COMMON CORE
STATE STANDARDS

DELAWARE

Delaware
Department of Education

# A GUIDE TO THE SHIFTS IN THE COMMON CORE STATE STANDARDS IN MATHEMATICS

The single most important flaw in United States mathematics instruction is that the curriculum is "a mile wide and an inch deep." This finding comes from research comparing the U.S. curriculum to high performing countries, surveys of college faculty and teachers, the National Math Panel, the Early Childhood Learning Report, and all the testimony the CCSS writers heard. The standards are meant to be a blueprint for math instruction that is more focused and coherent. … Crosswalks and alignments and pacing plans and such cannot be allowed to throw away the focus and coherence and regress to the mile-wide curriculum.

—Daro, McCallum, and Zimba, 2012 (from the CCSS Appendix)

# Introduction

The Common Core State Standards were developed through an unprecedented state-led initiative that drew on the expertise of teachers, parents, administrators, researchers and content experts from across the country. The Standards define a staircase to college and career readiness, building on the best of previous state standards and evidence from international comparisons and domestic reports and recommendations. Most states have now adopted the Standards to replace previous expectations in mathematics. Building on the strength of Delaware's current state standards, the Mathematics Common Core State Standards (CCSS) are designed to be: focused, coherent, clear and rigorous; internationally benchmarked; anchored in college and career readiness; evidence and research based. The following are the Key Points in the Mathematics Common Core State Standards:

- The K-5 standards provide students with a *solid foundation in whole numbers, addition, subtraction, multiplication, division, fractions and decimals*—which help young students build the foundation to successfully apply more demanding math concepts and procedures, and move into applications.

- In kindergarten, the standards follow successful international models and recommendations from the National Research Council's Early Math Panel report, by focusing kindergarten work on the number core: learning how numbers correspond to quantities, and learning how to put numbers together and take them apart (the beginnings of addition and subtraction).

- The K-5 standards build on the best state standards to provide detailed guidance to teachers on how to navigate their way through knotty topics such as *fractions, negative numbers, and geometry*, and do so by maintaining a continuous progression from grade to grade.

- The standards stress not only procedural skill but also conceptual understanding, to make sure students are learning and absorbing the critical information they need to succeed at higher levels - rather than the current practices by which many students learn enough to get by on the next test, but forget it shortly thereafter, only to review again the following year.

- Having built a strong foundation K-5, students can do hands on learning in geometry, algebra and probability and statistics. Students who have completed 7th grade and mastered the content and skills through the 7th grade will be *well-prepared for algebra* in grade 8.

- The middle school standards are robust and provide a coherent and rich *preparation for high school mathematics*.

- The high school standards call on students to *practice applying mathematical ways of thinking to real world issues and challenges*; they prepare students to think and reason mathematically.

- The high school standards set a *rigorous definition of college and career readiness*, by helping students develop a depth of understanding and ability to apply mathematics to novel situations, as college students and employees regularly do.

- The high school standards *emphasize mathematical modeling*, the use of mathematics and statistics to analyze empirical situations, understand them better, and improve decisions. For example, the draft standards state: "Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. It is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data."

The Guide is further organized to include instructional and administrative implications and resources. The instructional and administrative implications encourage such questions as: "What should be evident in instruction?", "What can be done to prepare teachers for the shifts?" and, "What should administrators see in our classrooms?" While these questions are not exhaustive, they are a place to start to help us internalize the shifts and focus priorities. The resources include a video and organizational tool for each shift from the authors of the Common Core State Standards, along with other pertinent videos and articles, evidence from *the Common Core State Standards* and *Publishers' Criteria for Mathematics.* Below are helpful links to introductory videos on the Mathematics Common Core State Standards and The Three Shifts:

- The Mathematics Standards: How They were Developed and Who was Involved
- Common Core in Mathematics: Overview
- Common Core in Mathematics: Getting Started

This document can be utilized by curriculum developers, administrators, and teachers individually for group study and discussions of the shifts that affect the Delaware ELA Common Core State Standards.

**The Mathematics Instructional Shifts Required by the Standards: Focus, Coherence, and Rigor**

There are three core shifts that are required by the Common Core State Standards. By describing these three core shifts, we aim to ensure that expectations for teaching and learning are clear, consistent, and tightly aligned to the goals of the Standards themselves.

**Focus**: focus strongly where the standards focus

**Coherence**: think across grades, and link to major topics in each grade

**Rigor**: in major topics, pursue with equal intensity

- conceptual understanding,
- procedural skill and fluency, and
- applications

## Math Shift #1: Focus

**Instructional Shift:**

***Focus*** requires that we significantly narrow the scope of content in each grade and deepen how time and energy is spent on major topics in the classroom.

### Instructional Implications

- Narrow the scope of content in each grade so that students more deeply experience what remains and is intended in the CCSS. Use the "Power of the Eraser" to greatly reduce the amount of material covered.
- The overwhelming focus of the Standards in the early grades (K-5) is arithmetic along with the components of measurement that support it. This includes the Domains of Operations and Algebraic Thinking, Number and Operations in Base Ten, and Numbers and Operations- Fractions.
- The focus of the Standards in middle school are in the Domains of Ratios and Proportional Reasoning and Expressions and Equations.
- Many lessons in textbook curricular programs will need to be eliminated or modified to meet the shift of Focus intended by the CCSS.
- Lessons will need to be identified within curricular programs or created in the Focus areas identified by the CCSS.

### Administrative Implications and Classroom "Look For's"

- In any single grade, students and teachers should spend the large majority of their time, approximately three-quarters, on the major work of each grade (see Achieve the Core Resource below for major work of each grade).
- If using a curricular program time will need to be spent vetting the units/lessons in regards to the shift of Focus mandated by the CCSS.
- Formative and Summative assessments used in classrooms should reflect the focus areas and major work of each grade.

