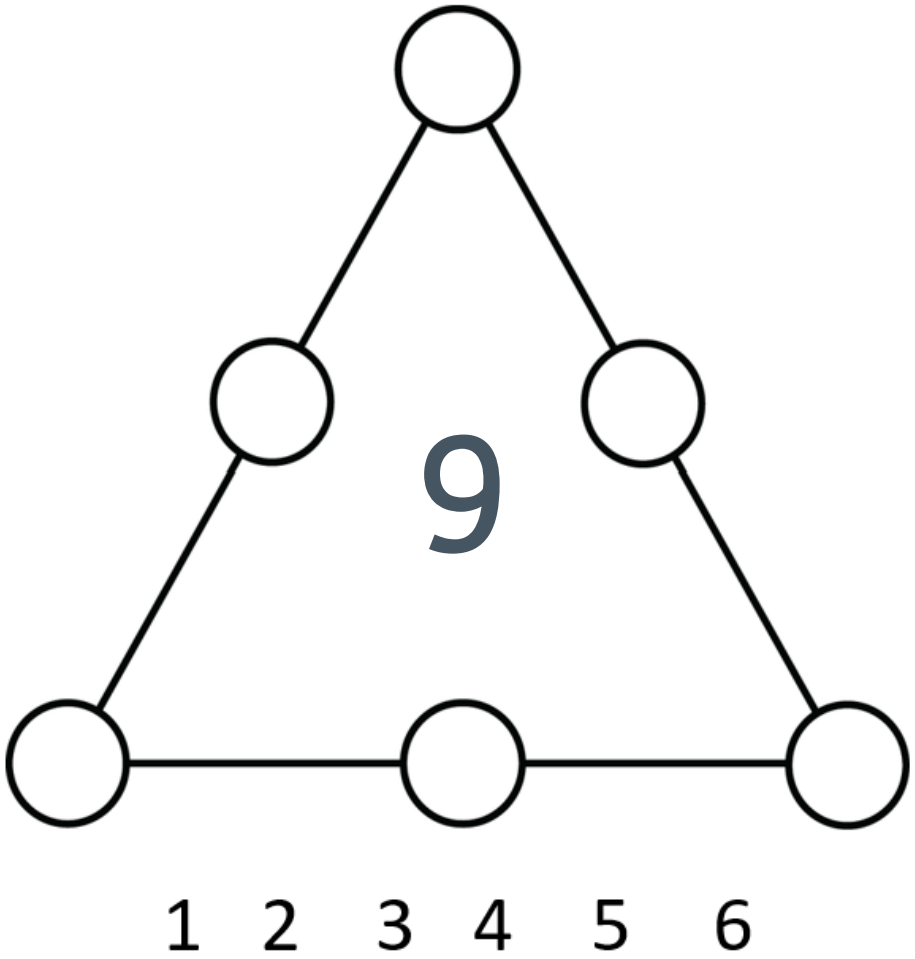
Can you come up with another solution?

Can you come up with **all** the solutions?

