

Math  
Parent University  
Grades 3-5

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Livingston Public Schools

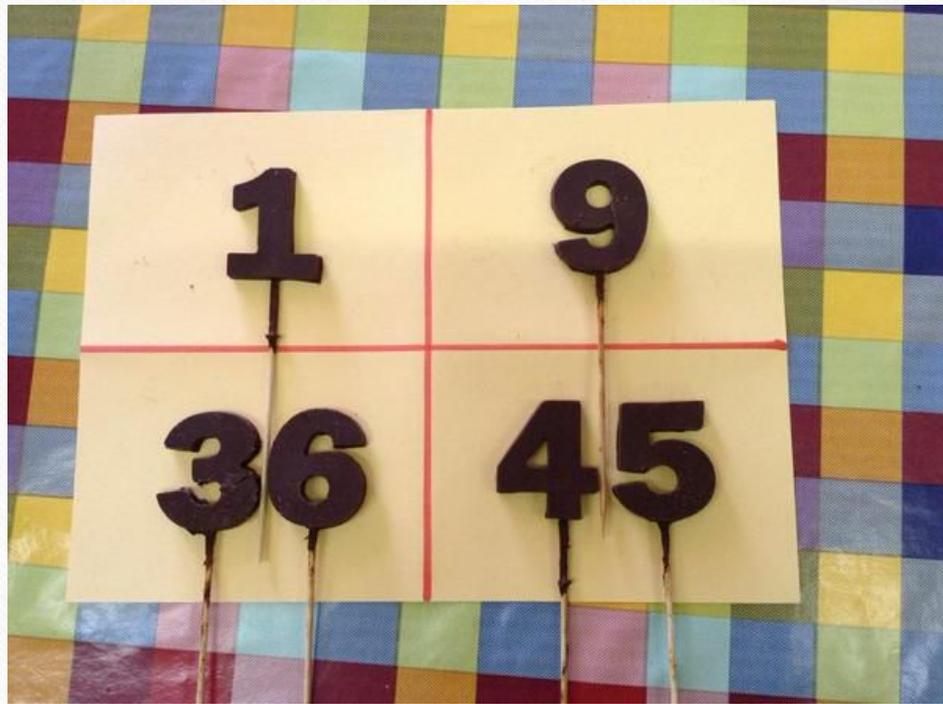
February 4, 2021

Presented By: Angelina Rodriguez

Pre-K -6 Mathematics Supervisor

While we wait. . .  
Which one doesn't belong?

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Which number does not belong in the group? Decide which one doesn't belong and why.



## Livingston Math Core Values

In each grade level, instruction is focused on conceptual understanding, visualization, mathematical variation, application, and procedural skill and fluency in math. We also believe that within classrooms, positive norms for math, developed by Dr. Jo Boaler, lay at the foundation of student learning.

- Mistakes are valuable.
- Questions are really important.
- Math is about creativity and making sense.
- Everyone can learn math to the highest levels.
- Math is about connections and communicating.
- Math is about learning.
- Depth is more important than speed.

# Livingston and Math in Focus

- K & 1 began the Math In Focus program in the 2019 - 2020 school year.
- 2nd Grade began Math in Focus this year. Each year another grade level will begin the program.
- K , 1, and 2 teachers are receiving continued Professional Development.
- 3-5 teachers will receive professional development on the pedagogy, best practices, and instructional strategies of the program.



