GVC Companion Guide for Grade 4

Guiding Philosophy, CGI, Cognitively Guided Instruction:

- We invite you to consider the following:
  - Students need space and time to make sense of mathematics.
  - Students need time to explain their thinking.
  - Take time to notice, strategically share, and celebrate diverse student thinking.
  - Use questioning to elicit, support, and extend thinking.
  - Facilitate student-centered discussions to deepen understanding and create spaces for sense-making.

Seven Guiding Principles of Cognitively Guided Instruction, CGI:

We tie these principles to the Social Justice Standards, learning for justice anti-bias framework - Learning for Justice Website

1. Every student comes to math class knowing some mathematics
2. Every student is capable of extending their mathematical ideas
3. Knowing the development of children's thinking helps you know how to support learning– "What am I working toward?"
4. Details of children's thinking support instructional decision making
5. Must challenge our assumptions about what students know and are able to do
6. Must create space for the participation of each and honor the different ways in which students are participating
7. Identity shapes participation, so want to position students competently

Fourth Grade Focus and Tips

- Start the school year with growth mindset work doing Inspirational Week of Math tasks doing Inspirational Week of Math tasks from YouCubed.org at Stanford (listed as weeks but is actually year 1, 2, 3, 4… of its existence). Set classroom norms and excitement for a great year of mathematics ahead! Consider using throughout the year with a big kick off week one using parts of any of the "weeks" provided. Work with your PLC to collaborate together on which to use when. Site offers numerous resources to support differentiation/enrichment and community communication.

- Consider the Cognitively Guided Instruction Formative Assessment Tasks to gauge where students are in their thinking at the start of the year. Can be administered in parts (e.g. 1-2 problems at a time) and it can also be given multiple times a year to show progression and progress.

- Establish structures and norms through sense-making routines. Sense-making routines/warm-ups are powerful structures to create student agency and access.
  - Downey CGI resources by grade
  - learningfromchildren.org/listening-to-childrens-thinking/resources
  - Dot Talks http://ntimages.weebly.com/
  - Number Strings https://numberstrings.com/
  - Choral Counting
  - Multiple Representations (Frayer Model: sample images consider application quadrant)

- Always, Sometimes, or Never | True-False … and why? | Give example(s) and/or counter-example(s) nrich.maths-ASN | true/false routine
- Same but Different
- Number-Math Talks | Making Number Talks Matter
- Error Analysis "My Favorite No" – My favorite wrong answer/Error Analysis
- Which one doesn't belong? (WODB) Which one doesn't belong?
- Academic Talk protocol(English learners++) | Partner A/Partner B (Academic Talk protocol)
- Estimation 180 | Estimysteries | Splat
- Open Middle (open-ended questions)
- Would You Rather
- Number Routines
- Counting Collections
- Data Talks

❖ Intentional Talk. Let's remember the **all-important share out opportunities**: variety of share outs and their templates

❖ Padlet of Sense Making Routines and Supports (thanks to SMMUSD MTLs–mathematics teacher leaders)

- 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)

Throughout the Year:

- Introduce line plots at the beginning of the year when aggregating class data. This will support later learning when Unit 6/chapter 11 addresses in its entirety. This could be displayed and referenced as the year progresses. Line plot integration can be incorporated with NGSS content when graphing data.

- Use Number Talks/Number Strings to reinforce computation strategies and relationships between operations. (This can include: true/false number sentences, equalities and inequalities, open number sentences, a sequence of equations that demonstrate specific consistencies, etc.)

- PLC Consideration: Each unit contains Performance Tasks and End of Unit Assessments which align with the adopted My Math resource. Please be aware that there are additional tasks and assessment items found in the Curriculum Resources Supplementary tab that can be used in addition to/in lieu of the assessments listed to *meet the goal(s) of the unit*.

- Illustrative Mathematics is a common core aligned resource. It is OpenUp Resources' base.

- Reference Math Milestones as examples of tasks that promote student thinking around the grade's big ideas.