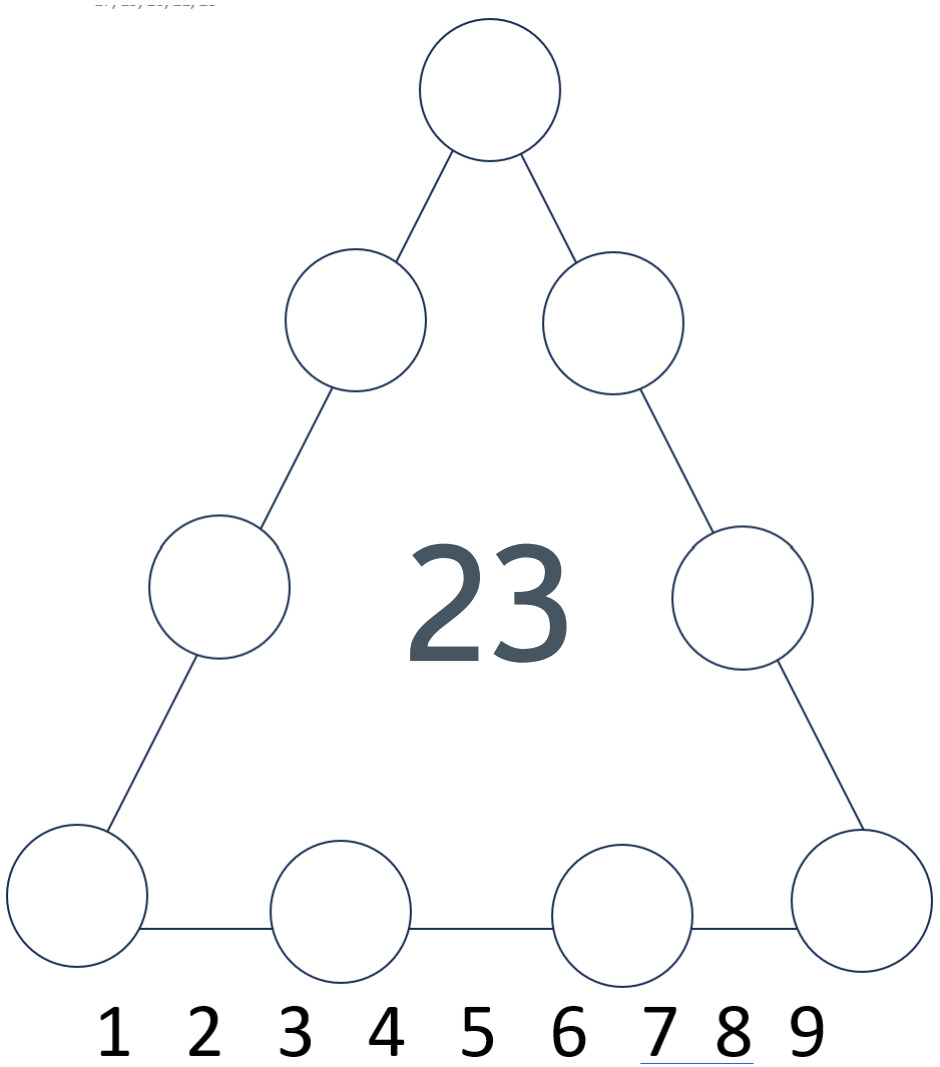
How do you know that you have all the solutions?

Invitation to Play!

Use the numbers below to make the target number in the middle.



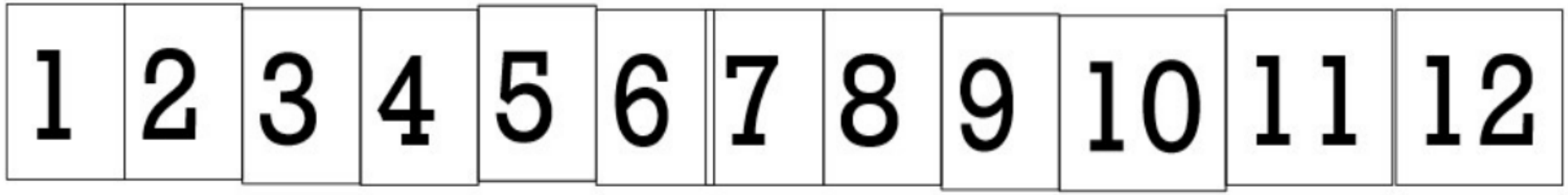
Magic Triangles



Walking steps…

Z. Number Path

You are on a number path made up of squares of numbers starting at 1 and continuing as far as you wish…



You move SOME steps forward.
Then you move SOME steps back.
You repeat both moves.
You land at 9.
How many steps each way?

