Dear California State Board of Education,

I am writing to ask you to REJECT the Mathematics Framework Revised Draft (CMF) proposed for the July 12-13, 2023 meeting. In the CMF, the adopted California Common Core Content Standards are being replaced with "Big Ideas" aligned to 4 "Content Connections" which were not vetted, shared with the CA public nor written by people with advanced math degrees; the there is no evidence the "big ideas" will prepare our students for success in mathematics. The SBE needs to require that a California Math Framework focus on the Math Content Standards adopted by the state of California. The proposed CMF will fail students (especially struggling students) as it shifts away from standards-based instruction where students learned specific concepts and skills towards ill-defined and vague "big ideas" which have no guarantee of ensuring topics required for success in math are mastered.

A California Mathematics Framework has the following goal: "This framework serves as a guide to implementing the California Common Core State Standards for Mathematics (CA CCSSM or the Standards), adopted in 2010 and updated in 2013." (Ch 1 line 37) Yet, only 6.3% of the CMF discusses or even lists specific CA math content standards (1072 lines out of 17,088 lines). The CMF has clearly FAILED to do its job.

In direct contrast to the job of a CA Math Framework, the proposed CMF I ask you to reject recommends teaching "Big Ideas" as <u>the content</u> (see evidence below). Who decided the "big ideas" should replace the content standards (which were created primarily by 3 professionals who hold PhD's in MATHEMATICS and which were vetted and voted on in California with public knowledge and input)? According to the CMF, three individuals determined the "big ideas" for California and the CMF. In Chapter 3 line 244 and again in Chapter 3 line 1468 we read, "Three big ideas (Boaler, Munson, and Williams, 2018), and "Three big ideas (Boaler, Munson, and Williams, 2018) related to number sense for the high school level call for students to do the following." Who are "Boaler, Munson and Williams" who apparently have the authority to determine what students in California will learn in math? Well, of these three, only 1 holds a degree in mathematics (Cathy Williams has a Bachelor's in Applied Mathematics). NONE of the three hold a master in mathematics and NONE of the three hold a PhD in mathematics. SBE-you must reject a framework where "big ideas" created by non-mathematicians are replacing content standards written by mathematicians and vetted by thousands. If not, California will fail to produce a STEM workforce; the decision about what math is to be learned *must* be left up to those with advanced degrees in mathematics who know what is needed for STEM careers.

Additionally, the CMF tells us these "big ideas" (chosen by three individuals without a single advanced math degree) are in fact just ONE interpretation of big ideas. "It should be said that <u>there are many interpretations of big ideas in mathematics</u>, and t<u>hose presented in these figures are one variation</u>. Providing mathematics teachers with adequate release time to collaborate with colleagues and engage in discussions around <u>their vision of big ideas</u> at their grade level or in a particular course can enable them to create rich, deep tasks that invite students to explore and grapple with those big ideas." (Ch 7 line 952). If this is the case, and big ideas are the way to go instead of standards, why doesn't the SBE put together a group of <u>qualified</u> individuals to

draft these and then have them vetted and voted upon in California. Why are we allowing three under qualified individuals to decide our students' fate or allowing grade level teams (who typically involve teachers without math degrees) to decide what "big ideas" their students will learn. This will be a failed experiment with the cost being math proficiency for a generation. Furthermore, in reading the CMF it is noted that the "big ideas" originated during distance learning. "So a focused set of big ideas, indicated as Big Ideas, was created as part of the California Digital Learning Integration and Standards Guidance initiative (CDE, 2021). These grade level Big Ideas, organized by Content Connections, and inclusive of multiple CA CCSSM content standards, are presented in the grade-banded chapters, 6, 7, and 8." (Ch 13 line 545). Note the use of the phrase "inclusive of multiple CA CCSSM content standards"; why not ALL content standards if teaching standards based mathematics if the job of a public school teachers?

