Mc Graw Hill

Educator's Snapshot

2023 California Mathematics Framework

California Reveal MATH®

Reveal a world of possibilities in your math classroom with these transformative concepts from the 2023 California Mathematics Framework.

"This framework lays out an approach to curriculum and instruction that harnesses and builds on students' curiosity and sense of wonder about the mathematics they see around them. Students learn that math enriches life and that the ability to use mathematics fluently—flexibly, efficiently, and accurately—empowers people to influence their lives, communities, careers, and the larger world in important ways." (CMF, Chapter 1, Page 5)

All Means All

The California Math Framework (CMF) discusses the importance of every student receiving a high-quality mathematics education and opportunities to succeed, regardless of their background, demographic, or personal circumstances. The objective is to eradicate inequalities in access, performance, and results among various student groups. The CMF stresses the importance of providing the essential support, resources, and teaching methods to reach every student exactly where they are. In California, "All" truly means ALL!

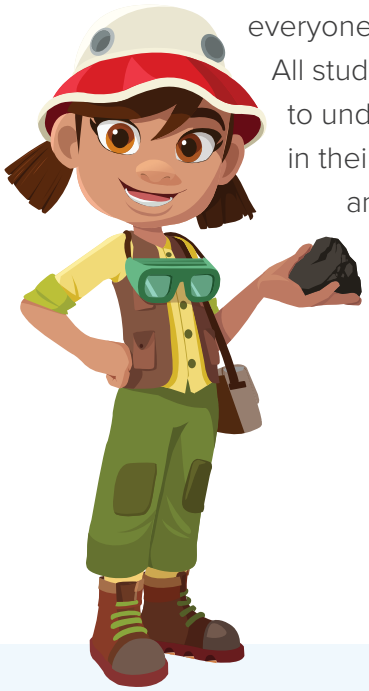
"...teachers need to create more opportunities for students to engage in intriguing, deep tasks that honor their ideas and thinking and draw on their backgrounds, interests, and experiences. Teachers pose purposeful questions and structure lessons to provide time for students to engage in mathematical reasoning through small and whole-group discussions. Such practices can enable all students to see themselves as mathematically capable learners with a curiosity and love of learning mathematics—capacities that will bolster them throughout their schooling." (CMF, Chapter 2, Page 45)

The five components of instructional design that encourage equitable outcomes are:

1. Teaching Big Ideas
2. Using open tasks
3. Teaching toward social justice
4. Supporting students' questions and conjectures
5. Prioritizing reasoning and justification

Every Person Is a Math Person

Math is not just numbers and algorithms; it's a source of joy and beauty. It unfolds in patterns, estimation, data, and logic, bringing a sense of wonder to problem-solving. Math is for everyone and is used by everyone. All students need opportunities to understand how math is used in their homes, by their families and in the world. Students must be empowered to see themselves as math people and have the opportunity to showcase their brilliance.



"...emerging research suggests that aspects of school context play a critical role in shaping students' beliefs in themselves as mathematics learners (Walton and Yeager, 2020). These factors include teacher beliefs about students' potential to succeed in mathematics (Canning et al., 2019; Yeager et al., 2021), use of instructional practices that consistently promote a growth mindset (Sun, 2019), and policies about when and how students can choose to enroll in advanced mathematics (Rege et al., 2021)." (CMF, Chapter 1, Page 13)

Math Is All Around Us

Incorporating real-life examples that engage students in exploring, discovering, and reasoning should be a focal point of the mathematics classroom. By demonstrating how math relates to their schools, communities, and the broader world, students gain empowerment and begin to view themselves as active participants, knowledgeable individuals, and creators of mathematical understanding.

"An authentic activity or problem is one in which students investigate or struggle with situations or questions about which they actually wonder. Lessons should be designed to elicit student wondering."
(CMF, Chapter 1, Page 30)

Designing Bird Feeders

Let's build some bird feeders together!

Building the Language of Math

Rich mathematical discourse helps students expand their mathematical thinking, language, and understanding. When students engage in collaborative learning experiences that challenge them to synthesize and articulate their understanding and critique the reasoning of others, they make connections to language and concepts. Teachers play a pivotal role in mathematical discourse serving as facilitators of student thinking.

"Activities should be designed in ways that provide students with a variety of structures to practice, engage in, and eventually master the vocabulary...create rich, effective discussions where students use developing skills to clarify, inform, question, and eventually employ these conversational behaviors without direct prompting..." (CMF, Chapter 3, Page 15)

It's All About the Big Ideas

The "Big Ideas" represent foundational and essential mathematical concepts that serve as key building blocks for students' understanding and proficiency in mathematics.

Big Ideas are essential for creating a meaningful and interconnected mathematics curriculum. These ideas are organized by grade level and progressions, guiding students through a coherent and meaningful mathematical journey within and across the grade levels.

"Big ideas open the door to connectedness, clarity, and engagement. Organizing instruction around grade-level big ideas, in which the power standards are embedded, can lead to greater achievement by many more students." (CMF, Chapter 1, Page 15).

We Live in a Data-Driven World

"Data Science" refers to the incorporation of data-related concepts and skills into the mathematics classroom at all grade levels. With the increasing availability of data and its role in various fields, students are encouraged to become informed consumers of data, capable of analyzing and using data effectively to make decisions. This approach aligns with the framework's goal of preparing students for real-world challenges and fostering a deeper appreciation of mathematics as a powerful tool for understanding and improving the world.

> *"Life in a data-rich world requires that California schools prepare all students to examine claims justified with data, to understand the probabilistic underpinning of drawing conclusions from samples, and to see the use of data as a tool for answering many questions of interest. Developing these abilities requires that students generate questions and work with data beginning in kindergarten (or before) and have experiences of increasing depth and complexity throughout their school careers."* (CMF, Chapter 5, Page 66)

Open Tasks Engage All Students

In the California Mathematics Framework, "Open Tasks" are designed to encourage students to think critically, explore mathematical concepts deeply, and engage in problem-solving in a more open-ended and creative way.

