Common Core Essential Elements for Mathematics

From the State Members of the

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Common Core Essential Elements
for Mathematics

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**Understand decimal notation for fractions, and compare decimal fractions.**

**Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.**

**Represent and interpret data.**

**4.MD.4.** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

**Geometric measurement: understand concepts of angle and measure angles.**

**EE4.MD.7.** N/A (See EE4.MD.5.)

**Draw and identify lines and angles, and classify shapes by properties of their lines and angles.**

**COMMON CORE ESSENTIAL ELEMENTS**

**FIFTH GRADE**

**COMMON CORE ESSENTIAL ELEMENTS FOR FIFTH GRADE**

**Write and interpret numerical expressions.**

**Understand the place value system.**

**Perform operations with multi-digit whole numbers and with decimals to hundredths.**

**Use equivalent fractions as a strategy to add and subtract fractions.**

**5.NF.2.** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5+1/2 = 3/7, by observing that 3/7<1/2.*

**Convert like measurement units within a given measurement system.**

**Represent and interpret data.**

**Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.**

**5.MD.3.** Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

**Graph points on the coordinate plane to solve real-world and mathematical problems.**
5.G.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate)...
Analyze proportional relationships and use them to solve real-world and mathematical problems.

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

EE7.NS.2.a. Solve multiplication problems with products to 100.

Use properties of operations to generate equivalent expressions.

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Draw construct, and describe geometrical figures and describe the relationships between them.

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Use random sampling to draw inferences about a population.

Draw informal comparative inferences about two populations.

Investigate chance processes and develop, use, and evaluate probability models.

- Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?

Know that there are numbers that are not rational, and approximate them by rational numbers.

Understand the connections between proportional relationships, lines, and linear equations.

Analyze and solve linear equations and pairs of simultaneous linear equations.

Define, evaluate, and compare functions.

Use functions to model relationships between quantities.

8.F.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Understand congruence and similarity using physical models, transparencies, or geometry software.

8.G.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the
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EEA-REI.3. N/A (See EEA-ECED.1-2.)

Solve systems of equations.

A-REI.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line \( y = -3x \) and the circle \( x^2 + y^2 = 3 \).

Represent and solve equations and inequalities graphically.

A-REI.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Understand the concept of a function and use function notation.

F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If \( f \) is a function and \( x \) is an element of its domain, then \( f(x) \) denotes the output of \( f \) corresponding to the input \( x \). The graph of \( f \) is the graph of the equation \( y = f(x) \).

Interpret functions that arise in applications in terms of the context.

F-IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

EEF-IF.4-6. Interpret rate of change (e.g., higher/lower, faster/slower).

Analyze functions using different representations.

F-IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

EEF-IF.9. N/A

Build new functions from existing functions.

EEF-LE.1. Model a simple linear function such as \( y = mx \) to show functions grow by equal factors over equal intervals.

EEF-LE.5. N/A

Interpret expressions for functions in terms of the situation they model.

EEF-LE.5. N/A

Extend the domain of trigonometric functions using the unit circle.

Model periodic phenomena with trigonometric functions.

Prove and apply trigonometric identities.

Experiment with transformations in the plane.

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**Make inferences and justify conclusions from sample surveys, experiments, and observational studies.**

**EES-IC.3-6.** N/A (See EES-ID.1-2)

**Understand independence and conditional probability and use them to interpret data.**

**S-CP.5.** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*

**Use the rules of probability to compute probabilities of compound events in a uniform probability model.**

**S-CP.7.** Apply the Addition Rule, \( P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) \), and interpret the answer in terms of the model.

**EES-CP.6-7.** N/A (See EES-IC.1-2)

**GLOSSARY AND EXAMPLES OF MATHEMATICS TERMS**

**GLOSSARY OF SPECIAL EDUCATION TERMS**

**BIBLIOGRAPHY OF DEVELOPMENT PROCESS**

**BIBLIOGRAPHY FOR MATHEMATICS CONTENT**

APPENDIX A: SEA/STAKEHOLDER DEMOGRAPHICS
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*For stakeholder demographics, See Appendix A.