**Evidence that the CMF wants to REPLACE Math Content Standards with their "Big Ideas"**

- "In this framework, the big ideas are delineated by grade level and are the core content of each grade." (Ch 6 line 228)
- "The foundational mathematics content—that is, the big ideas' (Ch 6 line 942)
- "In this framework, the big ideas are delineated by grade level and are the core content of each grade." (Ch 7 line 165)
- Teachers should be "Teaching from big ideas, not individual standards." (Ch 10 line 177)
- "Educators of pre-service teachers need to align their programs to reflect the authentic-context, big-idea-based instruction described in this framework." (Ch 10, line 247). So the "big ideas" proposed by 3 individuals without strong math backgrounds will be here to stay and the math content standards will be a thing of the past!

This replacement of math content standards as the primary focus applies to lesson design, publishers, Teacher Preparation Programs, and grading as well.

- "This framework reflects a revised approach, advocating that publishers and teachers avoid organizing around the detailed content standards and instead organize around the most important mathematical ideas." (Ch 1 Line 405)
- "To help educators attain the goal of ensuring deep, active learning of mathematics for all students, this framework is centered around the investigation of big ideas in mathematics, connected to each other and to authentic, real world contexts and taught in multidimensional ways that meet varied learning needs." (Ch 1 Line 50)
- "Planning teaching around big ideas, the first component of equitable, engaging teaching, lays the groundwork for enacting the other four." (Ch 1 line 361)
- "Design class activities around big ideas, with an emphasis on investigations and connections, not individual standards.' (Ch 1 line 590)
- "In the classroom, teachers teach the big ideas by designing instruction around student investigations of intriguing, authentic experiences relevant to students' grade level, backgrounds, and interests." (Ch 6 line 235)
- "These include designing lessons from a small number of big ideas in each grade band; spending a preponderance of student time on authentic problems that engage multiple content and practice standards situated within one or more big ideas; focusing on connections, to students' lives and among mathematical ideas; and using strategies that show connections between different mathematical ideas on various topics across grade levels." (Ch 10 line 789)
- "Instructional materials should primarily involve tasks that invite students to make sense of these big ideas, elicit wondering in authentic contexts, and necessitate mathematical

investigation. Big ideas in math are central to the learning of mathematics, link numerous mathematical understandings into a coherent whole, and provide focal points for students' investigations. An authentic activity or problem is one in which students investigate or struggle with situations or questions about which they actually wonder. Lesson design should be built to elicit that wondering. For example, environmental observations and issues on campus and in students' local community provide rich contexts for student investigations and mathematical analysis. Such discussions will concurrently help students develop their understanding of California's Environmental Principles and Concepts." (Ch 8 line 147)

- "Mastery-based grading describes a form of grading that focuses on mastery of ideas rather than on points or scores. This approach is sometimes referred to as standards-based grading, and although it refers to standards, it does not have to focus on specific standards. It could, instead, use cluster headings, which are more akin to the Content Connections and Big Ideas approach of this framework." Ch 12 line 606

Note that not EVEN ONCE are the Math Content Standards Written out anywhere in the over 17,000 lines of text. How can the SBE adopt a CA math framework that does not even list the content standards students are supposed to learn?

The math content standards were written in a logical order. As the CMF accurately notes, "California's mathematics content standards were built on progressions of topics across grade levels, informed by both research on children's cognitive development and by the logical structure of mathematics." (Ch 6 line 982). Later on we read, "The Common Core State Standards are based on an understanding of how young people typically develop mathematical knowledge and skills in a sequenced." (Ch 3 line 41) So why would the SBE adopt a CA math framework that recommends we shift away from this logical structure that is sequenced and built on research towards a single interpretation of "big ideas"? As Chapter 5 line 507 states, "As readers consider the three subsequent chapters of the framework, they will see ideas similar to the ones discussed in this chapter, organized to help them learn about and begin to use the big ideas approach. While the transition between standards domains and progressions discussed in this chapter and this new approach will not be straightforward for classroom teachers, both emphasize the central idea that students at all levels should have experiences that build their mathematical toolkits for making sense of their worlds." So the CMF is clearly suggesting a "transition" from standards domains and progression (those research based, logical, sequenced standards) to a "new" approach (big ideas) that will not be straightforward. This is not an experiment I want performed on CA public school students. We also read in Chapter 1 line 369, "To reach the goal of deep, active learning of mathematics for all, this framework encourages a shift away from the previous approach of identifying the major standards (or "power" standards) as focal points for organizing curriculum and instruction (see box). It instead encourages teachers to think about TK–12 math as a series of big ideas." What evidence is there to make these major shifts? In Chapter 2, line 287 the CMF states, "Rather than focusing on specific procedures and memorization, instruction is more effective when teachers aim to develop understanding of bigger ideas and procedures." What study do they cite to support this claim? NONE. The CMF is now making changes to instruction away from the standards based instruction California has implemented for over 26 years without ANY EVIDENCE.