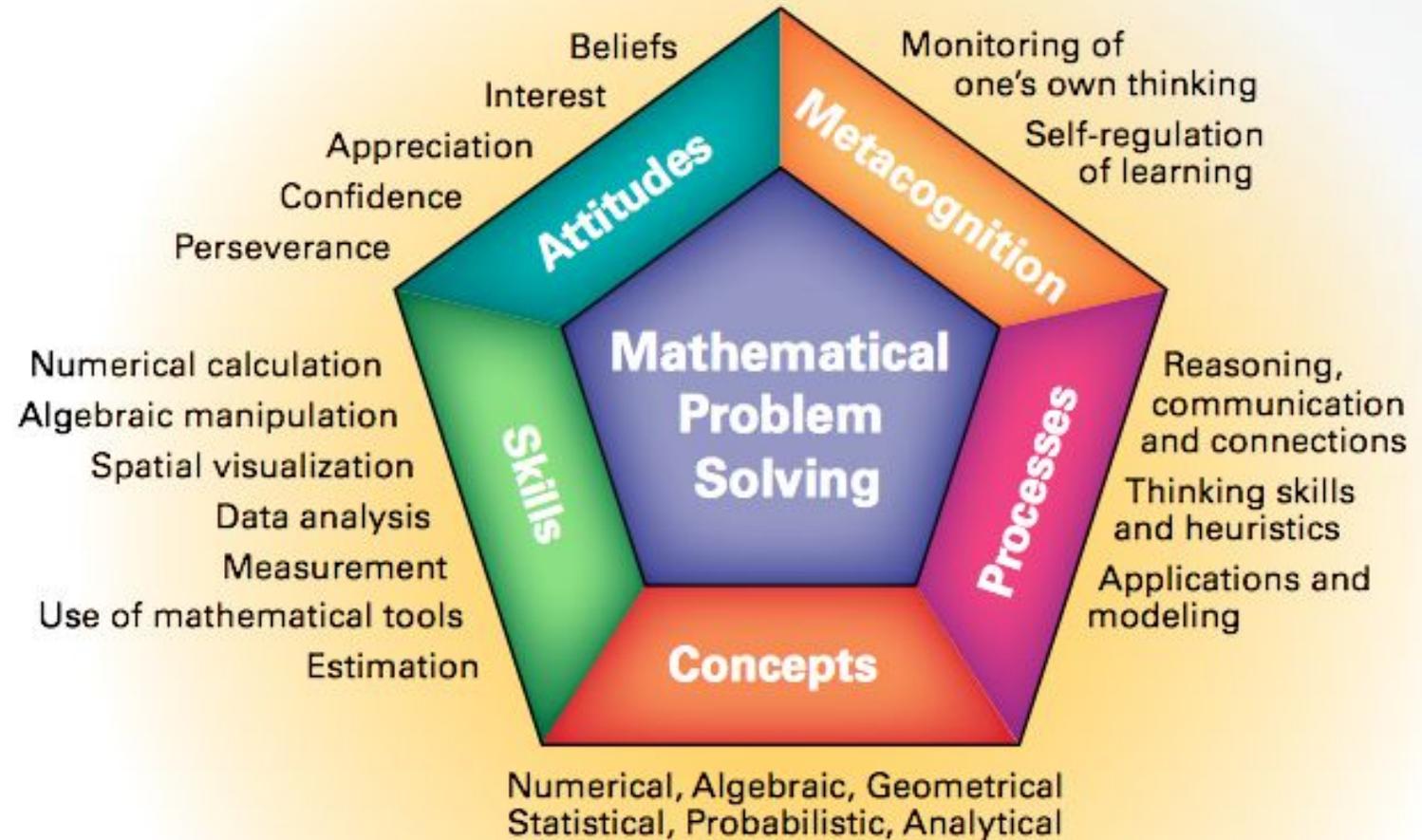
# NJSLS Mathematical Practice Standards

## Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

# Singapore Framework

## Singapore Mathematics Framework



*From the Singapore Ministry of Education*

# Singapore Pedagogy

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- Concrete - Pictorial - Abstract Progression
  - Visual Models/Pictorial/Visualization
  - Math is Thinking/Problem Solving
- Heuristics (Strategy Based Instruction)

# Concrete – Pictorial - Abstract



## Concrete

Every new skill is taught through first showing students physical objects they can touch to represent the concept.