Think Smart for Smarter Balance–MyMath assessments **Spanish Versions**

Trimester 1

Students should build on **prior knowledge** of...	Students should **master**…	Students should be **developing** and will continue to work on…
Place value with larger numbers and evaluate reasonableness in computation (Unit 1) Fluently adding and subtracting multi-digit numbers within 1,000 using strategies Area and perimeter by tiling (area only) and/or using side lengths to solve real world and mathematical problems Solving two step word problems involving the four operations Equivalent fractions in warm up tasks to prepare for substantial fraction work in trimester 2	Adding, subtracting, rounding, estimating, and mentally computing multi-digit numbers from 1 to 1,000,000 Fluently and efficiently apply area and perimeter formulas and problems in the real world. Solving multi-step word problems with whole numbers Prime, composite, factors, and multiples as it relates to multiplication and division (Unit	Fluently adding and subtracting multi-digit numbers from 1 to 1,000,000 using standard algorithm Multiplying and dividing whole numbers by 10s, 100s, and 1,000s will serve as the basis for measurement conversions in the 3rd trimester Writing equations which includes a variable to demonstrate understanding of real-world tasks Expanding prime, composite, factor, and multiple work as a foundation to fractions in Unit 3

SMMUSD Fall IAB for NBT (Numbers and Operations in Base Ten)

Things to be aware of:

- 3rd grade has done extensive work with addition/subtraction within 1,000 as well as multiplication/division within 100, time should be spent in 4th grade standards to reinforce the learning from the previous grade
- Using sense making routines to reinforce foundational skills is a great way to scaffold a lesson ex. practicing skip counting as a strategy to reinforce multiples
- Line plots are addressed in unit 6 however this concept can be interwoven throughout the year.

Trimester 2

Students should build on **prior knowledge** of...	Students should **master**…	Students should be **developing** and will continue to work on…
Fluent multiplication with product up to 100 Equivalent fractions Fractions greater than 1 Unit fractions (composition and decomposition)	Strategies for multiplying and dividing larger numbers (Unit 3) Interpreting the remainder (Unit 3) Identifying and creating number patterns and sequencing to build flexibility with numbers	Unit fractions and fraction equivalence to add and subtract fractions and mixed numbers with like and unlike denominators Decimal notation of a fraction on a number line for tenths and hundredths

Fractions on a number line Fractions with denominators 2,3,4,6,8	(Unit 3) Extend fraction work to fractions with denominators to 10, 12, 100 Using prime, composite, factor, and multiple work to create like numerators and denominators	Comparing fractions with different numerators and denominators

SMMUSD Winter IAB for OA (Operations and Algebraic Thinking)

Things to be aware of:

- A place for rich word problems and strategies to support Unit 3 is EngageNY Module 3
- Chapter 8, Lesson 5 works on simplest form. This is not part of the standard and should not be a focal point for fraction work. Allowing students to submit answers without simplifying provides formative data around student thinking.
- Unit 4 works on decimal fractions as it relates to the number line, be sure to connect this learning to place value to strengthen conceptual understanding.

Trimester 3

Students should build on **prior knowledge** of...	Students should **master**…	Students should be **developing** and will continue to work on…
Fractions are composed of unit fractions multiplied by a whole number Prime, composite, factors, and multiples of numbers as it relates to creating equivalent fractions, comparing fractions, and computation with fractions Properties/attributes of geometric figures Multiplying and dividing whole numbers by 10s, 100s, and 1,000s will serve as the basis for measurement Generating line plots with a data set of measurements using halves and fourths intervals Time and intervals of time to solve word problems involving	Adding and subtracting fractions by creating like denominators (Unit 5) Multiplying fractions by a whole number (Unit 5) Drawing and identifying lines and angles (Unit 5) Angle Measurement—angles are additive Classifying shapes by properties/attributes (Unit 5) Line of symmetry for 2-D figures (Unit 5) Solving addition and subtraction problems from line plots with a fractional data set Time and intervals of time to	Adding and subtracting whole numbers using strategies and algorithm Multiplication of larger numbers using strategies and algorithm Flexibility with fraction comparison and computation using benchmark fractions or common denominator as needed Computation with equations using the order of operations Rounding whole numbers

addition and subtraction	solve word problems involving four operations (Unit 6) Solve word problems involving measurement and measurement conversions	

Things to be aware of:

- Computation with fractions is extended to support students who may need additional work with Unit 4.
- Be sure to emphasize intervals of time. Refer to NGSS 4ESS2-1. Intervals of time ARE a 4th grade standard, but it is not sufficiently addressed in MyMath or OpenUp Resources. In 5th grade, the performance task is focused on intervals of time.

