CRITICAL AREAS

Grade 1

In grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

(1) Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

(2) Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.

(3) Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement.[1]

(4) Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

Mathematical Practice	Explanation and Examples
	MPs aligned to EL/ELD and NGSS: MP 1, 3, 6
MP.1 Make sense of problems and persevere in solving them.	In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.

MP.2 Reason Abstractly and quantitatively	Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities. In first grade students make sense of quantities and relationships while solving tasks. They represent situations by decontextualizing tasks into numbers and symbols. For example, "There are 60 children on the playground and some children go line up. If there are 20 children still playing, how many children lined up?" Students translate the situation into the equation: 60 – 20 = ___ and then solve the task. Students also contextualize situations during the problem solving process. For example, students refer to the context of the task to determine they need to subtract 20 from 60 because the total number of children on the playground is the total number less the 20 that are still playing. Students might also reason about ways to partition two-dimensional geometric figures into halves and fourths.
MP.3 Construct viable arguments and critique the reasoning of others	First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They practice mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" or "Explain your thinking," and "Why is that true?" They explain their own thinking and listen to the explanations of others. For example, "There are 15 books on the shelf. If you take some books off the shelf and there are now 7 left, how many books did you take off the shelf?" Students might use a variety of strategies to solve the task and then share and discuss their problem solving strategies with their classmates.
MP.4 Model with mathematics	In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, and creating equations. Students need opportunities to connect the different representations and explain the connections. They should be able to use any of these representations as needed. First grade students model real-life mathematical situations with a number sentence or an equation and check to make sure equations accurately match the problem context. Students use concrete models and pictorial representations while solving tasks and also write an equation to model problem situations. For example to solve the problem, "There are 11 bananas on the counter. If you eat 4 bananas, how many are left?" students could write the equation 11 - 4 = 7. Students also create a story context for an equation such as 13 - 7 = 6.

MP.5 Use appropriate tools strategically	In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem. In first grade students use tools such as counters, place value (base ten) blocks, hundreds number boards, number lines, concrete geometric shapes (e.g., pattern blocks, 3-dimensional solids), and virtual representations to support conceptual understanding and mathematical thinking. Students determine which tools are the most appropriate to use. For example, when solving 12 + 8 = __, students explain why place value blocks are more appropriate than counters.
MP.6 Attend to precision	As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning. In grade one, students use precise communication, calculation, and measurement skills. Students are able to describe their solutions strategies to mathematical tasks using grade-level appropriate vocabulary, precise explanations, and mathematical reasoning. When

	students measure objects iteratively (repetitively), they check to make sure there are no gaps or overlaps. Students regularly check their work to ensure the accuracy and reasonableness of solutions.
MP.7 Look for and make use of structure	First grade students look for patterns and structures in the number system and other areas of mathematics. While solving addition problems, students begin to recognize the commutative property, for example 7+4 = 11, and 4+7 = 11. While decomposing two-digit numbers, students realize that any two-digit number can be broken up into tens and ones, e.g. 35 = 30 + 5, 76 = 70 + 6. Grade one students make use of structure when they work with subtraction as a missing addend problem, such as 13 - 7 = __ can be written as 7+ __ = 13 and can be thought of as how much more do I need to add to 7 to get to 13?
MP.8 Look for and express regularity in repeated reasoning	In the early grades, students notice repetitive actions in counting and computation. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?" Grade one students begin to look for regularity in problem structures when solving mathematical tasks. For example, students add three one-digit numbers by using strategies such as "make a ten" or doubles. Students recognize when and how to use strategies to solve similar problems. For example, when evaluating 8+7+2, a student may say, "I know that 8 and 2 equals 10, then I add 7 to get to 17. It helps if I can make a 10 out of two numbers when I start." Students use repeated reasoning while solving a task with multiple correct answers. For example, solve the problem, "There are 12 crayons in the box. Some are red and some are blue. How many of each could there be?" Students use repeated reasoning to find pairs of numbers that add up to 12 (e.g., the 12 crayons could include 6 of each color (6+6 = 12), 7 of one color and 5 of another (7+5 = 12), etc.)