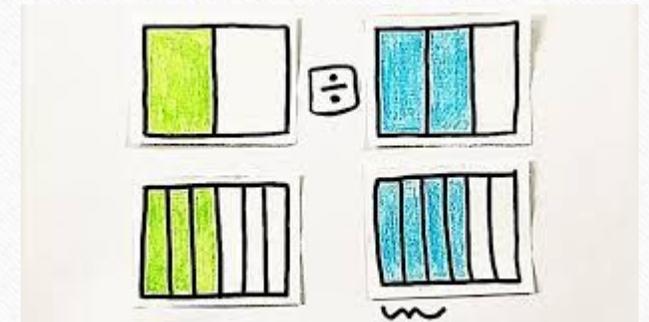
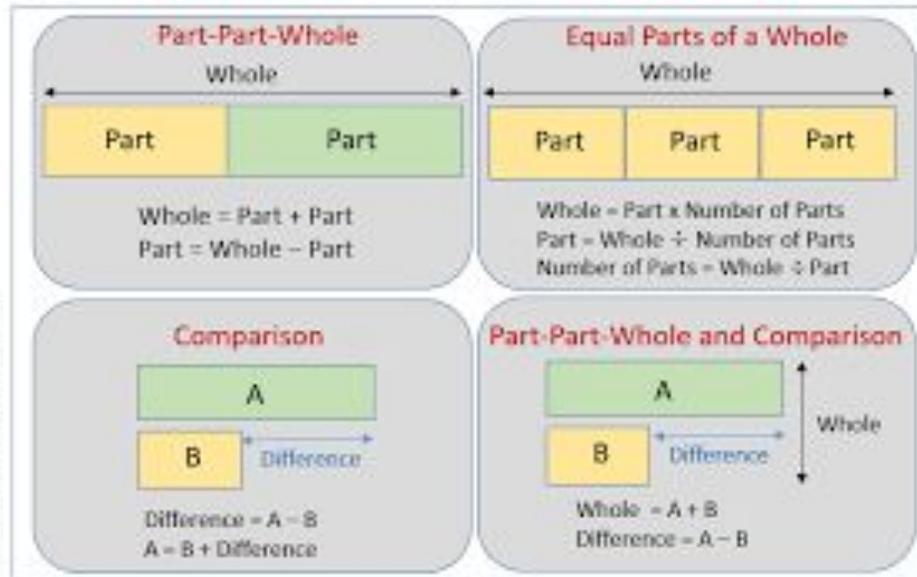
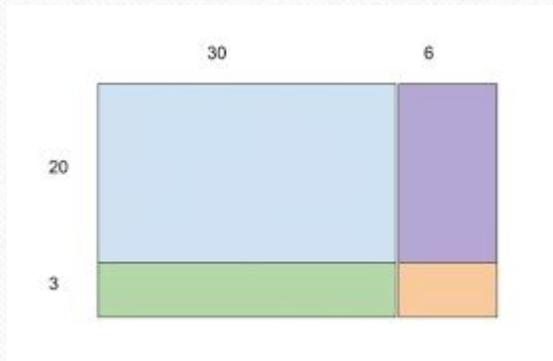
## Pictorial

Students will work on developing mathematical ideas through using pictures or diagrams.

## Abstract

Students will connect the concrete experiences and pictorial representations to symbols such as numbers.

# Visual Models



# Math is Thinking - Problem Solving

- Allow students to explore the problem through their own thoughts and connections
- Encourage the use of concrete material
- The teacher facilitates through questioning to guide students to the discovery of the concept

You have used models and number lines to find equivalent fractions. Multiplication can also be used to find equivalent fractions. Fractions that have the same numerator and denominator are equivalent to one whole.



## Math in My World



### Example 1

A recipe for spaghetti and meatballs calls for  $\frac{3}{4}$  pound of ground beef. Find two fractions that are equivalent to  $\frac{3}{4}$ .



# Polya's Problem Solving Approach - Heuristics

## Principle 1 – Understand the Problem

- Do you understand all the words used in stating the problem?
- What are you asked to find or show?
- Can you restate the problem in your own words?
- Can you think of a picture or diagram that might help you understand the problem?
- Is there enough information to enable you to find a solution?

## Principle 2 – Devise a Plan (Heuristics)

- Have you seen a problem like this before?
- Do you know a related problem?
- Can you restate the problem?
- Use a Heuristic:
  - Look for Patterns
  - Work Backwards
  - Make a List
  - Guess & Check
  - Draw a Diagram/Model/Picture
  - Act it Out
  - Solve Part of the Problem
  - Solve an Equation
  - Use a Model
  - Solve a Simpler Problem
  - Be Ingenious 😊

## Principle 3 – Carry out the Plan

- Carrying out the plan is usually easier than devising the plan
- Be patient – most problems are not solved quickly nor on the first attempt
- If a plan does not work immediately, be persistent
- Do not let yourself get discouraged
- If one strategy isn't working, try a different one
- Check your steps

## Principle 4 – Look Back/Reflect

- Does your answer make sense?
- Is your answer reasonable?
- Can you check the results?
- Did you answer all the questions?
- Did you answer all parts of the question?
- What did you learn by doing this?
- Could you have done this problem another way – maybe even an easier way?

## Principle 2 – Devise a Plan (Heuristics)

- Have you seen a problem like this before?
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# Mathematical Discourse

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Discourse is the mathematical communication that occurs in a classroom. Effective discourse happens when students articulate their own ideas and seriously consider their peers' mathematical perspectives as a way to construct mathematical understandings.