**There are a number of major concerns (beyond the background of who wrote the big ideas and the lack of evidence they will help students become proficient in math, and the fact that one interpretation of this will replace standards based instruction.**

1. The CA Common Core Standards for Math were written such that some standards were designated as "Major" and others were designated as "additional" or "supporting". It is

explained that the additional/supporting standards provide context and opportunities for students to practice and apply what is major, but the learning of those standards is not as important in and of themselves. In all grade levels, K-8 the major work includes all facts and operations with whole numbers, fractions, decimals and integers, place value, algebraic thinking (including expressions and equations) ,an, ratios and proportions. Additional or supporting standards include all standards related to data, statistics or probability as well as all standards related to Geometry. The CMF proposes that teachers "organize early-grade instruction around the Content Connections, which connect the mathematical big ideas." (Ch 6 line 153).The 4 Content Connections, which the CMF describe as the "what" of teaching math are as follows: 1) Reasoning with Data; 2) Exploring Changing Quantities; 3) Taking wholes apart, putting wholes together; and 4) Discovering shape and space (Ch 1 Line 457). So two of the four CC's (50%) are topics which the California Common Core Content Standards for Mathematics (as evidenced in the 2013 CA math framework and the SBAC blueprint) are NOT MAJOR WORK of ANY GRADE LEVEL. How will 50% of the "what" of math being focused on standards that are not major support struggling students? How will it help students achieve proficiency in math and be competitive for STEM careers? As noted previously, the CMF proposed a "shift away from the previous approach of identifying the major standards (or "power" standards) as focal points for organizing curriculum and instruction." On what evidence and research is this proposed? The authors of the CA Math Content standards (which this CMF proposed replacing with big ideas) surely had and used evidence as they wrote standards and noted which were major.

2. Based upon what is written in the CMF (and the fact that the math content standards are NEVER listed or written out anywhere in the 14 chapters + 3 appendices), there is no reason to believe teachers will even address most of the content standards if they implement this CMF.
    - The language of the CMF reveals not all standards will be addressed and further shows a lack of knowledge of the standards by the authors of the CMF.
        i. The CMF makes statements about instances when teachers might touch "multiple standards". "These chapters illustrate this framework's approach to instructional design by focusing on several big ideas that have great impact on students' conceptual understanding of numbers and that also encompass multiple content standards." (Ch 1 line 1699) Again in Chapter 8, line 922 we read, "As students explore and investigate with the Big Ideas, they will likely encounter many different content standards."
        ii. In another example, Chapter 3 line 812, we read about what teaching big ideas looks like in a classroom. The CMF states, "Students need time and opportunity to collaborate, critique, and reason about where to place the numbers on the number line (SMP.2, 3). For example, where might 4/7 be placed in relation to ½." This is great, but the problem is that this is describing a grade 5 classroom and the standards come from grade 4. Again, this gives the public no confidence that the authors of the CMF even know the content standards; further, this does not give the public confidence that our students, if the CMF is adopted, will have a chance to learn them.
        iii. In another example we read, "In sixth grade, students are introduced to the idea that letters can stand for numbers." (Ch 3 line 1302). Students are actually introduced to the idea that letters can stand for numbers in

BOTH the grades 3 & 4 content standards. Again I ask, do the authors of the CMF know the content standards?

iv. In yet another example, the CMF states, “For example, content standard 4.NF.2 (compare two fractions with different numerators and different denominators) may be addressed during an investigation in which students reason with data (CC1) and the same standard might also be addressed by lessons in which students take wholes apart and/or put parts together (CC3).” (Ch 6 line 301/431) This does not sound logical and well thought out but relies on when teachers “might” do math; given CA students’ dire performance in math, we can not adopt a framework that has opportunities to possibly learn specific math.