	Describe the Intent of This Mathematical Practice	**Describe One Teacher Action That Might Facilitate this Mathematical Practice**	**Describe Evidence of Students Engaged in This Mathematical Practice**
Mathematical Practice 1 Make Sense of Problems and Persevere	The goal is of this practice is for students to become successful problem solvers of word problems and operations.	To facilitate this practice, you select appropriate problems and guide students in the problem-solving process (for example, engage students in discussions about problems, and ask questions that promote students' thinking about problems).	When students are demonstrating this practice, they are actively pursuing solutions to a variety of problems. They make decisions about strategies to use, showcase their thinking, and explain the outcomes of problem-solving experiences.
Mathematical Practice 2 Reason Abstractly and Quantitatively	The goal of this practice is for students to learn how to reason with and about mathematics.	To support students' development of reasoning, you should provide students space to think and reflect on mathematical content and support students in communicating and refining their thinking	When students are demonstrating this practice, they are sharing and justifying their mathematical conceptions and adjusting their thinking based on mathematical information gathered through discussions and responses to their questions.
Mathematical Practice 3 Construct Viable Arguments and	The goal of this practice is for students to make and test conjectures and to	You establish social norms in the classroom that support communicating mathematical ideas and questioning the thinking of others. Your level of specialized content knowledge is such that	Students are presenting their solutions along with the justifications for their choices. When there is disagreement regarding a solution the student making the claim

Critique the Reasoning of Others	communicate their mathematical thinking.	you are able to provide rich problems to elicit conjectures and arguments, to identify common misconceptions, and to guide discussions around important mathematical ideas.	explains her thinking. The student critiquing the claim makes sense of the argument and then provides clarification, including examples or counterexamples and another justification.
Mathematical Practice 4 Model With Mathematics	The goal of this practice is for students to model real-world situations with mathematics in order to solve problems in everyday life and reasonable ways.	You focus students' attention on mathematizing real-life situations, and then question students to remind them to be sure that the solutions to these problems are reasonable relative to the context in which they arose.	Students are active participants in using mathematics to make sense of daily life. They use symbols and tools to help them make sense of and solve naturally arising problems in reasonable ways.
Mathematical Practice 5 Use Appropriate Tools Strategically	The goal of this practice is for students to make proper decisions about which tools (if any) they will use to learn the mathematics.	You can facilitate this practice by making appropriate tools accessible to students and guiding students in their selection and use of these tools.	Students engaged in this practice are actively using manipulatives and other practical learning tools when needed to develop their mathematics understanding.
Mathematical Practice 6 Attend to Precision	The goal of this practice is for students to attend to precision in all aspects of communications related to mathematics.	When you model the appropriate use of vocabulary, symbols, and explanations for current grade-level content, you prepare students for the mathematics to come in future grades. It is important to provide opportunities for students to share their mathematical ideas and for you to attend to what they share for accuracy.	Evidence of this practice must be grounded in communication, whether written or oral. Students engaged in this practice are using careful, accurate definitions; they are including units with quantities as necessary; and they are performing computations carefully and appropriately and accurately describing the procedures they used. Sharing of ideas for this aspect of student learning should be an ongoing part of the work in your collaborative team.
Mathematical Practice 7 Look For and Make Use of Structure	The goal of this practice is for students to recognize structure and to use mathematical structure to learn mathematics with understanding.	Your actions that facilitate this practice showcase various patterns for students to explore and provide students the opportunity to describe the structure they see.	Students engaged in this practice demonstrate awareness of structure in mathematics by identifying instances of structure, discussing structure, and using structure in advantageous ways to solve problems and learn other mathematics. (For example seeing 8+9 as a doubles plus 1 fact)

Mathematical Practice 8 Look For and Express Regularity in Repeated Reasoning	The goal of this practice is for students to look for repetition in the calculations they complete with the goal of determining general methods and related shortcuts.	You should be careful to avoid oversimplifying instructions or making sense of shortcuts in calculations for students. Instead, you want to provide examples for students to complete, highlighting regularity for students to identify, by questioning students regarding the processes they use. Additionally, you will create an environment that supports students in making and sharing conjectures about general methods they notice.	Evidence that students are demonstrating this practice takes the form of classroom discussions or written descriptions in which students describe the conjectures they make regarding what they notice about repeated calculations, as well as define their general methods.

