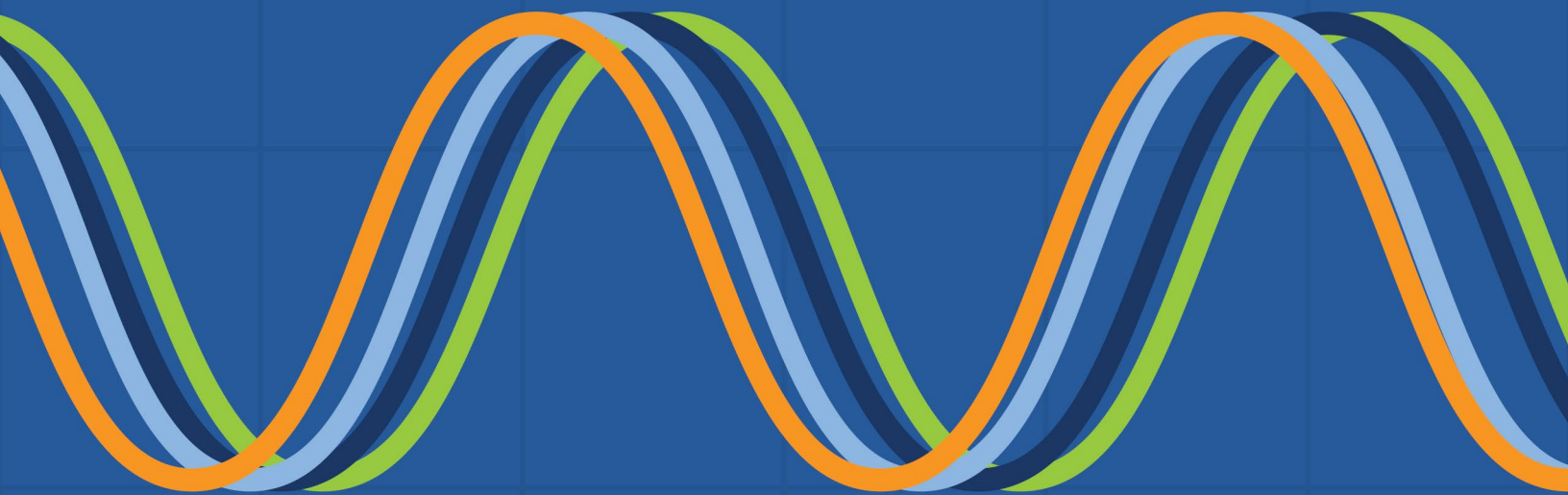


FEBRUARY 2025

# Transforming Math Teaching:

---

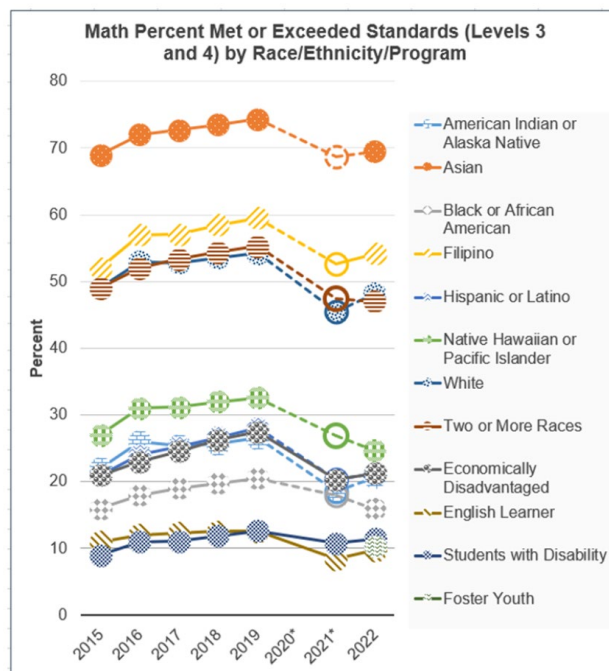
A Reflective Guide to the California Math Framework