Strategies	Tools
● Direct Modeling o Concrete representation for each object that must be counted o Rote counting, cardinality, one-to-one correspondence ● Counting o Starts with one number and uses a concrete representation for the second value o Number Conservation ● Invented Algorithms (Relational Thinking) o More abstract thinking: concrete representations are not usually seen in these strategies o Using what I know to help me figure out what I don't know o Eg: Combining like units, incrementing, compensation UCLA Mathematic Project, 2020	● Fingers ● Counters ● Tally Marks ● Hundreds Chart ● Number Line ● Ten Frames ● Base-10 Blocks ● Paper and Pencil ● Number Bonds ● Arrays ● Calculators ● Tape Models ● Etc.

For Grade Four Mathematics, instructional time should focus on three critical areas:

(1) Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find
quotients involving multi-digit dividends.

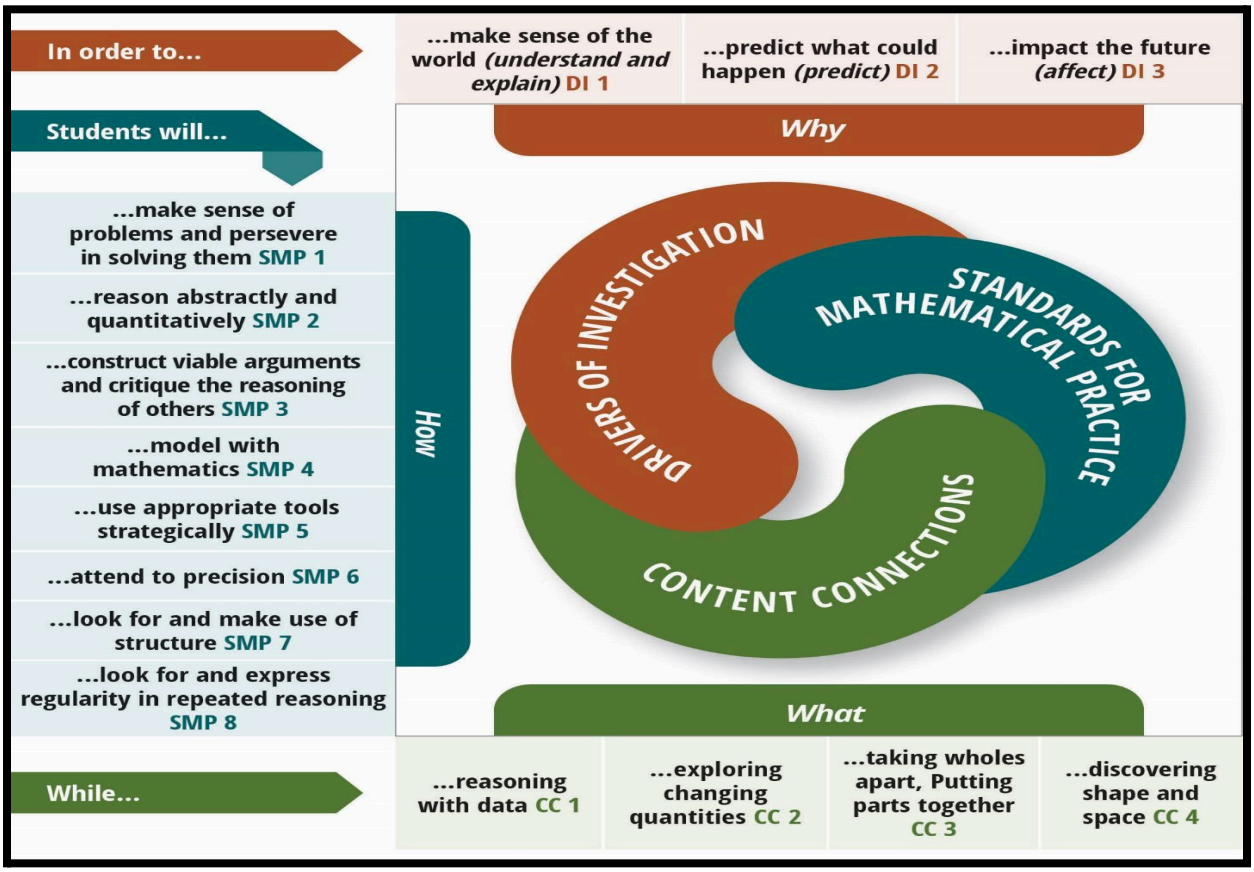
(2) Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.