Mathematics in a PLC at Work, Grades K-2

2013:

Operations and Algebraic Thinking, OA

- Represent and solve problems involving addition and subtraction.
- Understand and apply properties of operations and the relationship between addition and subtraction.
- Add and subtract within 20.
- Work with addition and subtraction equations.

Number and Operations in Base Ten, NBT

- Extend the counting sequence.
- Understand place value.
- Use place value understanding and properties of operations to add and subtract.

Measurement and Data, MD

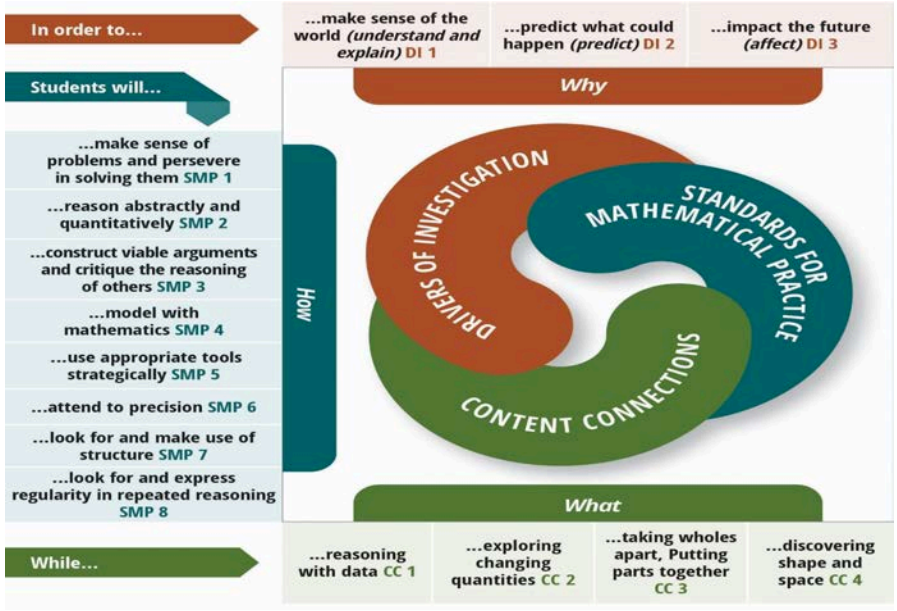
- Measure lengths indirectly and by iterating length units.
- Tell and write time.
- Represent and interpret data.

Geometry, G

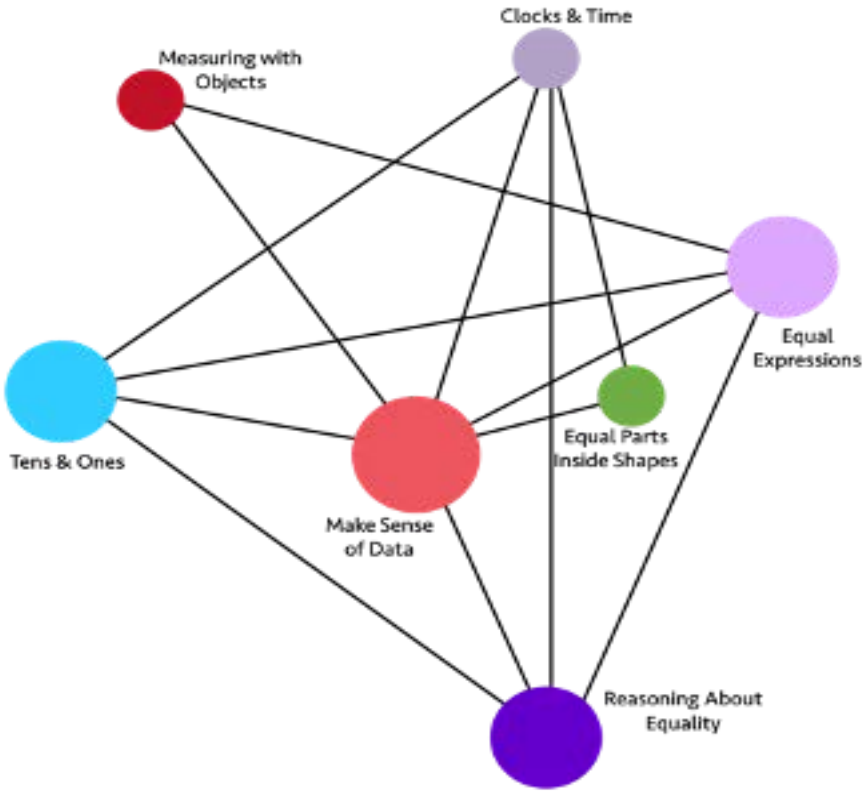
- Reason with shapes and their attributes