# Introduction and Background

The [California Mathematics Framework \(CMF\)](#) aims to provide a comprehensive and research-based guide for mathematics education in the state's school districts. It seeks to enhance the quality of math instruction by outlining effective teaching strategies, curriculum standards, and assessment practices. The CMF focuses on fostering critical thinking, problem-solving, and analytical skills among students, preparing them for the demands of a rapidly evolving technological and data-driven world. By promoting equity and access, the framework seeks to close achievement gaps and ensure that all students receive high-quality math education regardless of their background. Ultimately, the CMF is designed to create a cohesive and coherent approach to math education that supports student success and lifelong learning.

The creation of the CMF, and reforming math education in general, was essential to address the evolving demands of the modern world. The traditional approaches to teaching math often fail to equip students with the necessary skills for today's technology-driven and data-centric job market. Furthermore, significant achievement gaps persist among student populations in California, as shown in the chart below, highlighting the need for a more inclusive and equitable system. Reform efforts focus on strengthening 21st century skills, while making math education more engaging and relevant to students' lives. Integrating technology and adopting evidence-based teaching methods are also critical components, ensuring students are better prepared for higher education and global competitiveness.



Source: California Math Framework Chapter 2, page 3

We are a group of Teach Plus Policy Fellows and diverse educators from throughout California with over 60 years of experience in education. We are dedicated to equitably improving student outcomes and see the adoption and implementation of CMF as a critical step to reduce inequities in math education. In order to better understand what educators need to implement CMF, we conducted a series of interviews with math educators throughout California. Based on these interviews and extensive secondary research, we developed this guide to help bring the CMF to life in school communities throughout our state.

Through these interviews, we identified five major topics essential in shifting from traditional math education to the ideals of the CMF.

### 1. **Big Ideas:**

The framework integrates the standards around key “Big Ideas” rather than introducing concepts in isolation.

### 2. **Emphasis on Inquiry-Based Instruction:**

The framework stresses teaching math through inquiry-based instruction, actively engaging students in the learning process.

### 3. **Focus on Equity:**

The framework highlights strategies to promote equitable classroom instruction, engagement, and outcomes.

### 4. **More Support for Multilingual Learners:**

The framework emphasizes ensuring multilingual learners receive the support they need to meaningfully access math content.

### 5. **Pathway Updates:**

The framework outlines math pathways that districts can adopt to better support inclusive teaching.

We hope that educators, in partnership with their departments, administrators, and community leaders, will use our guide to reflect on their practice and continuously improve through the implementation of the CMF. Within each of the topics, this guide provides a brief description, essential questions to consider, educator insights, and additional resources to learn more.

- + The **“Educator Insights”** are direct quotes taken from our interviews with educators, expressing how the shifts show up in their classrooms and why they are important.
- + The **“Essential Questions”** are tools to guide reflections and discussions related to current practice. For a more in depth and locally relevant discussion, we recommend collecting student artifacts and conducting reciprocal observations.
- + The **“Additional Resources”** are tools for developing an inquiry cycle or improvement plan aligned to the CMF. This should be an iterative process that focuses on changing a single practice at a time.

One of the greatest barriers to implementing the CMF we observed during our interviews was a lack of awareness and understanding of the framework. Thus, this guide also includes a Frequently Asked Questions (FAQ) section to share with educators, administrators, and families to provide context about its creation and adoption.

# Topic 1: Big Ideas

CMF integrates the standards around key “Big Ideas” rather than introducing concepts in isolation. This approach emphasizes connections between different areas of math, both within and across grade levels, enabling students to see the relationships and connections linking individual concepts. When using CMF, students develop critical thinking and problem-solving skills that transfer across various contexts by focusing on overarching themes such as patterns, structures, and relationships. “Big Ideas” make math more relevant and engaging, as they have real-world applications and encourage exploration and inquiry. Ultimately, teaching through these “Big Ideas” supports students’ long-term knowledge retention and prepares them to tackle complex problems in academics and everyday life.