Encouraging students to construct their own mathematical understanding through discourse is an effective way to teach mathematics, especially since the role of the teacher has transformed from being a transmitter of knowledge to one who presents worthwhile and engaging mathematical tasks.

# Questions that Promote Discourse

## Help students work together to make sense of mathematics

- 1 What **strategy** did you use?
- 2 Do you **agree**?
- 3 Do you **disagree**?
- 4 Would you **ask the rest of the class** that question?
- 5 Could you **share your method** with the class?
- 6 What part of what he or she said **do you understand**?
- 7 Would someone like to **share** \_\_\_?
- 8 Can you **convince the rest of us** that your answer makes sense?
- 9 **What do others think** about what [student] said?
- 10 Can someone **retell or restate** [student]'s explanation?
- 11 Did you **work together**? In what way?
- 12 Would anyone like to **add to what was said**?
- 13 Have you **discussed** this with your group? With others?
- 14 Did anyone get a **different answer**?
- 15 **Where** would you go for **help**?
- 16 **Did everybody get a fair chance** to talk, use the manipulatives, or be the recorder?
- 17 How could you help another student **without telling them the answer**?
- 18 **How would you explain** \_\_\_ to someone who missed class today?

Help students **rely more on themselves to determine whether something is mathematically correct**

**Ready Classroom Mathematics**

- 19 Is this a **reasonable answer**?
- 20 Does that make **sense**?
- 21 **Why** do you think that? Why is that true?
- 22 Can you **draw a picture or make a model** to show that?
- 23 **How** did you reach that conclusion?
- 24 Does anyone want to **revise** his or her answer?
- 25 **How were you sure** your answer was right?

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## Help students learn to reason mathematically

- 26 **How did you begin** to think about this problem?
- 27 What is **another way** you could solve this problem?
- 28 How could you **prove** \_\_\_?
- 29 Can you **explain how your answer is different from or the same as** [student]'s answer?
- 30 Let's **break the problem into parts**. What would the parts be?
- 31 Can you **explain this part more specifically**?
- 32 Does that **always work**?
- 33 Can you think of a case where that **wouldn't work**?
- 34 How did you **organize** your information? Your thinking?

Help students **with problem comprehension**

- 35 What do you need to do **next**?
- 36 What have you **accomplished**?
- 37 What are your **strengths and weaknesses**?
- 38 Was your **group participation appropriate and helpful**?
- 39 What is this problem about? What can you **tell me about it**?
- 40 Do you need to **define or set limits** for the problem?
- 41 How would you **interpret** that?
- 42 Could you **reword that in simpler terms**?
- 43 Is there something that can be **eliminated** or that is **missing**?
- 44 Could you **explain** what the problem is asking?
- 45 What **assumptions** do you have to make?
- 46 What do you **know** about this part?

Help students **evaluate their own processes and engage in productive peer interaction**

# Tasks that encourage talk. . .

Share equal slices of cake from pan A with 8 friends OR share equal slices of cake from pan B with 6 friends?

Cake A



Cake B



wouldyoursurathemath.com

What is the same?  
What is different?