> *"Rather than being focused on one way of thinking or one right answer, student investigations rely on open tasks—that is, tasks that engage students in multidimensional exploration and investigation, drawing from their own knowledge and interests. Open tasks enable students to learn mathematics by meaningfully engaging in mathematical experiences that are visual, physical, and numerical and employ multiple representations and forms of expression (Foote and Lambert, 2011; Lambert and Sugita, 2016; Moschkovich, 1999; Boaler and LaMar, 2019)."*
> (CMF, Chapter 2, Page 16)

Rigor, Redefined

In previous contexts, rigor was often understood simply as the difficulty level of a problem. However, the California Mathematics Framework has redefined rigor to encompass a broader scope, aiming to facilitate more comprehensive mathematical experiences and understanding.

Rigor means that students understand and can flexibly apply methods to different situations, connect mathematical ideas, approaches, and representations.

"Rigor refers to an integrated way in which conceptual understanding, strategies for problem-solving and computation, and applications are learned, so that each supports the other. The challenge posed by the principle of rigor is to provide all students with experiences that interweave concepts, problem-solving (including appropriate computation), and application, such that each supports the other." (CMF, Chapter 13, Page 6)

Instruction With Intention: Data-Informed Decisions

Formative assessment practices serve as valuable tools throughout instruction, designed to provide ongoing feedback, monitor progress, and adjust instruction in-the-moment. By making student thinking visible, teachers gain valuable insights into when to offer guidance or introduce new challenges, fostering a dynamic and engaging learning environment tailored to individual student needs.

"Assessment is a critical step in the teaching and learning process for students, teachers, administrators, and parents. It is a 'systematic collection and analysis of information to improve student learning' (Stassen et al., 2001, 5). As increasingly modern assessments continue to replace traditional tests, all educational assessment should share a common purpose: collecting evidence to enhance student learning and to support students' development of positive mathematics identities (Aguirre, Mayfield-Ingram, and Martin, 2013)."

"Important mathematics learning often can be demonstrated through many forms of communication, such as speaking, drawing, writing, and model building, integrating mathematical content and practices." (CMF, Chapter 12, Page 3)

Empowered Teachers Empower Students

Continuous professional development programs that provide ongoing support for teachers are vital for student success. Teachers who prioritize Big Ideas, foster building connections, and use engaging math investigations see their students thrive. However, given that many teachers themselves did not learn mathematics in this way, they require support in reimagining their teaching approaches and in acquiring the skills and strategies necessary to bring about the essential changes in their practices that lead to improved student learning.

"...effective professional development is content focused, based in active learning, includes collaboration, uses instructional examples, provides coaching and expert support, includes feedback and reflection, and has a sustained duration." (CMF, Chapter 10, Page 15)

"A broad system of support to enable all students to succeed in mathematics learning consists of many interconnected parts. Teachers, as the drivers of learning, continually refine and adapt their practice to address the many dimensions of creating a rich mathematical learning environment focused on active learning for all students in their classrooms." (CMF, Chapter 10, Page 42)

Teaching Toward Social Justice

Research highlights that students' attitudes toward math are shaped by their social and cultural environment. Educators and researchers agree that teaching math with a social justice lens can profoundly enhance students' math engagement and performance. Teaching toward social justice involves establishing an inclusive classroom environment where every student, irrespective of their background, can see themselves as proficient and accomplished in math. It also involves equipping students with the skills to investigate issues of equity and injustice within their communities, utilizing math to address real-world challenges.

Mathematics is a tool that can be used to both understand and impact the world. But too often students believe mathematics is not for them (Bishop, 2012; Darragh, 2015). Research shows that social and cultural contexts play a role in learners' sense of belonging in mathematics classrooms. Additionally, learning environments enable or hinder whether and how students see themselves as doers of mathematics who believe that mathematics has a role in their lives (Lerman, 2000; Gutiérrez, 2013). Both mathematics educators and mathematics education researchers argue that teaching toward social justice can play an important role in shifting students' perspectives on mathematics as well as their sense of belonging as mathematics thinkers (Xenofontos, 2019). (CMF, Chapter 2, Page 26)

Thinking Like a Mathematician

The Standards from Mathematical Practice (SMPs) are not new to California educators but are reestablished with greater importance within the 2023 CMF. The SMPs are the habits of mind and the habits of interaction that serve as the foundations for math learning. To teach mathematics for understanding, it is essential for students to interact with the SMPs actively and intentionally throughout a math lesson. The eight SMPs are consistent in Grades K–12, allowing students to deepen their skills and knowledge as they progress in school.

> *"The SMPs must be taught as carefully and practiced as intentionally as the content standards, as two halves of a powerful whole, for effective mathematics instruction. The SMPs are designed to support students' development across the school years."*
> (CMF, Chapter 1, Page 23)

- **SMP1.** Make sense of problems and persevere in solving them
- **SMP2.** Reason abstractly and quantitatively
- **SMP3.** Construct viable arguments and critique the reasoning of others
- **SMP4.** Model with mathematics
- **SMP5.** Use appropriate tools strategically
- **SMP6.** Attend to precision
- **SMP7.** Look for and make use of structure
- **SMP8.** Look for and express regularity in repeated reasoning

Math is... **Explaining**

How can I explain my thinking?

California Reveal Math **supports the California Mathematics Framework.**

Learn how at **mhecalifornia.com**

For more information and guidance on the California Mathematics Framework, visit **cde.ca.gov/ci/ma/cf**

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