## Grade Six Content Connections, Big Ideas, and Standards



Source: California Math Framework Chapter 2, page 14

### Essential Questions

- » How do you connect different standards in your math courses (as opposed to teaching standards in isolation)?
- » How do you teach students to build conceptual understanding? How is this connected to building procedural fluency?
- » To what extent are concepts and skills vertically aligned in your math department?

### Educator Insights

*“Mathematics is a web of interconnected ideas. When reading individual standards, connections or overlaps are often apparent. In these cases, you can cluster those standards together when talking about the common idea. Another approach is to start with the topic or idea that I want students to explore, and then look at what standards align to that idea. I personally find it challenging to teach standards in isolation.”*

–7th grade math teacher

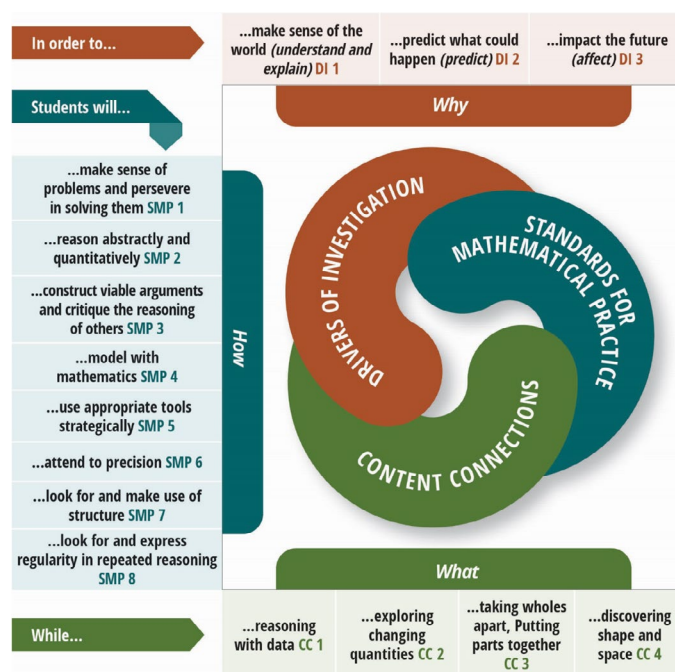
### Additional Resources

- + [Achieve the Core's Coherence Map](#) - Coherence Map from Achieve the Core is an interactive website that illustrates how the Common Core State Standards for Mathematics kindergarten-high school are connected to one another

## Topic 2: Emphasis on Inquiry-Based Instruction

Teaching math through inquiry-based instruction actively engages students in the learning process, fostering curiosity and a deeper understanding of mathematical concepts. This approach empowers students to ask questions, explore various problem-solving strategies, and discover solutions on their own or collaboratively, promoting critical thinking and independent learning. Inquiry-based instruction helps students develop a strong conceptual foundation by allowing them to connect new knowledge with prior understanding through hands-on activities and real-world applications. It also cultivates a growth mindset, as students learn to view challenges as opportunities for learning and development. By making math more interactive and student-centered, inquiry-based instruction enhances motivation, retention, and the ability to apply mathematical reasoning in diverse situations.

### Drivers of Investigation, Standards for Mathematical Practices, and Content Connections



Source: California Mathematics Framework Chapter 1, page 21

### Essential Questions

- » How do you make your math instruction relevant to your students?
- » To what extent do students have the opportunity to be curious in your math classes?
- » How do you connect math content to the real world in ways that engage and inspire students?
- » To what extent do students have ownership over the content and questions posed during your math classes?
- » How do you incorporate problem-solving opportunities in your math classes?