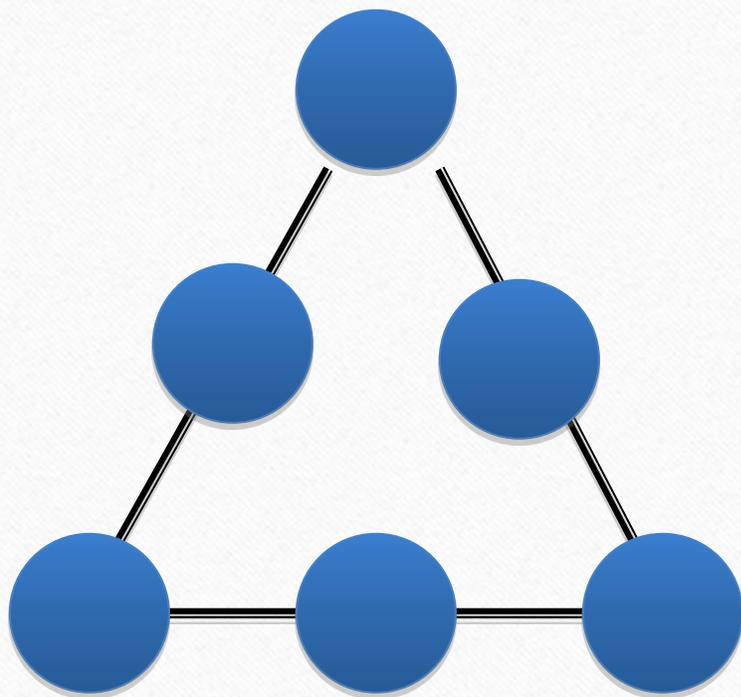


PIC•COLLAGE

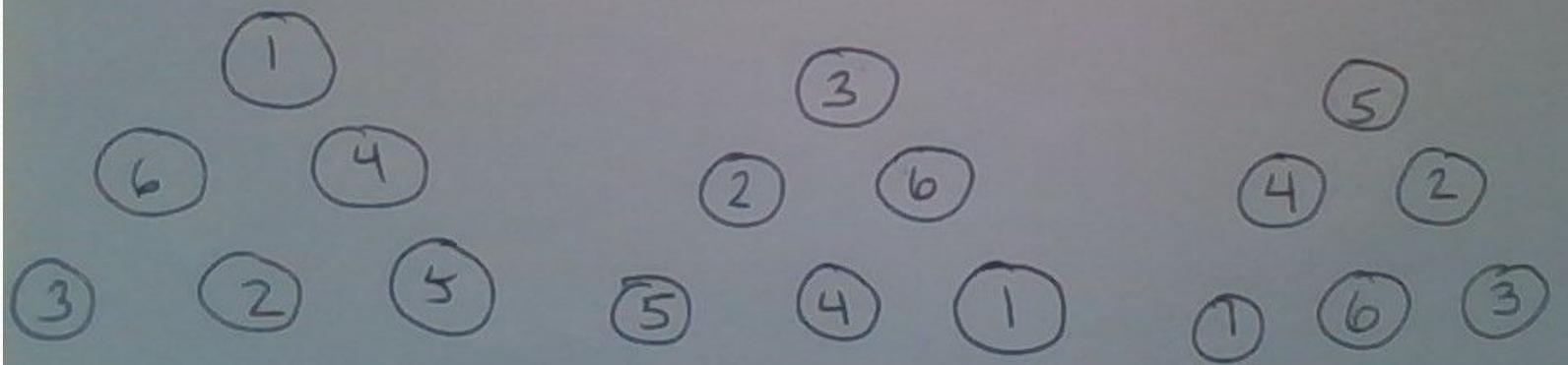
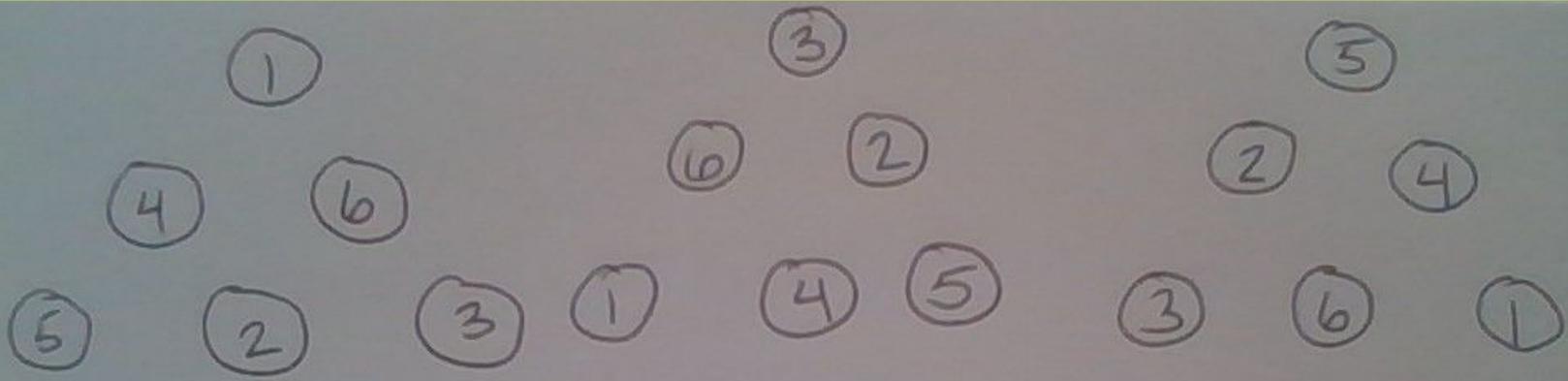
# Let's Solve It!