- There are CONTENT STANDARDS MISSING from the “big idea” tables. While the CMF never tries to write out all the math content standards, it does attempt to at least list a standard number next to each big idea. However, in doing this, they SKIPPED 3 standards. The revision process of this third version of the CMF has lasted over a year and not one author can notice that 3 standards are missing? That is unacceptable!
  i. TK is missing NS 2.4: Solve simple addition and subtraction problems with a small number of objects (sums up to 10), usually by counting.
  ii. Grade 2 is missing NBT 4: Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
  iii. Grade 6 is missing EE 8: Write an inequality of the form x>c or x>c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x>c or x<c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
  iv. When a standard is written out, it is partially written out which is very misleading to an elementary teacher who has multiple subjects to teach and cannot be expected to memorize all the math standards. For example grade 3 notes the standard “Categorize shapes by attributes and recognize that different shapes may share certain attributes.” (3.G.1) Unfortunately they left out the specific shape names listed in the actual standard (which include rhombus, parallelogram square and rectangle) so a grade 3 teacher reading the framework is likely to work on all shapes as opposed to the specific and narrow focus on quadrilaterals as called out in the content standards.
- Apparently to defend choosing not to write out the math content standards, the CMF argues “Given educators’ more-advanced understanding of the individual standards, this framework focuses on connections between standards” (Ch 1 line 809) What about new teachers or those who switch grade levels? They surely don’t know the standards. The CMF is happy to list the standards for

mathematical practice MULTIPLE times (e.g, Ch 4 line 378), so why can't we adopt a CMF that at least lists the math CONTENT standards once?

3. Examples of how to teach the "big ideas" through "content connections" reveal a clear lack of math knowledge of the writers of the CMF and give the public reason for concern if this CMF is implemented. Following are some specific examples of bizarre and illogical associations.
    - Grade 2: "Partition a rectangle into rows and columns of same-size squares and count to find the total number of them." is listed under the big idea "Represent Data" How is cutting a rectangle "data"?
    - Grade 2 MD 5 "Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem." This standard is listed under the big idea "Dollars and cents" How is "length" listed under dollars and cents?
    - Grade 4: NBT 3 "Use place value understanding to round multi-digit whole numbers to any place," and NBT 4 "Fluently add and subtract multi-digit whole numbers using the standard algorithm." These are both listed under the big idea of "Shapes and Symmetry", defined as "Draw and identify shapes, looking at the relationships between rays, lines, and angles. Explore symmetry through folding activities."
    - Grade 5: "NF 4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. Interpret the product *(a/b) × q* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. 5. Interpret multiplication as scaling (resizing), by: a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a/b = (n × a)/(n × b)* to the effect of multiplying *a/b* by 1. 7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.1 a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to

represent the problem.“ Guess what “big idea” these standards about multiplying and dividing fractions are found under? Did you guess “Shapes on a Plane”? Neither did I as there is NO connection here!!!

- Algebra I ”investigate situations that involve linear, quadratic, and exponential models, and use these models to solve problems. Recognize linear functions grow by equal differences over equal intervals; exponential functions grow by equal factors over equal intervals, and functions grow or decay by a percentage rate per unit interval. Interpret the inverse of functions, and model the inverse in graphs, tables, and equations.” This standard can be found under the content connection of “putting wholes together and taking whole apart”.

Why would nearly anything in Algebra I fit into the same 4 categories focused on in Kindergarten? Apparently for “consistency” as literally anything is taking the place of a focus on students mastering math content standards. The CMF states (Ch 8 line 77), “For consistency across the entire transitional kindergarten through grade twelve span, the expected understandings, skills, and dispositions of graduates are organized by Content Connection (CC).

- Reasoning with Data (CC1)
- Exploring Changing Quantities (CC2)
- Taking Wholes Apart, Putting Parts Together (CC3)
- Discovering Shape and Space (CC4).”

