

A “Coherence Map” for the High School Standards



WHY DID WE CREATE THIS MAP?

We began this map in response to our work with teachers at UnboundEd’s Standards Institutes—twice-yearly convenings of educators who want to learn more about the shifts in practice required by college and career readiness standards. During these events, we’ve observed how K-8 teachers benefit from Student Achievement Partners’ [Coherence Map](#)—both as an illustration of the coherence of the CCSSM, and in using it as a tool to design instruction that builds on students’ prior learning—and wanted to help high school teachers in a similar way.

We imagine that this map might be used in several ways: as a resource for lesson planning or curriculum development, or as a way to power the features of various instructional technologies. Perhaps most importantly, we see it as a way for high school teachers to assist students who have unfinished learning from previous grades. Students often enter high school without many of the prerequisite understandings and skills from K-8, and it’s up to high school teachers to skillfully integrate those ideas into an already packed instructional calendar. We hope that having easy access to the connections between middle and high school standards, as well as the connections among high school courses, will allow teachers to more quickly and effectively meet their students’ needs.

In our day-to-day work, we’ve also observed that open-source curricula and instructional resources are focused disproportionately on K-8. While giving students a solid mathematical foundation in the early years is certainly important, high school is a critical time for preparing students to meet the challenges of post-secondary education and careers. We believe it’s time for organizations to invest more heavily in high school instruction, and we hope this map can be one small part of that effort.

HOW DID WE DRAW THE CONNECTIONS?

A few notes about our process should help readers better understand the map:

Types of connections. As in the K-8 Coherence Map (and Jason Zimba’s [CCSSM Graph](#) before it), this map includes two types of connections: directed edges (i.e. arrows) and undirected edges (i.e. dotted lines). To paraphrase Zimba’s descriptions of these edges:

- A directed edge from one standard to another indicates that a student likely needs to meet the first standard in order to begin working toward the second. As in Zimba’s graph, we drew these connections only between “nearest neighbors” in order to avoid a redundant and overly-complicated network.
- An undirected edge from one standard to another represents a meaningful relationship between the two standards, although not one in which it’s clear that one standard should be taught before the other. (In these cases, it may be appropriate to teach both standards in conjunction.)

Courses and curricula. States, districts, and schools organize their courses in a variety of ways and rely on a vast array of curricula and textbooks. In order to be usable by all, this map does not group standards by course.

(+) standards. Since preparing students for a variety of post-secondary educational experiences, including advanced mathematics, is one important function of the high school standards, we thought it was important to include (+) standards on the map.

Primary focus: high school instruction. As we mapped the standards, our primary focus was helping high school teachers lead their students through a coherent mathematical journey, using the CCSSM as guideposts. Thus the map is limited to helping teachers see how CCSSM expectations in one grade or course serve as prerequisites or adjuncts to CCSSM expectations in the same or another grade or course, and not as an exhaustive representation of all possible connections among topics in 5-12 mathematics.

“Nodes.” The connections among some groups of standards are sometimes so intricate that it was difficult to determine whether and how they fall into a clear progression. In these cases, we thought it most likely that good instruction would begin with standards which emphasize conceptual understanding of a given topic, and then move to procedural skills and applications. (For example, in examining the Interpreting Functions domain, we determined that HSF.IF.A.1, which describes a

foundational understanding of a function, was the most likely “node” from which many other standards in the domain proceed.) While we recognize that this isn’t an absolute rule, and that different topics are best approached in different ways, this way of thinking helped us to avoid drawing an inordinate number of connections, and to design a map that best helps teachers account for important prerequisite understandings when planning.

Grouping and scaling. In order to simplify reading and locating standards on the map, we divided the map into a series of pages according to conceptual category; within each page, we placed standards in a given domain in the same general area. The map is not scaled in any way, so horizontal or vertical placement of standards and the lengths of various edges are all incidental.

WHAT TYPE OF FEEDBACK ARE WE LOOKING FOR?

As of April 2018, this map is in draft form. Over the next 12 months, we are seeking feedback from educators, with the aim of producing a stable version for public use. Feedback on the following issues is especially welcome:

- Does the map accurately represent the progression of mathematical ideas from Grades 5-8 to high school as described in the CCSSM?
- Do our “nodes” accurately represent the progression of mathematical ideas from Grades 5-8, to and through the high school standards?
- Are the connections between conceptual categories, as indented by the CCSSM, adequately represented in the map?
- Are there other connections, not presently captured on the map, which should be included because they impact classroom instruction?

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