As states consider adoption of the Common Core State Standards (CCSS), a frequently asked question is whether the CCSS adequately prepare students in K-7 to take Algebra I, or an equivalent course, in eighth grade. This question is grounded in states’ commitment to improving mathematics performance and graduating students from high school who are ready for college, careers and life.

A number of states and districts have made, or are considering making, Algebra I mandatory for all eighth graders, while in other jurisdictions it is not mandatory but strongly encouraged. State and district policies on the question of when students should or must take Algebra I vary greatly throughout the nation. This is the case because the decision about when to introduce Algebra I is dependent on more than just whether students have the necessary content knowledge and includes other important factors for success such as capacity or student maturity.

Regardless of when students take Algebra I, there are many similarities in the content typically contained in Algebra I courses. Achieve’s review of Algebra I courses, including those in Massachusetts, Indiana, and California (chosen because of their well-regarded Algebra I course standards), found a consistent focus on functions, expressions, and equations that are linear, quadratic, or exponential. In addition, given the importance of statistics and data analysis in not only college and careers but in everyday life, some Algebra I courses also integrate aspects of statistics and data analysis—particularly as they apply to linear relationships—into the course content.

In order to be ready for an Algebra I course, a student must have critical content knowledge and skills. To determine whether the CCSS provide this foundation, Achieve examined the K-7 mathematics standards in Minnesota and California. Achieve chose these states because they have standards that are meant to prepare students for Algebra I, or its equivalent, by the eighth grade. Achieve compared the CCSS K-7 standards to the K-7 standards in these states to determine if students who meet the K-7 CCSS would be prepared to take a rigorous Algebra I course by the eighth grade. Achieve found that they would.

In particular, Achieve found that the CCSS provide a strong foundation in critical content such as properties and arithmetic with integers and rational numbers, proportional reasoning and relationships, and basic algebraic manipulations involving expressions and simple equations. For students to be well-prepared to study Algebra I, or an equivalent course, they need to have a strong foundation in all of these topics and to have built a complimentary set of skills, such as the ability to reason mathematically and make sense of and solve problems.

Specifically:

- The CCSS for grades K-7 set high expectations for students with respect to arithmetic with decimals and fractions. They state that students are to “add, subtract, multiply, and divide decimals of one or two digits” in grade 5. With respect to fractions, students are introduced to addition and subtraction in grade 4 and to multiplication and division in grade 5. Their level of sophistication with fractions is expected to increase into middle school, and by grade 7, the CCSS set the expectation for students to perform operations on positive and negative rational numbers—strong precursor skills for Algebra I.
As the CCSS define the operations to be expected of students at particular grades, they also set the expectation that students understand relevant properties—such as the commutative, associative, and distributive properties and the identities for addition and multiplication. Developing an understanding of such properties prior to Algebra I, when their application to algebraic expressions becomes instrumental, is critical.

The ability to reason with proportions is critical to solving the types of problems expected of students in Algebra I and subsequent courses. The CCSS emphasize units and rates—precursors to proportionality—in grade 6 and continue in grade 7 with a more formal treatment of proportionality and its applications. The CCSS consistently connect proportional reasoning with quantities, a concept that is grounded in concrete applications and real world problems. Students who have a firm grasp of proportionality, as laid out in the CCSS for grades 6 and 7, should be well prepared in Algebra I to use equations to represent proportional relationships and solve problems modeled by such equations.

The CCSS for grades K-7 expect students to acquire the basic skills they will need to manipulate algebraic expressions and equations. The CCSS address simple unknowns, expressions and equations in the early grades, and include more advanced expectations in the upper elementary and middle school years. The formal concept of a variable and formal treatment of equations is introduced in grade 6 and the solving of simple linear equations is introduced in grade 7. These pre-Algebra I expectations in the early middle school years set a strong foundation for student success in Algebra I.

The purpose of the Common Core State Standards is to provide states with a coherent and rigorous progression of mathematical content and skills that are evidence based and benchmarked to the expectations of high-performing countries from around the world. The CCSS aim to set a level of expectation that will ensure that students who meet these expectations will, by the end of high school, be prepared for whatever their postsecondary endeavors may be. While the CCSS were not specifically developed with the goal of preparing students for Algebra I in grade 8, students who are successful in achieving the expectations set in these standards for grades K-7 should have the content knowledge to be well prepared for Algebra I, or its equivalent, in grade 8.

Achieve is a bipartisan, nonprofit education reform organization that has worked with states, individually and through the 35-state American Diploma Project, for over a decade to ensure that state K-12 standards, graduation requirements, assessments and accountability systems are calibrated to graduate students from high school ready for college, careers and life. Achieve has partnered with NGA and CCSSO on the Common Core State Standards Initiative and a number of its staff and consultants served on writing and review teams. For more information about Achieve, see www.achieve.org