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INTRODUCTION

The Common Core Essential Elements (EEs) are linked to the Common Core State Standards (CCSS) for Mathematics. A group of general educators, special educators, and content specialists from member states in the Dynamic Learning Maps (DLM) Consortium gathered to determine the essence of the CCSS. The stakeholder group members were selected by their states to participate in this work. State education agency (SEA) representatives and SEA-selected teachers collaborated to develop the EEs.

This document provides a high-level view of the relationship between the CCSS and the links to performance for students with significant cognitive disabilities. It is intended to provide a beginning structure for the design of a summative alternate assessment. The document is not intended as a stand-alone guide to instruction, nor is it intended to contain all the steps in a complete learning progression or detailed curriculum. The DLM and associated professional development will provide greater detail than described in this document.

Beginning with the Mathematics CCSS, stakeholders defined links to illuminate the precursors for the essential content and skills contained in the grade level CCSS clusters and indicators. These EEs are not intended as a redefinition of the standards. Rather, they are intended to describe challenging expectations for students with significant cognitive disabilities in relation to the CCSS. The EEs clarify the bridge between grade level achievement expectations for students with significant cognitive disabilities who participate in alternate assessments and the CCSS.

Neither are the EEs intended to prescribe the beginning or end of instruction on the content and skills they represent; rather, they indicate the grade level at which initial mastery would be the target to be assessed. Students should begin instruction in content and skills at the earliest point possible and continue instruction until mastery is attained.

NCLB GUIDANCE

The stakeholder group’s work was guided by the U. S. Department of Education’s Peer Review Guidance (Standards and Assessments Peer Review Guidance: Information and Examples for Meeting Requirements of the No Child Left Behind Act of 2001 [NCLB]), which requires that alternate academic achievement standards align with the alternate assessment. They must

- include knowledge and skills that link to grade level expectations,
- promote access to the general curriculum, and
- reflect professional judgment of the highest learning standards possible for the group of students with the most significant cognitive disabilities.

Although the grade-level content may be reduced in complexity or adjusted to reflect prerequisite skills, the link to grade-level standards must be clear. The Peer Review Guidance notes that the concept of alternate achievement standards related to grade level may be ambiguous. According to the Guidance, the descriptors

- should be defined in a way that supports individual growth because of their linkage to different content across grades;
- are not likely to show the same clearly defined advances in cognitive complexity as the general education standards when examined across grade levels;
- should rely on the judgment of experienced special educators and administrators, higher education representatives, and parents of students with disabilities as they define alternate achievement standards; and
- should provide an appropriate challenge for students with the most significant cognitive disabilities as they move through their schooling.

The Guidance requires links to grade-level standards. The EEs were developed by DLM consortium states to differentiate knowledge and skills by grade level. This differentiation is intended to clarify the link between the grade-level EEs and the grade-level CCSS and to show a forward progression across grades. The progression of content and skills across years of instruction reflect the changing priorities
for instruction and learning as students move from grade to grade. The differences from grade level to grade level are often subtle and progression is sometimes more horizontal than vertical. For example, the grade-to-grade level differences may consist of added skills that are not of obvious increasing rigor compared to the differences found in the CCSS across grade levels.

**ACCESS TO INSTRUCTION AND ASSESSMENT**

The EEs developed by the DLM consortium states are intended to create the maximum possible access to the CCSS for students with significant cognitive disabilities. The way in which information is presented for instruction and assessment and the manner in which students demonstrate achievement is in no way intended to be limited by statements of EEs. To that end, modes of communication, both for presentation or response, are not stated in either the EEs unless a specific mode is an expectation. Where no limitation has been stated, no limitation should be inferred. Students’ opportunities to learn and to demonstrate learning should be maximized by providing whatever communication, assistive technologies, augmentative and alternative communication (AAC) devices, or other access tools that are necessary and routinely used by the student during instruction.