(From Marian Small: https://tinyurl.com/ll7yvm8)

Target Number

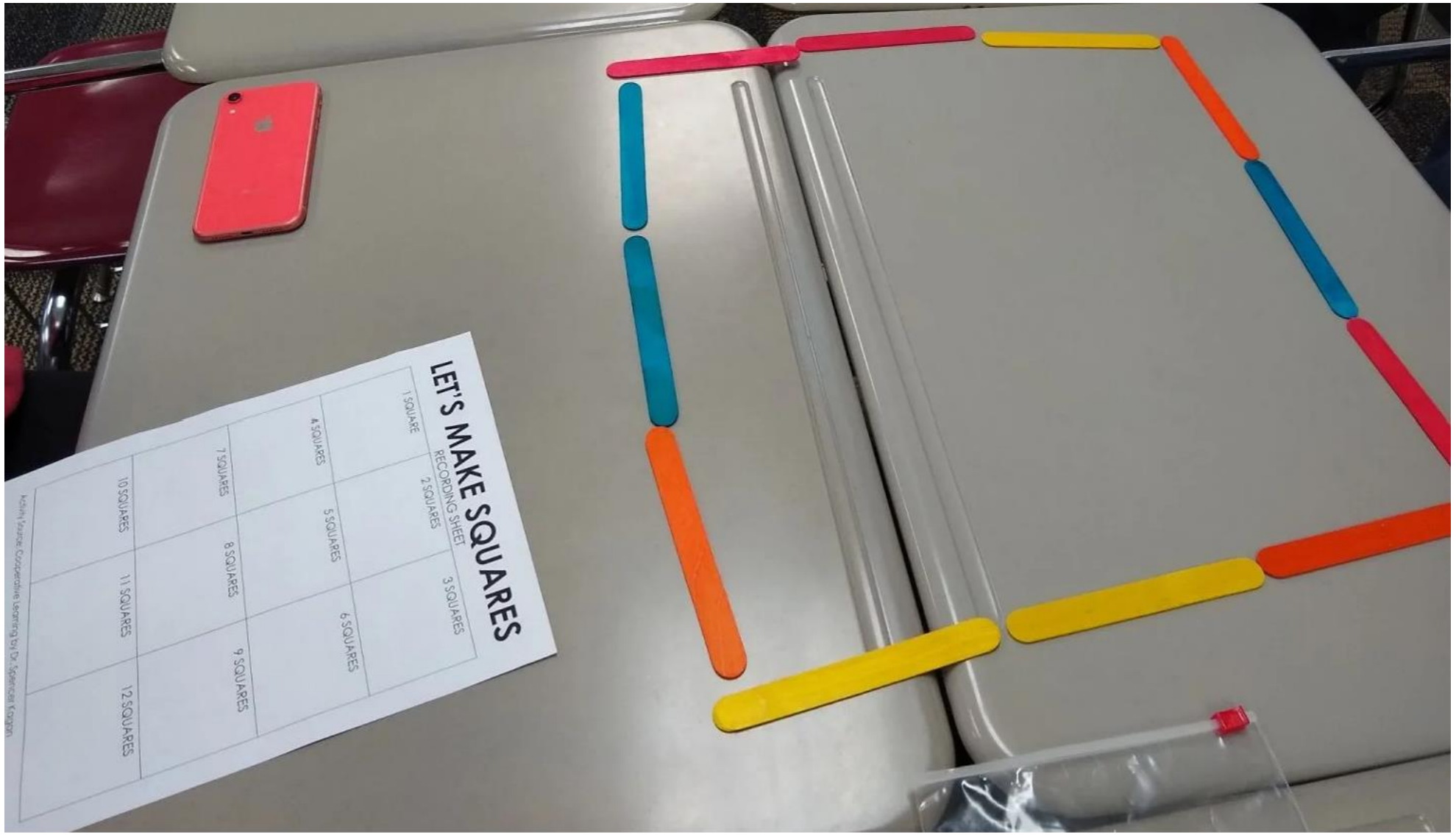
Number Talk to learn Number Operations

What type of operations do we know and use?