**Resources:**

Video: The Importance of Focus in Mathematics: from the authors of the CCSS.

Video: Common Core in Mathematics: Shift One- Focus: David Coleman speaks on the shift regarding Focus.

Achieve the Core Focus Document: Provides guidance for focusing math instruction. It details the instructional shifts, key fluencies, and content emphases by cluster for each grade.

Tri-State Quality Review Rubric for Mathematics Lessons & Units: Rubric designed to measure if units/lessons meet the requirements for Focus in the CCSS.

Critical Areas of Focus in Mathematics for Grades K-2: (Document)

Critical Areas of Focus in Mathematics for Grades 3-5: (Document)

Critical Areas of Focus in Mathematics for Grades 6-8: (Document)

K-8 Publishers' Criteria for the Common Core State Standards for Mathematics: Provides guidance to publishers, curriculum designers, administrators, and teachers as to what concepts to focus on at certain grade spans.

## Math Shift #2: Coherence

**Instructional Shift:**

***Coherence*** is about making math make sense. Mathematics is not a list of disconnected tricks or mnemonics. It is an elegant subject in which powerful knowledge results from reasoning with a small number of principles such as place value and properties of operations. The standards define progressions of learning that leverage these principles as they build knowledge over the grades.

**Instructional Implications**

- Connect the learning across grades so that students can build new understanding onto foundations built in previous years.
- Understand that the most important connections and progressions are vertical in nature: the links from one grade to the next allow students to progress in their mathematical education.
- Understand that each standard is not a new event but an extension of previous learning.
- Connections at a single grade level can be used to improve focus, by tightly linking secondary topics to the major work of the grade (see the Achieve the Core Resource above for a list of the supporting and additional clusters by grade level).

**Administrative Implications and Classroom "Look For's"**

- Provide time for grade spans to study the vertical progressions that exist in the Domains.
- Teachers should have a working knowledge of the standards in the previous grade as well as the standards in the following grade (Wiring Diagram below can be used as a resource).
- Lessons that include secondary topics (identified in the below Achieve the Core document) should have those topics linked within lessons/units to the major work of the grade.
- Coherence should be evident in unit/lesson plans.

**Resources:**

Video: Helping Teachers: Coherence and Focus: from the authors of the CCSS

Video: The Importance of Mathematics Progressions: from the authors of the CCSS

Video: The Importance of Coherence in Math: from the authors of the CCSS

Progression Documents for the CCSS in Math: Narrative documents created by the authors of the CCSS describing progressions of topics across grade levels.

Tri-State Quality Review Rubric for Mathematics Lessons & Units: Rubric designed to measure if units/lessons meet the requirements for Coherence in the CCSS.

Illustrative Mathematics: site created by the author of the CCSS with examples of coherence through grade levels. Also has assessments correlated to individual standards for all grades levels.

The Structure is the Standards: article by the authors of the Math CCSS regarding the importance of coherence and progressions.

K-8 Publishers' Criteria for the Common Core State Standards for Mathematics: Provides guidance to publishers, curriculum designers, administrators, and teachers as to what progressions should exist in curricular materials.

"Wiring Diagram": Diagram showing the connections between standards through the grade levels (developed by Jason Zimba, one of the lead authors of the CCSS).

**Math Shift #3: Rigor**

**Instructional Shift:**

To help students meet the Standards, educators will need to pursue, with equal intensity, three aspects of ***Rigor*** in the major work of each grade: conceptual understanding, procedural skill and fluency, and applications.

**Instructional Implications**

- Conceptual Understanding: Students need a conceptual understanding of key concepts, such as place value and rations. Teachers support students' ability to access concepts from a number of perspectives so that students are able to see math as more than just a set of mnemonics or discrete procedures.
- Procedural Skill and Fluency: Students need to have speed and accuracy when performing calculations. Teachers should structure class/homework time for students to practice core functions such as single-digit multiplication so students have access to more complex concepts and procedures.
- Application: Students need to be able to use math flexibly for applications. Teachers should provide opportunities for students to apply math in context. Teachers in content areas outside of math, particularly science, ensure that students are using math to make meaning of and access content.

**Administrative Implications and Classroom "Look For's"**

- Students deeply understand and can operate easily within a math concept before moving on. They learn more than a trick to get the answer right. They learn the math.
- Students are practicing and understanding. There is more than a balance between these two things in the classroom-both are occurring with intensity.
- Students should have mastered the required fluencies for their grade levels (see Achieve the Core document below).
- Students are expected to use math and choose the appropriate concept for application even when they are not prompted to do so.

**Resources:**

Video: Mathematics Fluency: A Balanced Approach: from the authors of the CCSS

Video: Common Core in Mathematics: David Coleman discusses the shift of Rigor.

Achieve the Core: document that contains the key fluencies in math that must be mastered at grades K-6.

Illustrative Mathematics: site created by the author of the CCSS with assessment tasks for individual standards meeting the requirement of Rigor intended by the CCSS.

K-8 Publishers' Criteria for the Common Core State Standards for Mathematics: Provides guidance to publishers, curriculum designers, administrators, and teachers as how to identify Rigor in curricular materials.

Tri-State Quality Review Rubric for Mathematics Lessons & Units: Rubric designed to measure if units/lessons meet the requirements for the Rigor intended in the CCSS.

REFERENCES

engage^ny Instructional Shifts for the Common Core, www.engageny.org

Common Core State Standards for Mathematics, CCSS with Appendices

Publishers' Criteria for Mathematics K-8, Publishers' Criteria K-8

Achieve the Core: Math Shifts, Key Fluencies, and Major Work of Grade, Achieve the Core