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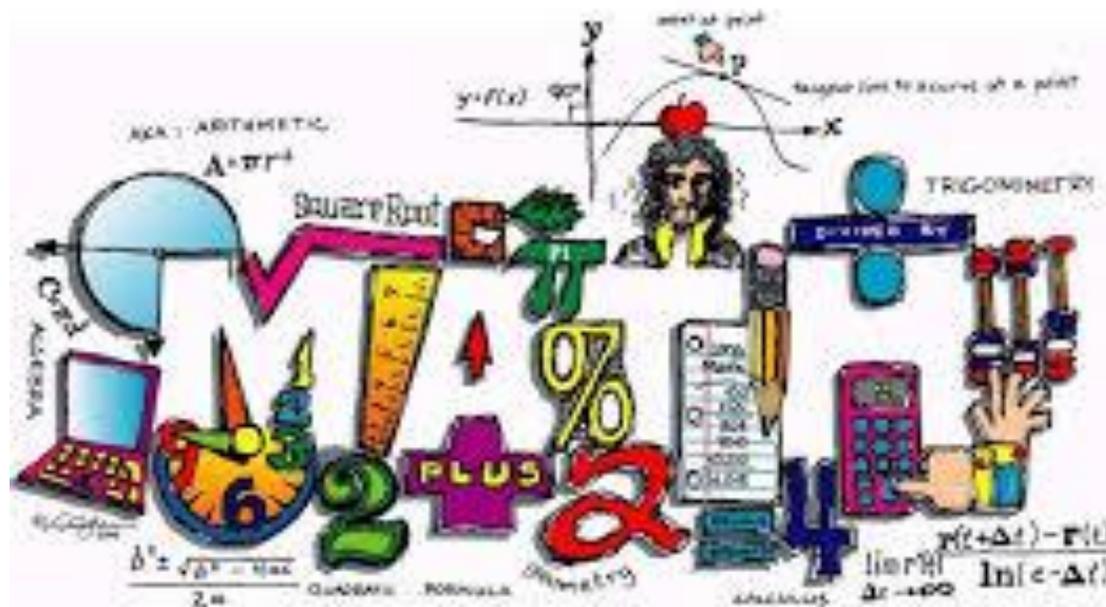
1. Work with a partner/group
1. Solve the Triangle Problem
2. Be ready to share



Arrange digits 1-6 to create sums of 10 on each side of the triangle.



# Math Classroom



- Engagement
- Depth vs. Breadth
- Problem Solving
- Mathematical Discourse
- Teacher as the facilitator
- Differentiation
- Hands on Exploration
- Mastery of content standards

# Mathematics Pathways 6th Grade and Beyond

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In Livingston, Grade 6 students all take Grade 6 Math which is organized into Levels A, B, and C. Students in all levels are taught the same NJ Student Learning Standards based curriculum, which appropriately prepares them for rigorous future math classes, but the classes differ in the degree of teacher directed instruction as well as the extent to which independent work is expected of students. To obtain additional information about the pathways that are available to students, please visit our website:

<https://www.livingston.org/Page/34493>.

# 5th Grade Math Placement Process

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The following criteria will be utilized to drive the Grade 5 to 6 placement decision:

- Average of grades earned in Marking Periods 1, 2, and 3
- Average of three Grade 5 Placement Testlets
  - Testlet #1 - January 26/27 based on when your child's cohort attends school.
  - Testlets #2 and 3 will tentatively be held in March and May. This will be finalized and you will be notified closer to the actual test dates.
  - *Testing dates may need to change based on hybrid/remote schedule.*
- Teacher observation of student mathematical practices (see selected practices below:)
  - Student makes sense of problems and perseveres in solving them.
  - Student displays a wide range of problem-solving strategies.
  - Student is a creative, insightful, original, and flexible thinker.
  - Student applies prior knowledge to novel situations/problems.
  - Student has effective written and verbal communication skills to explain own thinking and conceptual understanding.
  - Student has a strong conceptual understanding of skills through the concrete, pictorial, and abstract stages of learning.

# Contact Information

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# Resources for Reference

Singapore Pedagogy:

<https://mathsnoproblem.com/en/approach/what-is-singapore-maths/>

[http://www.singaporemathematics.com.au/why\\_choose\\_sam/pedagogy/#:~:text=More%20than%20one%20thousand%20schools,making%20maths%20meaningful%20to%20children.](http://www.singaporemathematics.com.au/why_choose_sam/pedagogy/#:~:text=More%20than%20one%20thousand%20schools,making%20maths%20meaningful%20to%20children.)

Concrete Pictorial Abstract:

<https://mathsnoproblem.com/en/approach/concrete-pictorial-abstract/>

Jo Boaler

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