Students with significant cognitive disabilities include a broad range of students with diverse disabilities and communication needs. For some students with significant cognitive disabilities, graphic organizers similar to those used by students without disabilities provide useful access to content and are adequate to maximize opportunities to learn and demonstrate achievement. Other students require a range of assistive technologies to access content and demonstrate achievement. For some students, AAC devices and accommodations for hearing and visual impairments will be needed. As with other physical disabilities, students with visual impairments may perform some expectations using modified items, presentations, or response formats. A few items may not lend themselves to such modifications. Decisions about the appropriate modifications for visual impairments are accounted for in the design of the assessments.

The access challenge for some is compounded by the presence of multiple disabilities. All of these needs, as well as the impact of levels of alertness due to medication and other physical disabilities which may affect opportunities to respond appropriately, need to be considered.

Most presentation and response access conditions do not constitute accommodations as they are understood for students who take the general assessment. Methods of presentation that do not violate the intended construct by aiding or directing the students’ response allow the student to perceive what knowledge or skill is expected. Aids to responding that do not constitute a violation of the intended construct allow the student to demonstrate the expected knowledge and skills. Examples of acceptable access technologies include the following:

- communication devices that compensate for a students’ physical inability to produce independent speech.
- devices that compensate for a students’ physical inability to manipulate objects or materials, point to responses, turn pages in a book, or use a pencil or keyboard to answer questions or produce writing.
- tools that maximize a students’ ability to acquire knowledge and skills and to demonstrate the products of their learning.

**ACCESSING THE GENERAL CURRICULUM**

Technology is also of particular importance to students with significant cognitive disabilities to access the general curriculum and achieve the EEs. Although educators have traditionally viewed technology as hardware and software, assistive technology tenets provide a broader view of the applications of low, medium, and high levels of technology use. Assistive technology tools can be vital to a student in acquiring and demonstrating learning unimpeded by the barriers that the disability presents.
Many students with significant cognitive disabilities have difficulty with or cannot use speech to communicate and/or are supported by the use of communication symbols (e.g., communication boards, speech generating devices, voice output communication devices) and supports to augment their speech and other means of communication. Students who require symbols and other AAC supports require frequent modeling in the use of those symbols to interact and respond during instruction. Students who use symbols and other communication supports need as much modeling as children who use speech to communicate. Modeling in this way is not viewed as a means of prompting, guidance, or support, just as having a teacher talk serves those purposes for a student who communicates using speech.

When modeling the use of symbols and other communication supports, teachers use the symbols and supports themselves, hand them to students without communication impairments to use, and involve the students who need to use them every day. Each of these steps can play an important role in validating the use of symbols and communication supports and demonstrating multiple levels of expertise in their use.

GUIDANCE AND SUPPORT

The authors of the CCSS use the words, “prompting and support” at the earliest grade levels to indicate when students were not expected to achieve standards completely independently. Generally, “prompting” refers to “the action of saying something to persuade, encourage, or remind someone to do or say something” (McKean, 2005). However, in special education, prompting is often used to mean a system of structured cues to elicit desired behaviors that otherwise would not occur. In order to communicate clearly that teacher assistance is permitted during instruction of the EEs, and is not limited to structured prompting procedures, the decision was made by the stakeholder group to use the more general term guidance throughout the EEs.

Guidance and support during instruction should be interpreted as teacher encouragement, general assistance, and informative feedback to support the student in learning. Some examples of the kinds of teacher behaviors that would be considered guidance and support include

• getting the student started (e.g., “Tell me what to do first”),
• providing a hint in the right direction without revealing the answer (e.g., Student wants to write dog but is unsure how, the teacher might say, “See if you can write the first letter in the word, /d/og.”),
• narrowing the field of choices as a student provides an inaccurate response,
• using structured technologies such as task specific word banks, or
• providing the structured cues such as those found in prompting procedures (e.g., least-to-most prompts, simultaneous prompting, and graduated guidance).