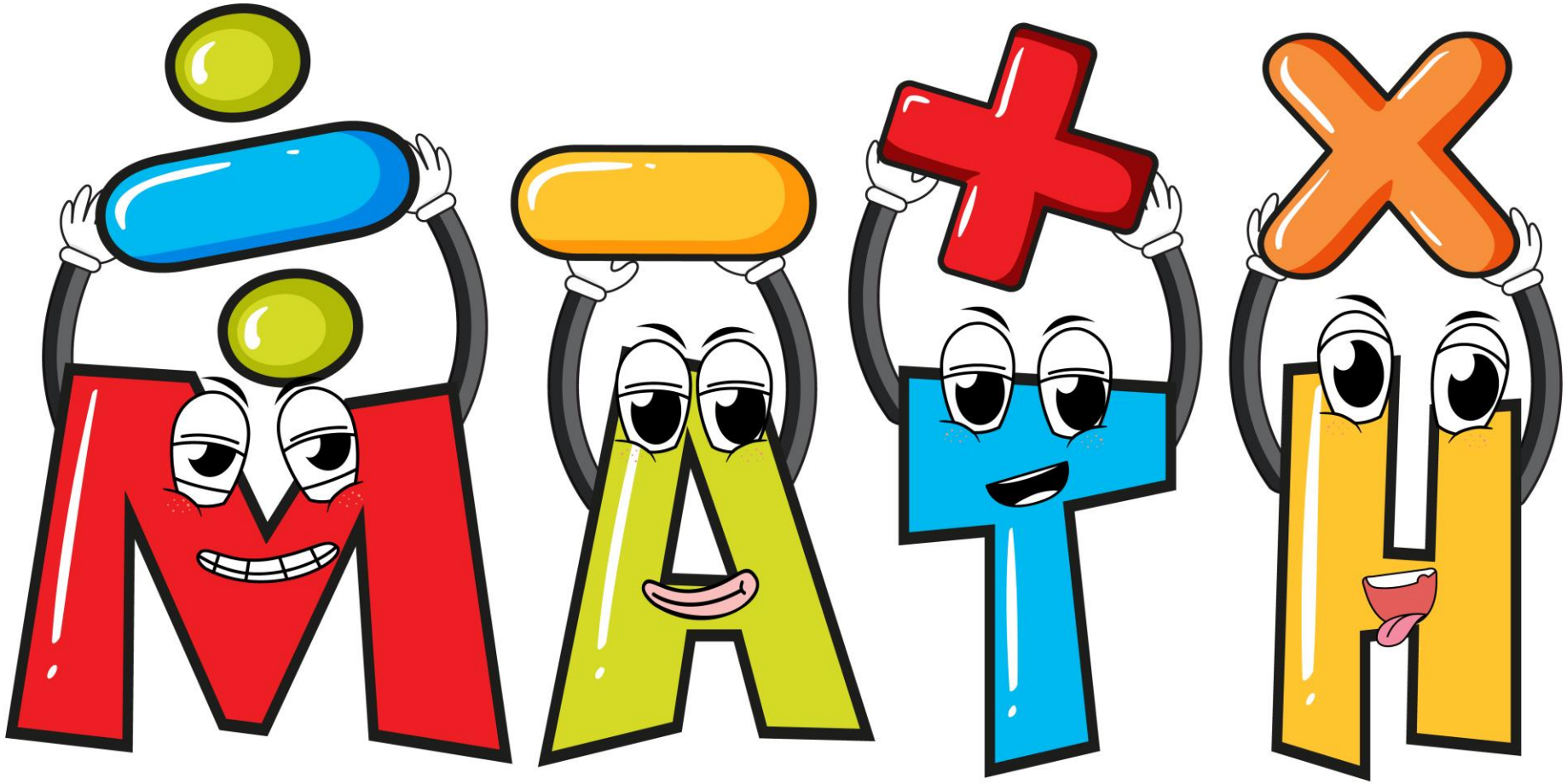
What about the order of operations? How does this impact our calculations?