4. An obsession with “data” has taken over much of the CMF without evidence to support this drastic change. As noted before, “data” has always been “additional or supporting” in the standards and NEVER major. Yet this CMF not only devotes an entire chapter to it, but also makes it 1 of the 4 content connections all big ideas relate to. I can understand the desire for relevance, but then why not focus on Financial Applications (and algebra in secondary). Is it because the two of the authors of the “big ideas” have designed their own data course? This is surely something to be explored by the SBE.

- In Chapter 5 line 231 we read, “there are multiple opportunities to support such data-rich experiences and integrate the five components of equitable and engaging teaching described in chapter two, <u>even if the standards domains do not appear explicitly within a grade or grade band.</u>” So teaching data comes BEFORE being concerned about grade level standards?
- Chapter 7 line 514 tells us, “Grades six through eight mathematics courses should give prominence to statistical understanding and reasoning with and about data—reflecting the growing importance of data in most mathematical situations that students will encounter in their lives.” Again, who is deciding this? Where are the math experts (those with PhD’s in math that know what students need to learn for a rigorous math education?)
- There are multiple instances of the CMF describing that teachers could or should do data that involve topics either well above or well below grade level standards This blatant disregard for content standards to focus on “data” is not acceptable. See Ch 5 line 493, Chapter 5 line 561 and Chapter 5 line 604 for examples.
- The focus on data has so clouded the CMF’s thinking, they describe activities with virtually no math (which would be ok if CA students were proficient, but since we’re far below, math teachers need to teach math content standards). We read, “For example,

students may be challenged to discover which location (inside or outside the classroom) has the "best" types of tables for collaborative group work. As a part of this task, students explore the idea of "best" and discuss features such as size of the tabletop, height of the table, and shape. The teacher guides the students to consider which attributes of the table could be measured and then provides a template for student pairs to collect their observations and measurements—e.g., of width, height, and shape of the table. After collecting data, students notice that some of the table shapes were hard to measure because of their unexpected shape—e.g., trapezoids, kidney beans, and circles." Ch 5 line 700. So students spend all this time to measure something and then note that some things are hard to measure. Is that the rigor we expect in CA schools in grade 5?

5. The authors of the CMF clearly see their "big ideas" as rivals of the math content standards.

- We read, "Chapters 6, 7, and 8 set out an approach to mathematics teaching through big ideas that integrates mathematical content and practices instead of narrow procedures." (Ch 12 line 92). Why are the math content standards (which were written to reflect a BALANCE of conceptual understanding, procedural skill and fluency and application) now being called "narrow procedures"?
- In a sample rubric to help assess students, we read, "*Student Strength:* What does the student understand <u>in terms of this standard</u>? What linguistic and cultural assets possessed by the students can I tap into to support all students, including those on the road to English proficiency, in their mastery of the content? Student Area for Growth: What should the student focus on to strengthen their <u>understanding of this standard</u>? (Ch 12 line 112) This sounds like we're back to standards based assessment; the only problem is there are NO content standards listed; just "big ideas". The CMF is conflating their "big ideas" with "content standards"

Textbook publishers are required to ensure content standards are all addressed.

- To be eligible for adoption, programs must include a well-defined sequence of instructional opportunities that provides a path for all students to become proficient in the standards (Ch 13 line 239)
- Materials that fail to meet all of the criteria in category 1 (Mathematics Content/Alignment with the Standards) will not be considered suitable for adoption. (Ch 13 line 246)
- Instructional materials, as defined in *EC* Section 60010(h), must be aligned to the CA CCSSM Content Standards and SMPs, adopted by the SBE in August 2010 and modified in January 2013. (Ch 13 line 257)

SBE, please hold the CMF to the SAME standard that the state of CA holds publisher to and require the CMF to address and list all math content standards. Do not allow three individuals of which 1 holds a bachelor's degree in mathematics and none hold masters or doctoral degrees in mathematics to determine what students will learn in CA public schools. The 2013 CA Common Core Content Standards for math were well written, written by experts with authority and written based upon research about how children learn math. The 2013 CA Math framework did an exceptional job describing what those standards look like and what it means for students to master those. Please REJECT this CMF and go back to the 2013 CA Math Framework which has much greater promise of helping all students achieve in California.