## Educator Insights

*"I make math instruction relevant by understanding who my students are as humans. This allows me to leverage their existing knowledge and build on it. Relevance is not always about inserting a student's name into a word problem or referencing a current pop culture trend. Relevance comes from knowing who your students are, what they know, and filling the very human need to understand something they don't quite understand yet, sparking curiosity to know more when things don't work as expected."*

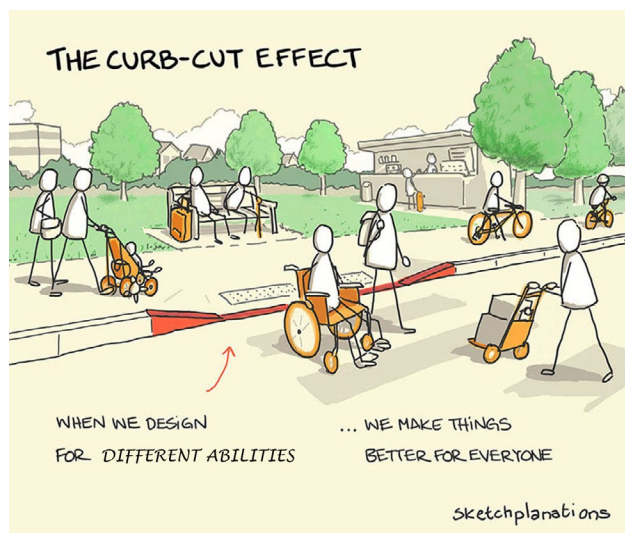
–7th grade math teacher

## Additional Resources

- + [Chalk Talk](#): strategy to reflect, generate ideas, and check on learning from the Center for Leadership & Educational Equity
- + [Critical Math Drop](#): podcast from math teachers including episodes 2 and 3, which include examples of embedding social justice in math
- + [Establishing a Culture of Questioning](#): *Edutopia* article detailing how questioning strategies lead to increased learning
- + [How We Use "Need to Know" Questions to Guide Sustained Inquiry](#): article in PBL Works on how to engage in critical inquiry in the classroom
- + [What is the QFT? Question Formulation Technique](#): resource outlining the Question Formulation Technique, or QFT, is a structured, digital way to refine the inquiry process, generating and improving questions

## Topic 3: Focus on Equity

Fostering a classroom environment where every student feels valued, capable, and motivated to explore the world of mathematics is essential in creating an equitable system so all students have access to the same opportunities. Chapter 2 of the CMF, titled “Teaching for Equity and Engagement,” delves into strategies to promote equitable classroom instruction and outcomes. This is the cornerstone of CMF, which emphasizes that all students view themselves as mathematically capable individuals. The framework aims to nurture and sustain students' curiosity and love for mathematics throughout their schooling. To achieve this, the chapter outlines various methods to create an inclusive and supportive learning environment where every student has the opportunity to succeed. It discusses the importance of culturally responsive teaching practices, differentiated instruction, and formative assessments to identify and address individual learning needs. Additionally, it emphasizes the need for professional development for educators to equip them with the skills and knowledge required to implement these strategies effectively.



Source: <https://sketchplanations.com/the-curb-cut-effect>

### Essential Questions

- » How do you foster a growth mindset in your math classes?
- » How do you set high expectations for all students? How do you support every student so they reach those high expectations?
- » How do you take the whole child into account when planning lessons, implementing lessons, and responding to classroom community expectations?
- » How are students' multiple identities incorporated into the classroom environment and content?
- » How do you honor each student's culture and background?
- » How do you ensure that students see themselves as mathematically brilliant?