(3) Understanding that geometric figures can be analyzed and classified based on their properties such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

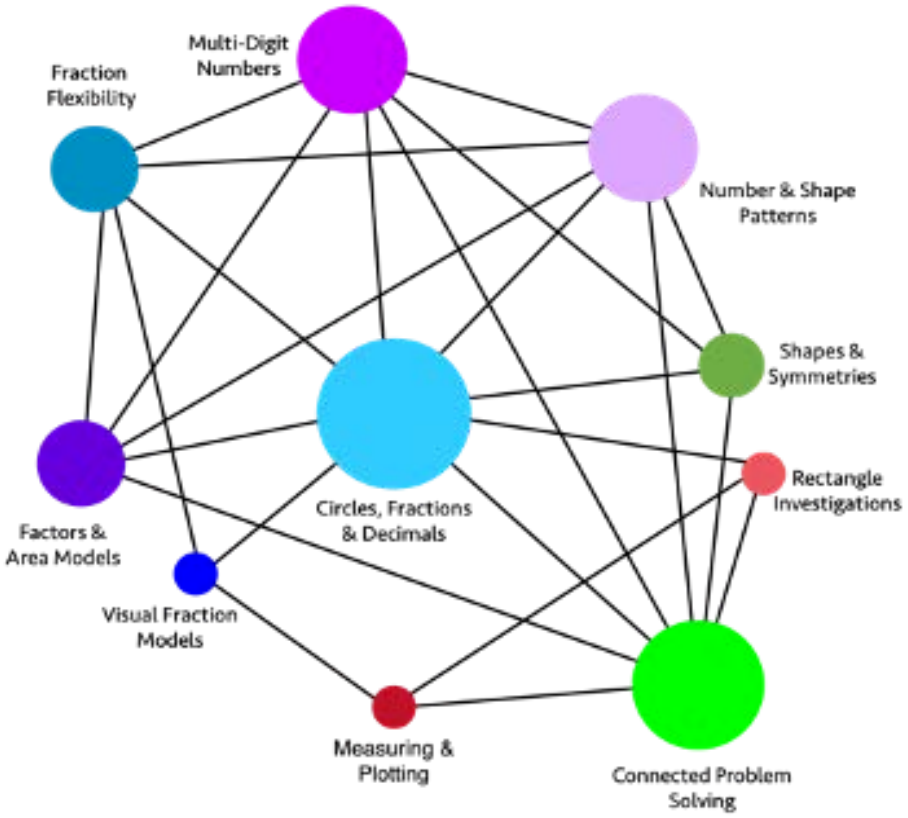
Reference Math Milestones as examples of tasks that promote student thinking around the grade's big ideas.

Standards for Mathematical Practices = the how-to of the content standards
MP1: Make sense of problems and persevere in solving them
MP2: Reason abstractly and quantitatively
MP3: Construct viable arguments and critique the reasoning of others
MP4: Model with mathematics
MP5: Use appropriate tools
MP6: Attend to precision
MP7: Look for and make use of structure
MP8: Look for and express regularity in repeated reasoning

Mathematical Practices 1-3-6 = connections to EL/ELD and NGSS standards: See 2013 Critical Areas for details of grade expectations



GRADE FOUR BIG IDEAS from 2023 CA MATH FRAMEWORK chapter 6



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

· Number & Shape Patterns directly connects to: Shapes & Symmetries, Connected Problem Solving, Circles Fractions & Decimals, Factors & Area Models, Fraction Flexibility, Multi-Digit Numbers

· Shapes & Symmetries directly connects to: Connected Problem Solving, Circles Fractions & Decimals, Multi-Digit Numbers, Number & Shape Patterns

· Rectangle Investigations directly connects to: Connected Problem Solving, Measuring & Plotting, Circles Fractions & Decimals

· Connected Problem Solving directly connects to: Rectangle Investigations, Shapes & Symmetries, Number & Shapes Patterns, Multi-Digit Numbers, Circles Fractions & Decimals, Factors & Area Models, Measuring & Plotting