Guidance and support as described above apply to instruction. Alternate assessments measure the degree to which students with significant cognitive disabilities have mastered the EEs. During any assessment, accommodation(s) allowed on the assessment must have been used and practiced during instruction; however, some accommodations that are permissible during instruction would compromise the integrity of the assessments, thereby yielding invalid and unreliable results and cannot be used for assessment purposes. Some guidance and support strategies may not be allowed for assessment purposes when variance in teacher assistance, cues, and prompts could compromise judgments about mastery of the EEs and comparability of administration.

RELATIONSHIP TO THE DYNAMIC LEARNING MAPS ASSESSMENT

The EEs developed by the DLM consortium states and their stakeholder representatives provide teachers with information about the level of knowledge and skills expected of their students. Standard setting will take into account the overall degree of accuracy with which a student would need to perform in order to achieve at a particular level. Just as on a general education assessment, no individual student will be expected to perform proficiently on every EE.
SYSTEM ALIGNMENT

The EEs are intended to contribute to a fully aligned system of standards, curriculum, teaching, learning, technology, and assessment that optimize equity of opportunity for all students in each classroom, school, and local education agency to access and learn the standards. To the degree possible, the grade level EEs are vertically aligned and linked to the grade level CCSS.

The linkages provided by the EEs to the CCSS are intended to increase access to the general curriculum for all students with disabilities. Just as the EEs are designed to define achievement in academic content areas linked to the CCSS, the EEs reframe the expectations for foundational skills in pre-academic and academic areas. Precursor/prerequisite and the unique enabling skills related to mathematics content is specified in the context of their roles as a foundation for students with significant cognitive disabilities to achieve skills related to academic content.

DOCUMENT ORGANIZATION

Common Core Grade-Level Clusters are the Cluster titles and Grade-Level Indicators as they appear in the CCSS for Mathematics (Common Core State Standards Initiative, 2010).

Common Core Essential Elements (EEs) describe links to the CCSS for access by students with significant cognitive disabilities.

<table>
<thead>
<tr>
<th>CCSS Grade-Level Clusters</th>
<th>Common Core Essential Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Represent and solve problems involving addition and subtraction.</td>
<td>EE1.OA.1.a. Use language to describe putting together and taking apart, aspects of addition and subtraction.</td>
</tr>
</tbody>
</table>

Directions for Interpreting Essential Elements

Essential Elements (EEs). The EEs are statements that provide links for students with significant cognitive disabilities to the essential content and skills defined in the grade-level clusters of the CCSS. The EEs provide a bridge for students with significant cognitive disabilities to the CCSS. The EEs are not intended as a reinterpretation of the CCSS; rather, they were developed to create a bridge between the CCSS and challenging achievement expectations for students with significant cognitive disabilities. The order in which the EEs are listed is a direct reflection of the order in which the CCSS are listed. The order is not intended to convey a sequence for instruction; rather, it illustrates progress across years. In the tables, the left column contains the CCSS grade-level clusters and indicators and the right column contains the EE linked to them. Each EE completes the phrase “Students will . . . .”

CCSS marked with an (+) are advanced standards and are not included in this document as it was determined by the stakeholder group that students of this population would not be accessing the curriculum at this advanced level and writing Essential Elements to this level would be unnecessary. Also, if it appears that a standard has been omitted in the high school grades, it is an advanced standard.

“Begins in grade __” is utilized when the expectations for students to begin to demonstrate mastery is found at a higher grade level. Planning for instruction should incorporate instruction related to the higher grade level EE and begin at the earliest possible point for each student. Students with significant cognitive disabilities may require several years of instruction prior to the point at which they may be expected to begin to demonstrate mastery of a concept.