Objective: Use the operations (division, multiplication, addition, subtraction) to write as many sentences as you can to find the target number.

Let’s make Squares with popsicle sticks!



Questions?



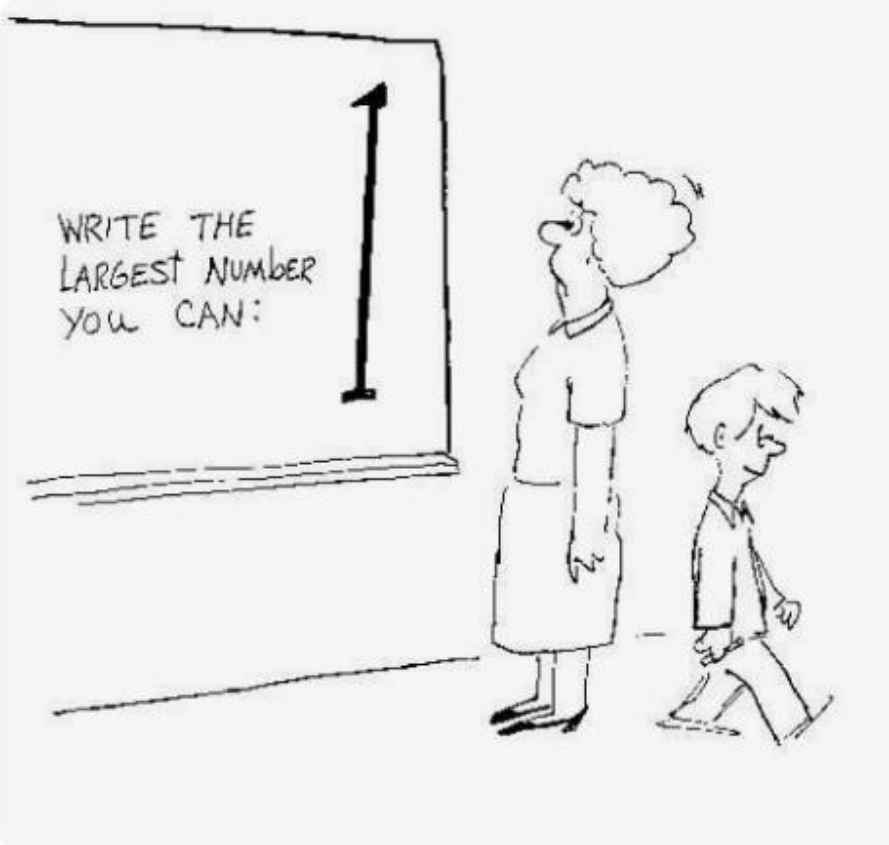
https://www.freepik.com/free-photos-vectors/math-clipart

RESOURCES

Copy paste the links into your browser if they do not work.

- BC Mathematics Curriculum link - https://curriculum.gov.bc.ca/curriculum/mathematics
- https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/curriculum/continuous-views/en_math_k-9_content.pdf
- FSA - https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/assessment/foundation-skills-assessment
- Brain Plasticity by Dr. Jo Boaler https://www.youcubed.org/resources/brain-science/
- Carol Dweck – The Power of Yet! https://www.ted.com/talks/carol_dweck_the_power_of_believing_that_you_can_improve?language=en
- Reggio Approach - https://www.reggiochildren.it/en/reggio-emilia-approach/
- Building Thinking Classrooms by Peter Liljedahl https://buildingthinkingclassrooms.com/podcasts/
- Nrich Maths - https://nrich.maths.org/9085
- Which One Doesn't Belong? https://wodb.ca/numbers.html
- Math Resources for home learning: https://www.meadowridge.bc.ca/home-learning/elementary/math

Thank you for attending this presentation.



Did we achieve our objectives today?

Be a risk-taker, participate in the tasks.

Be a inquirer & collaborator, ask questions and share ideas.

Be kind and caring.

Use a growth-mindset, you can do this!

Have fun with Maths! ☺