· Measuring & Plotting directly connects to: Connected Problem Solving, Rectangle Investigations, Visual Fraction Models

· Visual Fraction Models directly connects to: Measuring & Plotting, Circles Fractions & Decimals, Fraction Flexibility

· Factors & Area Models directly connects to: Connected Problem Solving, Circles Fractions & Decimals, Number & Shape Patterns, Multi-Digit Numbers, Fraction Flexibility

· Fraction Flexibility directly connects to: Factors & Area Models, Circles Fractions & Decimals, Number & Shape Patterns, Multi-Digit Numbers

· Multi-Digit Numbers directly connects to: Number & Shape Patterns, Shapes & Symmetries, Connected Problem Solving, Circles Fractions & Decimals, Factors & Area Models, Fraction Flexibility

Circles Fractions & Decimals directly connects to: Multi-Digit Numbers, Number & Shape Patterns, Shapes & Symmetries, Rectangle Investigations, Connected Problem Solving, Visual Fraction Models, Factors & Area Models, Fraction Flexibility.

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 Four Content Standards
Reasoning with Data	**Measuring and Plotting**	**MD.1, MD.4, NF.1, NF.2:** Collect data consisting of distance, intervals of time, volume, mass, or money. Read, interpret, and create line plots that communicate data stories where the line plot measurements consist of fractional units of measure. For example, create a line plot showing classroom or home objects measured to the nearest quarter inch.
Reasoning with Data	**Rectangle Investigations**	**MD1, MD2, MD3, MD5, MD6:** Investigate rectangles in the world, measuring lengths and angles, collecting the data, and displaying it using data visualizations.
Exploring Changing Quantities	**Number and Shape Patterns**	**OA.5, OA.1, OA.2, NBT.4:** Generalize number and shape patterns that follow a given rule. Communicate understanding of how the pattern changes in words, symbols, and diagrams - working with multi-digit numbers.

Content Connections	Big Ideas	Grade Four Content Standards
Exploring Changing Quantities	**Factors and Area Models**	**OA.1, OA.2, OA.4, NBT.5, NBT.6:** Break numbers inside of 100 into factors. Illustrate whole-number multiplication and division calculations as area models and rectangular arrays that illustrate factors.
Exploring Changing Quantities	**Multi-Digit Numbers**	**NBT.1, NBT.2, NBT 3, NBT.4, OA.1:** Read and write multi-digit whole numbers in expanded form and express each number component of the expanded form as a multiple of a power of ten.
Taking Wholes Apart, Putting Parts Together	**Fraction Flexibility**	**NF.3, NF.1, NF.4, NF.5, OA.1:** Understand that addition and subtraction of fractions as joining and separating parts that are referring to the same whole. Decompose fractions and mixed numbers into unit fractions and whole numbers, and express mixed numbers as a sum of unit fractions.
Taking Wholes Apart, Putting Parts Together	**Visual Fraction Models**	**NF.2, NF.1, NF.3, NF.5, NF.6, NF.7:** Use different ways of seeing and visualizing fractions to compare fractions using student generated visual fraction models. Use >, < and = to compare fraction size, through linear and area models, and determine whether fractions are greater or less than benchmark numbers, such as ½ and 1.
Taking Wholes Apart, Putting Parts Together and Discovering Shape and Space	**Circles, Fractions and Decimals**	**NF.5, NF.6, NF.7, OA.1. MD2, MD5, MD7:** Understand, compare, and visualize fractions expressed as decimals. Recognize fractions with denominators of 10 and 100, e.g., 25 cents can be written as 0.25 or 25/100. Connect a circle fraction model to the clock face. Example 3/10 + 4/100 = 30/100 + 4/100 = 34/100
Discovering Shape and Space	**Shapes and Symmetries**	**MD.5, MD.6, MD.7, G.1, G.2, G.3, NBT.3, NBT.4,** Draw and identify shapes, looking at the relationships between rays, lines, and angles. Explore symmetry through folding activities.
Discovering Shape and Space	**Connected Problem Solving**	**MD.1, MD.2, MD.3, NBT.3, NBT.4, NBT.5, NBT.6, OA.2, OA.3, G.3:** Solve problems with perimeter, area, volume, distance, and symmetry, using operations and measurement.

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)