## Educator Insights

*“Teachers are trained in complex instruction, which supports teachers to disrupt status in the classroom by teaching math concepts as a web—not a ladder—in order to invite all students to identify their mathematical strengths.”*

–9th grade math teacher

## Additional Resources

- + [CAST](#): website of a nonprofit educational research and development organization that created the Universal Design for Learning framework with resources and research
- + [Complex Instruction](#): resources for implementing complex instruction pedagogy from Stanford University
- + [Critical Math Drop](#): podcast from math teachers, including episodes 7 and 8 on why we are all math people
- + [Dynamic Learning Map - Math](#): statements of knowledge and skills tied to essential elements of math by grade level in accordance with Common Core standards
- + [Georgia Standards](#): Georgia Department of Education mathematics standards and educator resources
- + [Maryland Coalition for Inclusive Education](#): math education resources, blogs, podcasts and more from a non-profit coalition in Maryland focused on meaningful and successful inclusion of all students
- + [Social Justice Math Resources](#): website and research project providing book recommendations, lesson templates and educator resources for teaching social justice math lessons
- + [You Cubed](#): program from Stanford University providing mathematics education resources and courses for teachers



## Topic 4: More Support for Multilingual Learners

Historically, multilingual learners in California have not received the support they needed to meaningfully access content. All educators—regardless of content area—are teachers of both content and language. They must provide all students access to rich content by intentionally supporting receptive and productive language skills. In addition to the supports discussed in the previous section, Chapter 2 in the CMF also delves deeply into best practices and supports for multilingual learners. It emphasizes the importance of an asset-based approach, which acknowledges and leverages the rich linguistic and cultural backgrounds that multilingual students bring to the classroom. This approach fosters an inclusive learning environment where students' home languages are not only supported but celebrated, promoting a sense of belonging and identity. The chapter also highlights the necessity of developing students' academic language, which is crucial for their success across various subjects, particularly in understanding complex mathematical concepts. Teachers can facilitate meaningful conversations that enhance language development and critical thinking skills by building more discourse opportunities. Furthermore, Chapter 2 integrates the English Language Development (ELD) standards, linked below, throughout math instruction, ensuring that language learning is embedded within the content area. This integration helps multilingual learners develop their English proficiency and mathematical understanding, leading to a more holistic and effective educational experience.



Source: [https://commons.wikimedia.org/wiki/File:Flag\\_Map\\_of\\_The\\_World\\_\(2016\).png](https://commons.wikimedia.org/wiki/File:Flag_Map_of_The_World_(2016).png)

### Essential Questions

- » How do you explicitly teach and assess language in your math classes?
- » How do you use discourse and other language routines to support learning the target language?
- » How do you integrate content and language objectives in your teaching?
- » How do you support students who understand math in their home language to express that understanding in the target language?

## Educator Insights

- + *"Students are given the opportunity to translate words into their home language."*  
–9th grade math teacher
- + *"We choose content standards and then a language function based on the main ideas of the unit. Then, we write a language objective related to the content objective for every lesson."*  
–9th grade math teacher