Consider using kid lit books as part of math warm ups = a way to talk about shapes/positions (supporting concepts)
Maths from Stories and Describe-Draw-Describe (DDD)

2023:



GRADE ONE BIG IDEAS from 2023 CA MATH FRAMEWORK chapter 6



The graphic illustrates the connections and relationships of some first-grade mathematics concepts. Direct connections include the following:

· Clocks & Time directly connects to: Equal Parts Inside Shapes, Reasoning About Equality, Make Sense of Data, Tens & Ones

· Equal Expressions directly connects to: Reasoning About Equality, Make Sense of Data, Tens & Ones, Measuring with Objects

· Reasoning About Equality directly connects to: Equal Expressions, Clocks & Time, Make Sense of Data, Tens & Ones

· Tens & Ones directly connects to: Reasoning About Equality, Make Sense of Data, Equal Expressions, Clocks & Time

· Measuring with Objects directly connects to: Equal Expressions, Make Sense of Data

· Equal Parts Inside Shapes directly connects to: Clocks & Time, Make Sense of Data

Make Sense of Data directly connects to: Reasoning About Equality, Tens & Ones, Measuring with Objects, Clocks & Time, Equal Expressions, Equal Parts Inside Shapes.

CONTENT CONNECTIONS ~ BIG IDEAS ~ CONTENT STANDARDS

CC1~reasoning with data CC2~exploring changing quantities

CC3~taking wholes apart, putting parts together CC4~discovering shape and space

Content Connections	Big Ideas	Grade One Content Standards
Reasoning with Data	**Make Sense of Data**	**MD.2, MD.4, MD.3, MD.1, NBT.1, OA.1, OA.2, OA.3:** Organize, order, represent, and interpret data with two or more categories; ask and answer questions about the total number of data points, how many are in each category, and how many more or less are in one category than in another.
Reasoning with Data and Exploring Changing Quantities	**Measuring with Objects**	**MD.1 MD.2, OA.5:** Express the length of an object by units of measurement e.g., the stapler is five red Cuisenaire rods long, the red rod representing the unit of measure. Understand that the measurement length of an object is the number of units used to measure.
Exploring Changing Quantities	**Clocks & Time**	**MD.3, NBT.2, G.3:** Read and express time on digital and analog clocks using units of an hour or half hour.
Exploring Changing Quantities	**Equal Expressions**	**OA.6, OA.7, OA.2, OA.1, OA.8, OA.5, OA.4, OA.3, NBT.4:** Understand addition and subtraction, using various models, such as connected cubes. Compose and decompose numbers to make equal expressions, knowing that equals means that both sides of an expression are the same (and it is not simply the result of an operation).
Exploring Changing Quantities	**Reasoning about Equality**	**OA.3, OA.6, OA.7, NBT.2, NBT.3, NBT.4:** Justify reasoning about equal amounts, using flexible number strategies (e.g., students use compensation strategies to justify number sentences, such as 23 - 7 = 24 - 8).
Taking Wholes Apart, Putting Parts Together	**Tens and Ones**	**NBT.4, NBT.3, NBT.1, NBT.2, NBT.6, NBT.5:** Think of whole numbers between 10 and 100 in terms of tens and ones. Through activities that build number sense, students understand the order of the counting numbers and their relative magnitudes.
Discovering Shape and Space	**Equal Parts inside Shapes**	**G.3, G.2, G.1, MD.3:** Compose 2D shapes on a plane as well as in 3D space to create cubes, prisms, cylinders, and cones. Shapes can also be decomposed into equal shares, as in a circle broken into halves and quarters defines a clock face.

Drivers of Investigation. Unifying reasons that both elicit curiosity and provide the motivation for deeply engaging with authentic mathematics.

D1~make sense of the world (understand and explain)

D2~predict what could happen (predict)

D3~impact the future (affect)