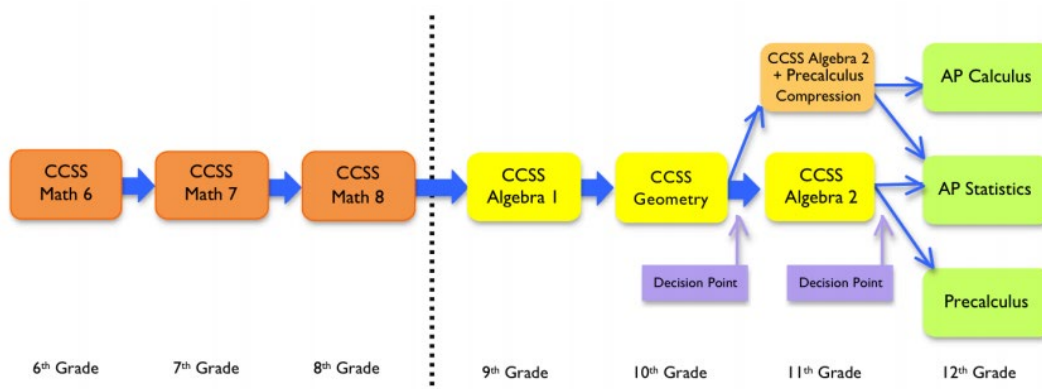
## Additional Resources

- + [3 Reads Protocol](#): reading strategy to support students with complex word problems
- + [Discourse Routines](#): routines and strategies that support students to share their ideas and refine their thinking
- + [Dyad Video](#): video sharing an example of a teacher leading their class in a Dyad exercise as a strategy for developing language and understanding in math class
- + [ELD Standards](#): California English Language Development Standards for grade K-12
- + [ELL Success Forum](#): math guidelines for supporting multilingual learners in five focus areas from the English Learners Success Forum
- + [English Learner Roadmap](#): framework and collection of guidance to support multilingual students throughout California

## Topic 5: Pathway Updates

School districts will always have the final say in developing educational pathways in their school systems. The math pathways recommended by the CMF are intended to better support inclusive teaching, but district leadership will ultimately determine what is actually being offered to best meet the needs of their students. While the final approved framework suggests that schools offer algebra starting in 9th grade, it allows for district autonomy to accelerate this course in middle school. CMF no longer suggests a separate data science high school pathway and instead includes guidance for integrating data science instruction across grade levels. CMF also notes that the high school course can be an option as a third-year course, leaving schools and districts the opportunity to decide on a variety of pathways. Accelerated opportunities should be available to all students, and the demographics of students in accelerated pathways should mirror as much as possible the demographics of the school/district. Furthermore, school sites should actively recruit underrepresented students to participate in accelerated pathways.

### EXAMPLE COURSE SEQUENCE



Source: San Francisco Unified School District's secondary detracked math sequence

### Essential Questions

- » How do you determine which math courses to offer?
- » How do you decide which teachers teach advanced level math courses?
- » What are the differences in curriculum and instruction in honors vs. non-honors courses?
- » How do you make sure every student is aware of their opportunities to take advanced level math courses?
- » What are your procedures for recruiting and accepting students into advanced level math courses?
- » What are the demographics of your honors and Advanced Placement (AP) math courses? To what extent do these reflect the demographics of the district/school?

## Educator Insights

- + *"We try to make the classes as reflective of the student demographics as possible by actively recruiting students and supporting them before and during the AP/Honors courses."*  
–9th grade math teacher
- + *"Our math teaching staff, counselors, site admin, and district office staff partner in an 'honors task force' to calibrate messaging and establish systems to communicate to students and families course options, and share the costs and benefits of participating in advanced math courses."*  
–7th grade math teacher

## Additional Resources

- + [A Guide to Detracking Math Courses: The Journey to Realize Equity and Access in K-12 Mathematics Education](#): book that can serve as a guide for developing a system of detracked math including the structures, instructional shifts, coalition building, and educator training and support necessary to ensure a path to equity
- + ["Why I support detracked math in San Francisco public schools"](#): article that captures an argument for detracking math from "a white mother of 2 black daughters" in San Francisco

## AUTHORS:

### TEACH PLUS CALIFORNIA POLICY FELLOWS

- + Amber Bradley
- + Jackie Gardner
- + Taica Hsu\*
- + Bryan Monroy, Teach Plus California Policy Manager
- + Katie Larson
- + Anaité Letona
- + Rebecca Pariso\*

\*Denotes lead authors

## ABOUT TEACH PLUS

The mission of Teach Plus is to empower excellent, experienced, and diverse teachers to take leadership over key policy and practice issues that advance equity, opportunity, and student success. Since 2009, Teach Plus has developed thousands of teacher leaders across the country to exercise their leadership in shaping education policy and improving teaching and learning for students. [teachplus.org](https://teachplus.org)



[teachplus.org/CA](https://teachplus.org/CA)

 [facebook.com/TeachPlusCA](https://facebook.com/TeachPlusCA)

 [@TeachPlusCA](https://twitter.com/TeachPlusCA)